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American Academy of Otolaryngology–
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Los Angeles, CA

October 3-6, 2021

2021 Official Program Abstracts

Daniel C. Chelius, Jr., MD

Annual Meeting Program Coordinator

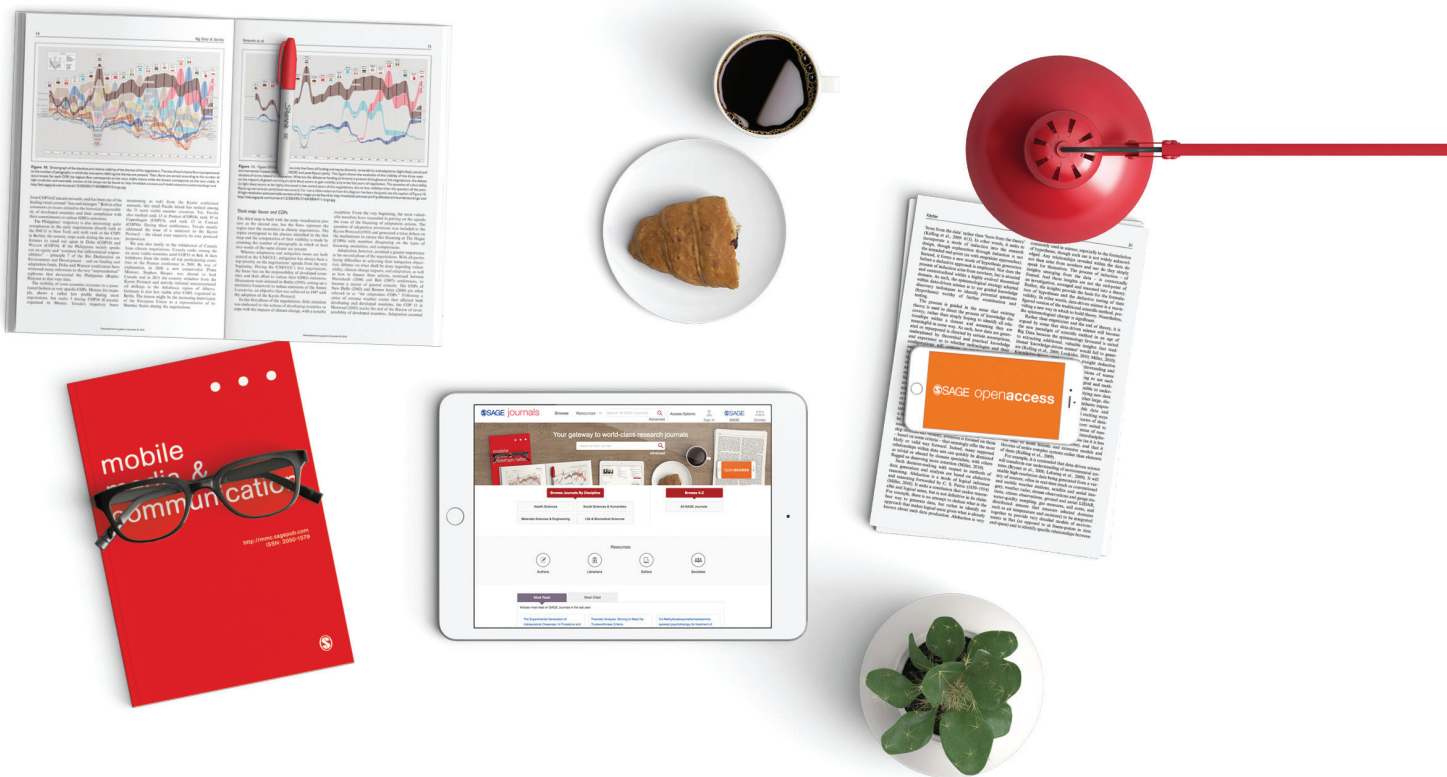
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Mission Statement

The mission of *Otolaryngology–Head and Neck Surgery* is to publish contemporary, ethical, clinically relevant information in otolaryngology, head and neck surgery (ear, nose, throat, head, and neck disorders) that can be used by otolaryngologists, scientists, clinicians, and related specialists to improve patient care and public health.



Conference Schedule-at-a-Glance

| | October 2 SATURDAY | October 3 SUNDAY | October 4 MONDAY | October 5 TUESDAY | October 6 WEDNESDAY | | |
|----------|-----------------------|----------------------|---------------------------------|-----------------------------|----------------------------|-----------------------------|--------------------|
| 6:00 am | | | OTOs on the Run 5K | | | | |
| 7:00 am | | Sunrise Yoga | IAB General Assembly | | Education Sessions | | |
| 8:00 am | BOD Meeting | Opening Ceremony | | Education Sessions | | | |
| 9:00 am | | | Myers Lecture | SRF General Assembly | Cotton-Fitton Lecture | Education Sessions | |
| 10:00 am | | OTO Experience | Education Sessions | Worse Case Scenarios | Great Debates | Education Sessions | |
| 11:00 am | | | Education Sessions | | Education Sessions | | |
| 12:00 pm | | | Great Debates | Lunch in the OTO Experience | WIO General Assembly | Lunch in the OTO Experience | Education Sessions |
| 1:00 pm | | | Education Sessions | OTO Experience | Great Debates | Education Sessions | |
| 2:00 pm | | | Conley Lecture | Worse Case Scenarios | Great Debates | Education Sessions | |
| 3:00 pm | | | Education Sessions | YPS General Assembly | Humanitarian Efforts Forum | Neel Lecture | House Lecture |
| 4:00 pm | | BOG General Assembly | Education Sessions | SIM Tank | Education Sessions | Hall of Distinction Lecture | Education Sessions |
| 5:00 pm | | BOG Reception | Education Sessions | | | | |
| 6:00 pm | | | Simulation Showcase & Reception | Education Sessions | Reception | Education Sessions | |
| 7:00 pm | Presidents' Reception | | | | ENTrepreneur Faceoff | | |
| 8:00 pm | | | | | | | |

Accreditation Information

The AAO-HNSF 2021 Annual Meeting & OTO Experience targets practicing otolaryngologists-head and neck surgeons and associates, researchers in otolaryngology, senior academic professors and department chairs, audiologists, administrators, leaders of international societies, fellows-in-training, residents, and allied health professionals.

The General Competencies for Physicians (adopted by the Accreditation Council for Graduate Medical Education and the American Board of Medical Specialties)—medical knowledge, patient care, interpersonal and communication skills, professionalism, practice-based learning and improvement, and systems-based practice—will be addressed in presentations throughout the various sessions.

By the end of the conference, participants should be able to:

- Apply knowledge of current issues globally affecting the diagnosis, evaluation, and treatment of otolaryngologic and related disorders.
- Analyze global research-based information and updates on practical applications affecting operative procedures, drugs, and medical devices.
- Utilize improved practice management techniques to facilitate physician performance improvement.
- Translate into practice a broader understanding of the global approaches used in otolaryngology—head and neck surgery.

This meeting has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education. AAO-HNSF is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

AAO-HNSF designates this live activity for *AMA PRA Category 1 Credit™*. Physicians should claim credit commensurate with the extent of their participation in the activity.

- Education Program
- Guest Lectures
- Meet the Scientific Poster Authors Sessions

While not all sessions are eligible for *AMA PRA Category 1 Credit™*, the total number of credits a participant can earn will be awarded to physicians when documented by the submission of the 2021 Annual Meeting & OTO Experience Evaluation.

The Foundation is not accredited to offer credit to non-physicians. To determine if activities designated for *AMA PRA Category 1 Credit™* are acceptable for your licensing or certification needs, please contact your credentialing body directly. The following education activities are NOT designated for *AMA PRA Category 1 Credit™*:

- Education Session deemed non-CME

Disclosure of Relevant Financial and Intellectual Relationships

The AAO-HNSF endorses the guidelines for accredited continuing medical education as set forth in the Accreditation Council for Continuing Medical Education's Standards for Commercial Support and adheres to these standards in the conduct of its education activities. The Foundation maintains control over the development of its education activities and the selection of planners, topics and presenters. A full disclosure of financial and intellectual relationships is submitted by all planners and presenters and the presence of any relevant relationships with a commercial interest is reported to the participants both in the program's printed materials and at the presentation. In addition, presenters will disclose their intent to discuss drugs or devices or the uses of drugs or devices that have not been approved by the Food and Drug Administration (FDA).

Free Exchange of Medical Education

The AAO-HNSF is committed to the free exchange of medical education. Inclusion of any presentation or exhibit in this meeting, including presentations or exhibits on drugs or devices, or the uses of drugs or devices that have not been approved by the FDA, does not imply an endorsement by the AAO-HNSF of the uses, products, or techniques presented.

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Carol R. Bradford, MD, MS

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The Annual Meeting Program Committee is responsible for developing the Education Program for the AAO-HNSF Annual Meeting & OTO Experience. The committee members review all submissions to the Panel Presentations, Scientific Oral, and Scientific Poster programs and select those accepted for presentation.

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(Dr. Wax is only the second individual in the Academy's history who has received five Distinguished Service Awards.)

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Honorary Guest Lecturers 2021

John Conley, MD Lecture on Medical Ethics

J. Nwando (Onyejekwe) Olayiwola, MD, MPH

J. Nwando (Onyejekwe) Olayiwola, MD, is the chief health equity officer and senior vice president of Humana, Inc., and is an adjunct professor at The Ohio State University College of Medicine Department of Family and Community Medicine and The Ohio State University College of Public Health. She also serves as a family physician at the Heart of Ohio Community Health Center. Throughout her career, Dr. Olayiwola has championed health equity. In her current role at Humana, she is responsible for setting a health equity agenda and strategy to promote health equity across the business. At Ohio State, she serves as a faculty advisor on anti-oppression, health disparities, and health equity research, programs, and policies. She is also the co-chair of the Ohio State Medical Center's Anti-Racism Action Plan Oversight Committee.

Dr. Olayiwola's expertise also encompasses COVID-19-related telehealth expansion, primary care operations, and improving the digital divide. She received her bachelor's degree from Ohio State and her medical degree from Ohio State/Cleveland Clinic Foundation. She completed her residency in family medicine at Columbia University and New York Presbyterian Hospital. Dr. Olayiwola completed a Commonwealth Fund/Harvard University Fellowship in minority health policy at Harvard Medical School and received a master's degree in public health from the Harvard School of Public Health.

Eugene N. Myers, MD International Lecture on Head and Neck Cancer

Ben Panizza, MBBS, FRACS, MBA

Ben Panizza, MBBS, is the director of otolaryngology-head and neck surgery at Princess Alexandra Hospital in Brisbane, Australia, and the chair of ENT Services for Metro South Health. He also is the director of the Queensland Head and Neck Cancer Centre, a research collaborative. As well, Dr. Panizza is a full professor of surgery in the Faculty of Medicine at the University of Queensland.

Dr. Panizza's research interests include head and neck cancers and skull base surgery. He is the lead investigator in a number of clinical trials, including a National Health and Medical Research Council grant-funded study on opportunities for treatment of incurable cancers. He has authored multiple research papers and textbook chapters, lectures internationally, and serves on the editorial boards of scientific journals.

Dr. Panizza established the Queensland Skull Base Unit at Princess Alexandra Hospital in 2006 and served as its co-director until 2017. He is the president of the Australian and New Zealand Skull Base Society.

Dr. Panizza graduated from the University of Queensland and completed his specialist qualifications in Queensland. He then completed a fellowship in head and neck/ skull base surgery in London and another fellowship in otology/neurotology/skull base surgery in Italy.

H. Brian Neel III, MD, PhD Distinguished Research Lecture

Alexander H. Gelbard, MD

Alexander H. Gelbard, MD, is an associate professor of otolaryngology-head and neck surgery at Vanderbilt University in Nashville, Tennessee, where he serves as the codirector of the Vanderbilt Center for Complex Airway Reconstruction. He is also the managing director of the North American Airway Collaborative, a multi-institution consortium with 40 participating centers in the United States and Europe that works to exchange information about the treatment of airway disease.

Dr. Gelbard's research focuses on laryngeal and tracheal disease. He is a National Institutes of Health principal investigator studying the immunologic mechanisms underlying benign laryngeal and tracheal disease. He is also the principal investigator on a prospective multi-institutional study of idiopathic subglottic stenosis. In addition, Dr. Gelbard has authored numerous peer-reviewed articles and book chapters and lectures internationally on adult airway disease. He received his bachelor's degree from Stanford University and earned his medical degree from Tulane School of Medicine. Dr. Gelbard completed an internship and his residency at the Baylor College of Medicine.

He then completed a postdoctoral research fellowship in immunology at the MD Anderson Cancer Center as well as a clinical fellowship in laryngeal surgery at Vanderbilt School of Medicine.

Cotton-Fitton Endowed Lecture in Pediatric Otolaryngology

Ellen M. Friedman, MD

Ellen M. Friedman, MD, is the director for the Center for Professionalism in Medicine and a professor in the Bobby R. Alford Department of Otolaryngology at the Baylor College of Medicine in Houston, Texas.

Dr. Friedman's research interests include topics in pediatric otolaryngology as well as medical professionalism, education, and training. She has published more than 100 articles in peer-reviewed journals, is on the editorial boards of numerous journals, and produced a video on clinical medicine for *The New England Journal of Medicine*.

Prior to her current position, Dr. Friedman served as the chief of service at the Department of Pediatric Otolaryngology at Texas Children's Hospital, where she also served as president of the Medical Staff from 2011 to 2012. In addition, Dr. Friedman was the first woman to serve as the president of the American Society of Pediatric Otolaryngology and served as president for the American Broncho-Esophagological Association.

Dr. Friedman received her medical degree from the Albert Einstein College of Medicine and then completed an internship in surgery at Montefiore Medical Center. Thereafter, she completed an otolaryngology residency at Georgetown University School of Medicine and a pediatric otolaryngology fellowship at Boston Children's Hospital.

Howard P. House, MD Memorial Lecture for Advances in Otology

Lloyd B. Minor, MD

Lloyd B. Minor, MD, is the Carl and Elizabeth Naumann Dean of Stanford University School of Medicine. He also serves as a professor of otolaryngology-head and neck surgery and, by courtesy, professor of Bioengineering and of Neurobiology at Stanford.

Dr. Minor's research interests focus on balance and inner ear disorders. His work has identified adaptive mechanisms responsible for compensation to vestibular injury in a model system for studies of motor learning (the vestibulo-ocular reflex). He and his colleagues discovered superior canal dehiscence syndrome. In 1998 they published a description of the clinical manifestations of the syndrome and related its cause to an opening in the bone covering the superior canal. He developed a surgical procedure that corrects the problem and alleviates symptoms.

Prior to joining Stanford, Dr. Minor became provost of Johns Hopkins University in 2009 where he also served as chair of the department of otolaryngology-head and neck surgery and otolaryngologist-in-chief at Johns Hopkins Hospital.

Dr. Minor received his bachelor's and medical degrees from Brown University. He completed a residency at Duke University Medical Center and a research fellowship at the University of Chicago. He then completed a clinical fellowship at The Otology Group and The EAR Foundation in Nashville, Tennessee.



PANEL PRESENTATIONS

Business of Medicine/Practice Management

Advanced Practice Providers in Otolaryngology: Addressing the Patient Access Gap

Michael J. Brenner, MD (moderator);
Richard W. Waguespack, MD;
Pratyusha Yalamanchi, MD, MBA;
Craig M. Kilgore

Session Description: With an aging population and static national otolaryngology workforce, there is increasing unmet demand for otolaryngology care, with a projected deficit of 1620 otolaryngology physicians by 2025. The advanced practice provider (APP) workforce grew nearly 35% over the past 5 years, with a 51% increase in the number of unique APPs billing for common otolaryngology procedures. While APPs are expected to play an important role in health care delivery in the face of physician shortage, there are significant challenges and limited data on (1) the utilization of APPs in otolaryngology care and (2) the establishment of a practice structure to support successful integration and engagement of APPs into team-based models of care. Lessons learned from practice environments incorporating APPs over the past decade offer opportunities to optimize timely, equitable otolaryngology care delivery, particularly in the era of telemedicine. The goal of this interactive panel presentation is to understand the evolving role of APPs in otolaryngology care and strategies for successful integration into practice environments to increase patient access and satisfaction. These expert panelists will describe (1) an overview of national APP vs physician workforce trends, (2) current challenges in the utilization and optimization of APPs with opportunities for improved data collection, and (3) value in successful integration of APPs into otolaryngology practices to increasing patient access and satisfaction, particularly with increasing patient demands and a static physician workforce. The panelists will provide a framework for ongoing decision making with the goal of optimizing patient outcomes with limited physician and financial resources.

Outcome Objectives: (1) Understand national otolaryngology physician and APP workforce trends and recognize the role of increasing mismatch between patient demand and workforce capacity as its driver. (2) Recognize opportunities afforded by integrating APPs into practice, with respect to business model, practice structure, and approaches for improving satisfaction and access. (3) Apply data to address care gaps in patient access

and satisfaction through successful integration of APPs into otolaryngology within private and academic practices.

Alternate Pathways for the Otolaryngologist: The Hospitalist-Surgeonist Models

Elizabeth S. Willingham, MD (moderator);
Phillip G. Allen, MD; Christopher H. Rassekh, MD;
Matthew S. Russell, MD

Session Description: This program will describe the otolaryngology hospitalist-surgeonist as an emerging practice paradigm, compare the implementation at several academic institutions, and discuss the benefits and challenges of the paradigm and its future. The hospitalist model is well established in medicine, and in recent years this model has been adopted by specialty fields. The hospitalist model is particularly relevant to the surgical specialist, for whom the need is often urgent or emergent and whose availability is often limited by an elective practice, potentially on another campus. In 2011 the first otolaryngology hospitalist program was implemented, and since that time, the paradigm has been applied at several institutions in varying forms, including that of a surgeonist. What does an otolaryngology hospitalist-surgeonist do? Does your institution need one? How do you implement and integrate the hospitalist-surgeonist? Who benefits from this model? Come learn from our panelists who established the inaugural services at 4 academic institutions. New this year, how does the otolaryngology hospitalist-surgeonist improve patient care and decrease provider risk during COVID? How does the billing work and is this financially feasible?

Outcome Objectives: (1) Understand what an otolaryngology hospitalist-surgeonist does in different practice settings. (2) Implement an otolaryngology hospitalist-surgeonist in a hospital or academic system. (3) Navigate the system-based practice hurdles of the otolaryngology hospitalist-surgeonist model.

Continuing Certification in Otolaryngology- Head and Neck Surgery: Need-to-Know Updates 2021

Ramon M. Esclamado, MD, MS (moderator);
Brian Nussenbaum, MD, MHCM; Mark C. Weissler, MD;
Jeffrey P. Simons, MD, MMM

Session Description: Continuing certification (formerly known as maintenance of certification) has continued to be

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an area of significant interest and in national discussions. This panel discussion will focus on informing the audience about critical, need-to-know updates on continuing certification for otolaryngologists-head and neck surgeons. The purpose and value will be discussed from the perspectives of both physicians and the public, particularly as related to the medical profession's commitment to self-regulation. There are ongoing innovative changes occurring in the continuing certification program to best achieve alignment with the program's purpose, provide added value, and address diplomate concerns. The details of these program changes along with data-driven program design decisions will be described along with how the American Board of Otolaryngology–Head and Neck Surgery (ABOHNS) and the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) are collaboratively working together to maximize the added value. Details will be described about how feedback is being used that is responsive to the needs of the public and diplomates. The major findings from the ABOHNS Commission Advisory Report, which addressed the future of continuing certification in the United States, and this report's impact on national standards for medical certifying bodies will be summarized to inform the discussion. This topic has relevance to the majority of practicing otolaryngologists-head and neck surgeons in the United States in all specialty areas. The format will be talks by leaders from the ABOHNS and AAO-HNS, followed by an interactive discussion with the audience.

Outcome Objectives: (1) Explain the purpose and value of continuing board certification to both otolaryngologists and the public. (2) Discover how the program changes being made best align with the purpose of continuing certification. (3) Recognize how collaborations between the ABOHNS and the AAO-HNS are maximizing the value of the continuing certification program.

Going (or Going Back) Into Practice: What to Expect

Stephen P. Cragle, MD (moderator); Betty Tsai, MD;
Gopi Shah, MD; Samantha J. Hauff, MD

Session Description: While starting a practice, taking a new position, or transitioning to a different practice type or location is a common step in an otolaryngology career, it remains a daunting proposition and one that we are often ill-prepared for. Many of the practice management decisions we have to make are outside our expertise and comfort zone. We present a lively discussion of the key issues that will help make your practice transition a success. (1) Pick your practice: private practice, academic, large group/employed model, locum tenens. (2) Prepare for the hassles: electronic health records, rates and terms, prior authorizations. (3) Fill your exam rooms (and keep them full): personal branding, reputation management, focus on service. (4) Understand the essentials of getting paid: relative value units, revenue cycle, coding, merit-based incentive program system. (5) Create the right

culture for your practice: vision, engagement, and team culture. (6) Make every second count: lessons in efficiency. (7) Use experts to help build and protect your practice: attorneys, accountants, and brokers. This panel presentation will illuminate major topics an otolaryngologist needs to understand to start a practice, join an existing single- or multispecialty clinic, or accept an academic position. Presenters have extensive experience in private practice, group practice, and academic medicine and will give their perspectives on building a successful career in otolaryngology.

Outcome Objectives: (1) Compare and contrast options to practice otolaryngology after residency or transition from your current practice and highlight strengths and weaknesses of each practice type to find your best fit. (2) Discover the key steps to start or join a new practice successfully. (3) Optimize the success of your new practice with a focus on efficiency and patient-centered care.

Online Reputation Management

Karen A. Rizzo, MD (moderator); James Benson, MS;
Angela Sturm, MD; Aaron Minc, JD

Session Description: This course will discuss the optimum way to establish, maintain, and manage an otolaryngologist's professional reputation. It will evaluate best practices to improve patient satisfaction and office awareness. It will analyze effective communication strategies to minimize patient dissatisfaction. Patients continue to use the internet and social media to gain information on their health care needs and options. Being able to manage patient expectations effectively and efficiently will improve the patient-doctor interaction, educate the patient accurately, and provide enhanced communication to optimize results. Developing a strategy to manage patient questions, concerns, and dissatisfaction will create an environment that supports honesty and empathy. Understanding the legal implications of conflict management and the impact of COVID-19 will be covered as well. By optimizing your online reputation, practice revenue, sustainability, and growth can improve.

Outcome Objectives: (1) Learn about options available using the internet and social media to improve office and service awareness in your community. (2) Implement strategies to improve patient communication, understanding, and expectations more effectively to optimize the patient's experience. (3) Understand strategies available to manage patient conflicts, including COVID-related issues, and the legal implications associated with them.

Proper Coding in Facial Plastic and Reconstructive Surgery

Nikita Gupta, MD (moderator); Joshua D. Rosenberg, MD;
Chaz L. Stucken, MD; Yan H. Lee, MD

Session Description: Appropriate coding is key for reimbursement as well as documentation. While many facilities

use professional coders, it is still imperative that surgeons understand the nuances of coding to code effectively and efficiently for the procedures done. Facial plastic and reconstructive surgical procedures in particular have various types of coding combinations that may confuse both coders and surgeons. In addition, use of modifiers for complex cases or cases with 2 surgeons may be underutilized. This panel will discuss surgical procedure codes for local excisions, local flaps, free flaps, rhinoplasty, and facial reanimation, as well as proper use of modifiers.

Outcome Objectives: (1) Understand nuances in various codes available for facial plastic and reconstructive procedures. (2) Utilize these codes and modifiers appropriately based on the work done. (3) Recognize how to code appropriately in rhinoplasty, facial reanimation, and facial reconstruction.

The RUC Survey Process: Your Direct Role in Reimbursement

R. Peter Manes, MD (moderator); Lance A. Manning, MD; Jay R. Shah, MD

Session Description: This panel presentation will provide attendees with a distinct look into the Relative Value Scale Update Committee (RUC) survey process. This process is used by Medicare to determine the relative value unit (RVU) valuation for all Current Procedural Terminology (CPT) codes. We will review why certain codes undergo the survey process and delineate the specific steps clinicians have to go through when filling out the survey. Understanding of this is critical, as the data gained from these surveys directly affect the final RVU determination by the Centers for Medicare & Medicaid Services. This is the physician's primary opportunity to provide information regarding the work and worth of procedures. These surveys can frequently be confusing and are often ignored by physicians. Typical survey response rates hover around 1%. This presentation will provide education regarding the best way to think about these surveys and will encourage participants to take part in this process.

Outcome Objectives: (1) Explain the structure of the RUC process and how CPT codes come up for review. (2) Examine the RUC survey so participants can provide accurate data regarding the time/effort needed to perform procedures. (3) Encourage participation in the RUC survey process, which has a direct impact on reimbursement.

Say WHAT? Integrating OTC Hearing Devices in Your Practice

Brian Woodhead (moderator); Frank Lin, MD, PhD; Nicholas Reed, AuD

Session Description: The Over-the-Counter Hearing Aid Act of 2017 changed hearing device distribution in the United States such that patients can purchase hearing aids designed for mild-to-moderate loss without the need to see an audiologist or hearing aid dispenser. After the implementation of the law, prospective patients have been inundated with marketing

from large corporate vendors. To ensure optimal hearing care that complements the law, practices are faced with the challenges of educating prospective patients on the capabilities of over-the-counter (OTC) devices, offering support services, and managing the sales of OTC devices. This panel will explore successfully incorporating OTC devices into practice. By 2060 the number of Americans with hearing loss is projected to double to nearly 76 million, and hearing loss is associated with negative health outcomes such as social isolation. Despite this, less than 20% of people with hearing loss pursue hearing aids. OTC hearing devices may represent a gateway opportunity to reach patients to achieve better hearing. In this panel discussion, an otologist, an audiologist, and 2 administrators will discuss managing OTC device assimilation into practice best. The panel will focus on the cultural changes needed to adopt devices for otolaryngology partners, audiologists, and clinical support staff. The panel will provide input on a wide variety of topics, including identifying patients, clinical and administrative staff training, and procurement and inventory management of devices. The panel will also explore patient and referring physician marketing, technical support for the devices, and reimbursement for sales.

Outcome Objectives: (1) Describe methods to assimilate the use of OTC devices into the current practice. (2) Identify strategies to market and engage patients who have tried OTC devices, with the goal of directing patients to more comprehensive hearing care or auditory surgical solutions. (3) Review proposed steps toward building a long-term relationship with a patient for their hearing care in the era of OTC hearing devices.

Your First Job: Finding the Right Fit the First Time

Todd Blum, PhD (moderator); Lucas Bryant, MD; Miguel Rivera, MD

Session Description: A recent survey from Jackson and Coker found that more than 25% of newly graduated physicians left their first job after 1 or 2 years. There are many reasons cited for moving, including quality of practice, type of practice, quality of work-life balance, location, salary, and family needs, to name a few. So, what would make a successful practice match the first time? Join our panel of physicians and administrators and discuss what to look for, what to ask, how to negotiate, how to evaluate opportunities, and what is best for your lifestyle. The group will also take you through finding the right job while discussing questions such as when to start looking, what you need to know before you agree to the position, and everything else you need to for your decision making. If you are in the process or ready to start the process, you will be glad you attended this session.

Outcome Objectives: (1) Identify key characteristics to look for employment that optimizes attendees' talents and interests. (2) Determine questions that need to be asked and documented before committing to a new job. (3) Discuss the best practices involved in finding a practice where you stay and thrive.

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Comprehensive Otolaryngology

Acupuncture in ENT: A Primer for Otolaryngologists

Chau T. Nguyen, MD (moderator); Marilene B. Wang, MD; Malcolm B. Taw, MD

Session Description: Increasingly, patients are turning to non-Western traditions of medicine for complementary care. Acupuncture is one well-studied medical tradition that has shown promise in many ear, nose, and throat (ENT) diseases. Herein we seek to elucidate the evidence base for acupuncture in ENT. We will demonstrate general techniques with opportunity for live simulation, discuss how to integrate acupuncture into an ENT practice, and go through case studies to illustrate. As comprehensive otolaryngologists, we have an opportunity to successfully integrate East-West medicine into our practice for the benefit of our patients.

Outcome Objectives: (1) Review the current evidence for acupuncture in ENT. (2) Learn how to integrate acupuncture into an ENT practice. (3) Demonstrate how acupuncture works and go through case study examples.

Are You Up-to-Date? Key Otolaryngology Systematic Reviews, Part I

Cristina Cabrera-Muffly, MD (moderator); Alan Kominsky, MD; Stephanie Joe, MD; Erynne A. Faucett, MD

Session Description: Given the sheer volume of annual publications, it is difficult to remain up-to-date in evidence-based otolaryngology. This course will summarize the key literature in the fields of pediatric otolaryngology, rhinology, and sleep medicine, including randomized trials, systematic reviews, and clinical practice guidelines. Participants will be able to update current clinical knowledge and improve their patients' quality of care. This miniseminar is presented in collaboration with the American Academy of Otolaryngology—Head and Neck Surgery Foundation's General Otolaryngology and Sleep Education Committee and Outcomes Research and Evidence-Based Medicine Committee.

Outcome Objectives: (1) Identify key evidence-based medicine (including randomized trials, systematic reviews, and clinical practice guidelines) within the topics of sleep, rhinology, and pediatric otolaryngology. (2) Utilize the presented evidence-based information to increase current knowledge in clinical practice. (3) Integrate evidence-based information into clinical practice to improve patient outcomes.

Are You Up-to-Date? Key Otolaryngology Systematic Reviews, Part II

Jeffrey D. Sharon, MD (moderator); Christopher M. Johnson, MD; Vikas Mehta, MD; Nicholas A. Dewyer, MD

Session Description: Given the sheer volume of annual publications, it is difficult to remain up-to-date in evidence-based otolaryngology. This course will summarize the key literature in the fields of head and neck, laryngology, and otology/neurotology, including randomized trials, systematic reviews, clinical practice guidelines, and other important evidence-based updates. Participants will be able to update current clinical knowledge and improve their patients' quality of care. This miniseminar is presented in collaboration with the American Academy of Otolaryngology—Head and Neck Surgery Foundation's General Otolaryngology and Sleep Education Committee and Outcomes Research and Evidence-Based Medicine Committee.

Outcome Objectives: (1) Identify key evidence-based medicine—including randomized trials, systematic reviews, and clinical practice guidelines—within the topics of head and neck, laryngology, and otology/neurotology. (2) Utilize the presented evidence-based information to increase current knowledge in clinical practice. (3) Integrate evidence-based information into clinical practice to improve patient outcomes.

Current Controversies in Otolaryngology: Do Masks Matter? A Pro/Con Debate

Soham Roy, MD (moderator); Michael J. Brenner, MD; Carol M. Bier-Laning, MD, MBA; Robert C. McLean, MD, PhD

Session Description: As practicing otolaryngologists, we must critically consume medical information. With the onset of the COVID-19 pandemic, the information surrounding safe and effective provision of care has been overwhelming in its volume and speed of change. In addition, there are political, social, and other pressures outside medicine that have led to challenges in understanding best practices. The concept for this panel grew out of an interesting debate that happened via the ENTConnect discussion board on the utility of mask usage in otolaryngology clinics. The overarching goal of this panel will be to expand that debate, with attendees hearing a balanced presentation and having time for questions. This panel discussion will start with an overview of general principles when assessing the literature. The majority of the panel will be a pro vs con debate surrounding the issue of face mask use during the pandemic and the ability of mask wearing to prevent the spread of the SARS-CoV-2 virus. The panelists will also consider how the vaccination efforts and related public health efforts inform this dialogue. The guidelines of the debate will be the respectful interchange of information with equal time being given to each side. Although mask wearing has been associated with many political, economic, and social issues, the primary focus of this panel will be limited to the medical literature.

Outcome Objectives: (1) Improve the ability of attendees to be effective consumers of knowledge and critically assess information from various sources. (2) Apply historical and contemporary evidence on viral transmission to the current controversy around mask wearing. (3) Understand the role played by otolaryngologists in particular and physicians in general to the dissemination of public health messaging.

Diagnosis and Treatment of Mild Pediatric OSA

Joseph E. Dohar, MD (moderator); Ron B. Mitchell, MD;
Norman M. Friedman, MD; Derek J. Lam, MD, MPH

Session Description: Pediatric obstructive sleep apnea (OSA) is characterized by upper airway obstruction, poor sleep, and daytime sequelae such as hyperactivity. Although controversy exists regarding the ideal evaluation for children with obstructive sleep-disordered breathing, the severity of OSA is currently determined by overnight polysomnography (PSG). Mild OSA is defined by an apnea-hypopnea index (AHI) >1 and <5. Most (approximately 85%) healthy school-aged children evaluated by otolaryngologists for tonsil hypertrophy and obstructive symptoms have either primary snoring or mild OSA. This reality positions mild pediatric OSA squarely in the domain of both general and pediatric otolaryngologists alike and served as the primary impetus for submitting this panel. The treatment of mild OSA in children is controversial. There is a lack of data on the natural history of mild sleep apnea. Furthermore, a poor correlation exists between quality of life scores and OSA severity; mild OSA in children may have a significant impact on their general health and well-being. High-quality studies comparing observation, medical management, and surgery for mild pediatric OSA are just beginning to emerge. Many of these studies use varied measures to assess outcomes. Thus, it may be difficult for providers treating children with mild OSA to counsel parents on the optimal treatment for their child. This panel will employ a case-oriented approach to illustrate the current evidence-based best practice for this subpopulation of patients. Audience response to case-related questions will precede responses by the panel. The specific areas to be discussed will include how the diagnosis is made, the need for PSG, the evidence correlating treatment with cognitive and behavioral outcomes, the role of drug-induced sleep endoscopy (DISE), medical and surgical treatments, the role of observation, non-surgical appliance and positional options, and the management of adenotonsillectomy treatment failures. The panel, composed of national experts, will provide updates and some great debates on areas that remain controversial.

Outcome Objectives: (1) Diagnose effectively and practically children with mild OSA. (2) Understand the role of observation and medical treatment for children with mild OSA as well as the options for appliances and positional therapy. (3) Understand all surgical treatment options for mild pediatric OSA and the role of DISE and be aware of ongoing studies and future directions.

Enhanced Recovery After Surgery: Optimizing Perioperative Patient Care

Carol M. Lewis, MD (moderator); Aru Panwar, MD;
Carol M. Bier-Laning, MD, MBA; Karthik Rajasekaran, MD

Session Description: In recent years there has been increased scrutiny of specific postoperative metrics by hospital administrators and payers. Surgeons have been asked to minimize hospital length of stay, readmission rates, and postoperative

complications for their patients for both quality and financial reasons. Enhanced recovery after surgery (ERAS) programs, whose ultimate goal is expedited recovery of patients, have implications for these issues. ERAS relies on interdisciplinary coordination that optimizes patient nutrition, antibiotic prophylaxis, thromboprophylaxis, and pain control, among other factors, through standardized and evidence-based care pathways to achieve early mobilization and faster recovery. Importantly, these protocols utilize multimodal analgesia strategies to minimize opioid use. These strategies have obvious implications for patient safety and quality improvement and for addressing our national opioid crisis. This panel discussion will focus on informing otolaryngologists about the emerging literature on ERAS in otolaryngology-head and neck surgery, with opioid-sparing multimodal analgesia as an essential component. Speakers will describe the benefits of ERAS and strategies for the enactment into practice for otolaryngology patients, with discussion of both head and neck surgery-specific protocols and programs that include all otolaryngology subspecialties. Furthermore, discussion will include the methods for monitoring compliance and outcomes. Audience members will have the opportunity to choose specific ERAS interventions for further discussion.

Outcome Objectives: (1) Describe the rationale and role of enhanced recovery pathways in otolaryngology-head and neck surgery. (2) Identify multimodal analgesia as an alternative to opioid analgesia in otolaryngology-head and neck surgery. (3) Understand strategies for introducing enhanced recovery and multimodal analgesia into practice and for monitoring progress through compliance and outcomes.

Eustachian Tube Dysfunction: Evidence and Controversies

Edward D. McCoul, MD, MPH (moderator);
Dennis S. Poe, MD, PhD; Michael Setzen, MD;
Raj Sindwani, MD

Session Description: Eustachian tube dysfunction is a common diagnosis in general otolaryngology practice. A growing body of evidence suggests the need for a multifactorial evaluation when this diagnosis is being considered, and various options for treatment are available for which the indications and effectiveness continue to be defined. This panel presentation will provide an overview of the currently available evidence related to the diagnosis and management of adult eustachian tube dysfunction. Presentations will synthesize available knowledge, drawing upon statements from the American Academy of Otolaryngology-Head and Neck Surgery Foundation Clinical Consensus Statement. Discussion will feature expert opinions from a well-versed panel, with representation by otologists and rhinologists to provide a balanced perspective of the topic.

Outcome Objectives: (1) Understand the diagnostic evaluation of adult eustachian tube dysfunction. (2) Appreciate current areas of consensus in the management of adult eustachian

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tube dysfunction. (3) Recognize where experts agree and disagree regarding the indications for treating adult eustachian tube dysfunction.

From e-Cig to Puff Bar: Otolaryngology and the Vaping Epidemic

Karthik Balakrishnan, MD, MPH (moderator);
Robert K. Jackler, MD; Michael J. Brenner, MD;
Ryan M. Collar, MD

Session Description: Every otolaryngologist should know about vaping. Vaping-related harm may include catastrophic lung injury, fatal accidental ingestion in children, explosion of combustible devices, accelerated nicotine addiction, and interaction with COVID-19 risk. Vaping amplifies disparities in use and addiction, mediated through social determinants of health. This panel reveals the evidence around vaping most relevant to practicing otolaryngologists trying to grasp this complex public health concern. We explain vaping epidemiology, sociological undercurrents and disparities, pathophysiology of vaping-related disease, and what to do about it. We describe how JUUL's meteoric rise to dominance in the electronic cigarette (e-cigarette) space—growth rivaling that of Facebook—was catalyzed by social media, positioning as new technology, stealthy design, and alluring flavors. We probe the science of vaping from surgical wound healing to effects of inhaling formaldehyde, propylene glycol, heavy metals, and other vapors—risks magnified in unregulated cannabinoids. The experiences of individuals who survived vaping-related injury, from respiratory exacerbation to ventilator dependence, is testimony to the crisis. The session offers insights on vaping-related disease, persistent misconceptions, and social determinants of health. e-Cigarettes, a potential “off ramp” for adult smokers have evolved into a heavily trafficked “on ramp” for the next generation. We close with counseling pearls, advice for patients grappling with misinformation, and opportunities for our specialty to lead.

Outcome Objectives: (1) Describe trends in electronic nicotine device use, interaction with social determinants of health, current slang used for these habits, and forthcoming inhaled tobacco technology. (2) Describe how sociological factors and biology interact in the pathogenesis of vaping-related respiratory injury and wound healing. (3) Discuss specific talking points for counseling patients and strategies for dispelling misconceptions around vaping-related disease.

Frontal Sinus Surgery for the General Otolaryngologist

Abtin Tabae, MD (moderator); Gurston Nyquist, MD;
Jeffrey Suh, MD

Session Description: Surgical management of the frontal sinus is associated with unique challenges such as complex and variable anatomy, proximity to critical structures, and the need for advanced techniques. Understanding the indications, surgical principals, and limitations of the array of different surgical approaches to the frontal sinus is paramount to success.

This session will provide a framework for successful frontal sinus surgery with a target audience of general otolaryngologists treating chronic rhinosinusitis. The different surgical procedures will be discussed in detail, including indications, technique, and surgical pearls. The full spectrum of office and surgical procedures will be reviewed, including balloon, endoscopic, and open approaches. A framework for applying surgical and radiographic anatomy of the frontal recess will be presented, including a discussion of the latest nomenclature for frontal sinus anatomy. Finally, the role of the latest technological advances in sinus surgery in management of frontal sinus pathology will be discussed, including the role of stents and powered instruments.

Outcome Objectives: (1) Present the indications, techniques, and surgical pearls associated with frontal sinus surgery. (2) Review advanced frontal sinus surgical and radiographic anatomy. (3) Apply the latest advances in instrumentation and technology to frontal sinus surgery.

Health Disparities Research: A Primer for the Otolaryngologist

Uchechukwu C. Megwalu, MD, MPH (moderator);
Nosayaba Osazuwa-Peters, MPH; Nikhila P. Raol, MD, MPH;
Regan W. Bergmark, MD

Session Description: Health disparities are defined as variation in rates of disease occurrence and outcomes between sociodemographic and/or geographically defined population groups. Significant disparities in care and treatment outcomes are documented across many areas of otolaryngology—head and neck surgery. In addition to clinical risk factors, sociodemographic factors, such as race/ethnicity, gender, socioeconomic status, geography, and insurance status, exert a powerful influence on disease severity, access to care, and treatment outcomes. A prime example is the impact of race/ethnicity on head and neck cancer outcomes. Racial/ethnic minorities present with more advanced tumors, are less likely to receive timely and appropriate treatment, and have inferior survival outcomes than majority racial groups, even after adjusting for disease stage and medical morbidities. Disparities have also been observed in the pediatric population, especially in access to cochlear implantation and adenotonsillectomy. The drivers and potential solutions to these disparities are not well understood, due to the paucity of high-quality research in our specialty. The goals of this panel discussion are to stimulate interest in health disparities research and to educate future leaders in health disparities research. This panel will discuss key concepts in health disparities research, including (1) social determinants of health in the context of otolaryngology, (2) tools for measurement of health outcomes, and (3) phases of disparities research. The speakers will also discuss health disparities research methods, including strategies for identifying data sources, study design, and statistical analysis. These concepts will be illustrated using high-quality studies from otolaryngology, as well as other specialties.

Outcome Objectives: (1) Understand how sociodemographic factors affect health outcomes. (2) Recognize the multifactorial and multilevel drivers of health disparities. (3) Design and implement research studies to identify, understand, and mitigate disparities.

Identifying Cochlear Implant Candidates for the Comprehensive Otolaryngologist

Jeffrey W. Yu, MD (moderator); Michael S. Harris, MD; Aaron C. Moberly, MD; Kristin Kozlowski, AuD

Session Description: The purpose of this session is to update comprehensive otolaryngologists and audiologists on current cochlear implant (CI) candidacy criteria and provide guidance on when to refer patients for CI. This session highlights changes to CI candidacy and new research supporting expanded indications such as bilateral implantation, asymmetric hearing loss, and implantation with significant residual hearing. New considerations, including hearing preservation and the impact of untreated hearing loss on cognitive decline, are also addressed in the context of CI.

Outcome Objectives: (1) Demonstrate patient factors and features from basic audiograms that can be used by a comprehensive otolaryngologist to identify potential CI candidates. (2) Discuss expanded CI candidacy and the differences between US Federal Drug Administration candidacy and Centers for Medicaid & Medicare Services. (3) Provide an overview of pertinent research on the connection between untreated hearing loss and cognitive decline in the context of CI.

Indeterminate Thyroid Nodules: Operate or Observe?

Elizabeth Cottrill, MD (moderator); David Goldenberg, MD; David Cohen, MD; Julia E. Noel, MD

Session Description: Indeterminate thyroid nodules represent a gray zone in which surveillance, repeat fine-needle aspiration, hemithyroidectomy, and total thyroidectomy are all possible and at times pragmatic treatment options. Determining the best course of action cannot rely solely on cytopathology alone but rather is a complex decision that often involves thorough assessment of patient, ultrasound, and genetic variables. Participants will learn which patient-specific factors and clinical findings increase suspicion for malignancy. In addition, they will learn to identify specific concerning ultrasonographic features and gain an appreciation for how a nodule's size and location within the gland may affect clinical decision making. Lastly, the growing availability of molecular testing to identify specific gene mutations or gene fusions adds yet another layer of complexity with ever-evolving and nuanced data. Within this course, we will elucidate the most up-to-date methods of molecular inquiry, their benefits and shortcomings, and the specifics of various gene mutations that every otolaryngologist performing thyroid surgery should be proficient in discussing with their patients. Given the feedback from prior years, we will plan to elaborate more on the role of molecular testing in decision making and will use case presentations to help drive these points home. The case-based

approach also helps to make the molecular information, which can seem daunting at times, more approachable, digestible, and pragmatic. We will plan to incorporate audience polling if live (whether in-person or virtual) to tailor the course to the specific interests of the participants. This panel is composed of experts in the field of thyroid surgery and will aim to provide education that allows for better clinical decision making and clearer goals of care for indeterminate thyroid nodules. It is directed toward both the general otolaryngologist as well as head and neck oncologic-trained or endocrine-trained surgeons.

Outcome Objectives: (1) Identify patient factors that may increase risk of malignancy or may, from a pragmatic standpoint, make either surgery or observation more favorable. (2) Identify ultrasonographic features that may indicate a higher or lower suspicion of cancer and understand what role nodule size and location play in clinical decision making. (3) Understand the concept of molecular testing, including both its advantages and its limitations, and how to incorporate these data into clinical decision making.

Managing Surgical Complications: Skull Base Perspective for the Comprehensive Otolaryngologist

Marc-Elie Nader, MD (moderator); Shirley Y. Su, MBBS, FRACS; Rick F. Nelson, MD PhD; Pamela C. Roehm, MD PhD

Session Description: Skull base surgical complications can be devastating for both the patient and the surgeon. Otolaryngologists may encounter complications during ear and sinus surgery. The purpose of this panel presentation is to offer practical and actionable advice to general otolaryngologists on how to avoid and how to manage common major surgical complications. This unique panel will be composed of anterior and lateral skull base surgeons. The panelists will share their approach to critical evaluation of preoperative imaging and to dealing with iatrogenic complications of the orbit, carotid artery, facial nerve, sigmoid sinus, and tegmen. Case presentations will be used to illustrate the utility of preoperative imaging in detecting challenging anatomy that may alter the surgical approach, the importance of sound surgical technique to help prevent complications, and the decision-making process when complications do occur.

Outcome Objectives: (1) Recognize which findings on preoperative imaging can increase the risk of major surgical complications. (2) Implement surgical approaches and techniques to avoid complications. (3) Summarize the management of orbital, tegmen, vascular, and facial nerve complications that can occur during sinus and otologic surgery.

MRI Basics: What Every Otolaryngologist Needs to Know

John C. Goddard, MD (moderator); Rebecca J. Hammon, MD; Ivan H. El-Sayed, MD; Theodore McRackan, MD

Session Description: Comprehensive otolaryngologists must understand detailed imaging to help properly diagnose and treat disorders of the head and neck.

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The goals of this miniseminar are to provide a cost-effective review of magnetic resonance imaging (MRI) basics and highlight common MRI findings for disorders of (1) the ear and temporal bone, (2) sinuses and anterior skull base, and (3) soft tissues of the head and neck. Case presentations will be used to illustrate helpful patterns and techniques in reading MRI scans that practicing otolaryngologists will be able to apply to their daily practice.

Outcome Objectives: (1) Understand basic principles of MRI imaging, particularly as it pertains to the comprehensive/general otolaryngologist. (2) Recognize common MRI findings among disorders of the ear and temporal bone, sinuses and anterior skull base, and soft tissues of the head and neck. (3) Implement a reliable method for reviewing MRI scans to help diagnose and treat patients in daily practice.

Multidimensional Care of Transgender Patients: An Introduction for the Otolaryngologist

Scott R. Chaiet, MD, MBA (moderator); Angela Sturm, MD; Seth Dailey, MD; Kevin Pasternak, MS, CCC-SLP

Session Description: There are 1.4 million adults in the United States who identify as transgender. Transgender and nonbinary gender individuals may present to the otolaryngologist with general complaints of the ear, nose, and throat as well as those directly tied to gender affirmation. The spectrum of gender identities, combined with the gender-defining characteristics of the voice and face, present unique opportunities for otolaryngologists to be leaders in a critical and growing part of LGBTQ+ health care. However, we often and understandably lack fundamental knowledge in a field that is rapidly changing. The goal of this multidisciplinary panel is to address that gap by providing foundational knowledge to all practicing otolaryngologists, as well as those who desire an introduction to specialized gender-affirming procedures. First, key terminology and best clinical practices will be introduced for all otolaryngology–head and neck surgeons. Panelists will then provide an overview of facial gender-affirming surgery, voice and communication therapy, and phonosurgery for the transgender patient. This session will benefit all American Academy of Otolaryngology–Head and Neck Surgery members, among others, by enhancing our ability to provide equitable and excellent care for patients of all genders and fostering collaboration between other otolaryngologists involved in gender care.

Outcome Objectives: (1) Learn terminology and evidence-based approaches to creating affirming practices for patients of all gender identities. (2) Understand the indications for laryngochoondroplasty and facial gender-affirming surgeries. (3) Describe anatomy, become familiar with approaches and pitfalls related to pitch-altering phonosurgery, and understand the role of gender voice and communication therapy.

Not Just the Tonsils: OSA Management in Special Pediatric Populations

Nikhila P. Raol, MD, MPH (moderator); David Smith, MD, PhD; Mary Musso, DO; Derek J. Lam, MD, MPH

Session Description: Pediatric obstructive sleep apnea (OSA) affects 3% to 5% of the general pediatric population in the United States. However, in specific populations, the prevalence can be much higher. For example, in cerebral palsy, the prevalence is greater than 50%, and in trisomy 21, nearly all patients are diagnosed with OSA during their lifetimes. In otherwise healthy children, adenotonsillectomy is curative in approximately 70% of patients, but in patients with particular diseases and syndromes, the management is more complex and often requires both medical and surgical interventions. In trisomy 21, adenotonsillectomy results in a 51% decrease in the average apnea-hypopnea index. Simultaneously, these children have a 33% prevalence of periodic limb movement disorders, potentially affecting their sleep quality. When managing special populations with OSA, care should be taken to ensure that other aspects of the patient's medical condition are considered. The goals of this panel discussion are to introduce the otolaryngologist to special considerations for managing pediatric OSA in patients with complex diseases and syndromes and help them determine when referral to specialty care, including sleep medicine and neurology, would be indicated before considering surgery. This panel will discuss key concepts in approaching OSA within the context of a pediatric patient with the particular conditions of trisomy 21, cerebral palsy, mucopolysaccharidoses, autism, epilepsy, and other genetic syndromes, focusing on (1) surgical OSA management beyond adenotonsillectomy, (2) concomitant nonobstructive sleep disorders that often affect these patients, and (3) factors relating to the underlying disease processes that can impact clinical sequelae associated with OSA. These concepts will be illustrated using high-quality studies from otolaryngology, as well as other specialties.

Outcome Objectives: (1) Understand nonanatomic factors impacting OSA in special pediatric populations. (2) Recognize the limitations to adenotonsillectomy in these populations. (3) Identify which patients would benefit from nonsurgical intervention prior to considering surgery.

Otolaryngology Patients With Dementia: What's Our Care Contribution?

Carrie L. Nieman, MD, MPH (moderator); Yuri Agrawal, MD; J. Thomas Roland Jr, MD; Anais Rameau, MD, MPhil

Session Description: Currently, 1 in 3 older adults will die with a diagnosis of dementia. With an aging population, otolaryngologists have a unique role to play in the care of patients with cognitive impairment. Otolaryngologic issues such as hearing loss, vestibular dysfunction, presbylaryngis, and dysphagia are among the most common comorbidities in patients

with dementia. As otolaryngologists caring for patients across the life course, this session will discuss the otologic, vestibular, laryngologic, and surgical care of patients with cognitive impairment. The presentation will cover the current understanding of the potential connections between sensory loss and cognition, the epidemiology of these common issues, and care recommendations. The presenters will also discuss preoperative decision making and postoperative care for patients with dementia, utilizing cochlear implantation under local anesthesia as a key example. Geriatric otolaryngology is a growing part of daily practice, and this session aims to serve as a primer for providers in the care of patients with cognitive impairment and leverage the latest research and techniques.

Outcome Objectives: (1) Explain the current understanding of the association between sensory loss and changes in cognition. (2) Implement dementia-friendly, evidence-informed otologic, vestibular, laryngologic, and surgical care. (3) Explain considerations and approaches to perioperative decision making and care for patients with cognitive impairment.

Pediatric Dysphagia, Drooling, and Aspiration: What the Comprehensive Otolaryngologist Should Know

Allison Tobey, MD (moderator);
Jennifer McLevy-Bazzanella, MD; Kristin Cangilla, MS;
Wednesday Sevilla, MD

Session Description: Of infants and children, 25% experience some degree of dysphagia, and the incidence is rising. The prevalence of pediatric dysphagia is higher in patients with neurodevelopmental disorders, cardi thoracic conditions, and a history of prematurity. Sialorrhea, frequently present, is often both a manifestation and an exacerbating factor of thin liquid dysphagia. Aspiration associated with pediatric dysphagia and drooling may result in pneumonia, hospital admission, and, eventually, bronchiectasis. While many afflicted children will outgrow dysphagia by the age of 4 to 5 years old, the negative impact on the patient and the family in terms of patient growth, risk of aerodigestive infection, and financial burden of thickeners and repeated medical evaluations and interventions is significant. Given the prevalence and rising incidence of pediatric dysphagia, the comprehensive practice otolaryngologist will encounter pediatric patients with swallowing, drooling, and aspiration complaints in their practice. The goals of this panel are to review the medical workup of pediatric dysphagia, understand the treatment options for drooling, and review the surgical options for management of aspiration. We will review the key presenting symptoms of pediatric dysphagia and aspiration. We will review the diagnostic modalities available, including use of video fluoroscopic swallow, fiber-optic endoscopic evaluation of swallowing, and sialograms. Medical interventions, diet modifications, thickening agents, reflux medications, and drying agents will be discussed. The complications associated with uncontrolled dysphagia, sialorrhea, and aspiration will be reviewed. Surgical options including supraglottoplasty,

treatment of surgical clefts, salivary gland botulinum toxin injection, and salivary gland resection will be presented. Upon completion of the session, the comprehensive otolaryngologist should be able to apply a treatment algorithm for pediatric dysphagia, drooling, and aspiration to their practice.

Outcome Objectives: (1) Understand pediatric dysphagia—how it presents and how it affects otorhinolaryngologic disorders in the pediatric population—and identify structural anomalies associated with pediatric dysphagia. (2) Explain and compare diagnostic tools used to identify dysphagia and assess response to treatments. (3) Recognize when and how to intervene as well as how to counsel caregivers effected by pediatric dysphagia.

Prophylactic Perioperative Antibiotics: Treating Patients or Surgeons?

Philip G. Chen, MD (moderator); William B. Armstrong, MD;
Yvonne Chan, MD, FRCSC; Dennis J. Kitsko, MD

Session Description: Antibiotics have revolutionized medical practice, but their judicious use is being increasingly questioned. Antibiotics have risks of side effects such as anaphylaxis and increased drug resistance. This panel will discuss controversial topics regarding the use of perioperative antibiotics and address the evidence that guides when they are most beneficial.

Outcome Objectives: (1) Discuss the pros and cons of antibiotic usage in surgery. (2) Explain the indications of perioperative antibiotics in various types of otolaryngologic surgeries. (3) Understand the evidence regarding perioperative antibiotic usage and the strength of the data.

Proton Pump Inhibitors Update: Navigating Risks, Controversies, and Patient Conversations

John Paul Giliberto, MD (moderator);
Simon Brisebois, MD, MSc, FRCSC; Anais Rameau, MD, MPhil;
Maggie A. Kuhn, MD

Session Description: Proton pump inhibitors (PPIs) continue to be among the top 10 most common prescribed drugs nationally. The past decade has seen a flurry of reports on the potential association of PPIs with various short- and long-term adverse effects. Emerging high-quality randomized controlled trials now suggest that many of these observed associations are not causal relationships. Despite this level 1 evidence supporting PPI safety, otolaryngologists often find themselves in the midst of patient discussions regarding the risk, benefits, and alternatives of PPIs. Further, the years of concern regarding the use of PPIs and innovative approaches to laryngopharyngeal reflux (LPR) management have led many otolaryngologists to critically consider the role of PPIs in management of diagnoses potentially related to LPR. This panel will start with a short didactic from each panelist. After reviewing the most up-to-date publications, the panel will discuss appropriate workup for clinical entities associated with gastroesophageal reflux and evidence-based PPI use for the management thereof. Finally, the short didactic session will end with a discussion about the

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approach to patient conversation regarding PPIs and in general how to make decisions in the face of conflicting data. Most of the panel will focus on cases and expert panel discussion. A variety of cases will be reviewed and issues around patient counseling, ordering and interpreting pertinent testing, and long-term management of laryngeal and pharyngeal clinical entities where LPR plays a pathologic role will be discussed.

Outcome Objectives: (1) Review and interpret current literature regarding the associated adverse effects with PPIs use. (2) Delineate appropriate workup for gastroesophageal reflux as well as medical and surgical options for LPR management. (3) Discuss how to counsel patients about PPI use in a clear and concise manner.

Recent Publications That Could Change Your Daily Practice

Jennifer J. Shin, MD, SM (moderator);
Michael G. Stewart, MD, MPH; Jay F. Piccirillo, MD;
Scott E. Brietzke, MD, MPH

Session Description: Emerging publications can change our daily practice. Only a limited number of the half a million articles published each year, however, have clinical results, study designs, and demonstrated validity that could or should change how we practice. Even well-intentioned and highly motivated practitioners can inadvertently miss these key publications, which can be hidden in the vast sea of surrounding manuscripts. It is critical, however, to have awareness of important, actionable, new data. This program thus highlights recent publications that substantiate changing clinical practice in children and adults. Topics addressed include ear disease, chronic rhinosinusitis, obstructive sleep apnea, and perioperative medications, among others. The selected publications span the spectrum of pediatric, otologic, rhinologic, and comprehensive practice. New publications and data are presented, including key action items as they relate to existing standards. The panel encompasses the editorial leadership from top-tier otolaryngology journals, as well as leadership from the clinical practice guidelines and consensus statements endorsed by national professional organizations.

Outcome Objectives: (1) Discuss significant, valid, and actionable data from publications within the past 1 to 3 years in pediatric and comprehensive adult otolaryngology. (2) Discuss significant, valid, and actionable data from publications within the past 1 to 3 years in otology, rhinology, sleep surgery, and perioperative medications. (3) Analyze and interpret data to highlight action items for implementing significant, valid, and actionable literature from recent key publications.

Social Determinants of Health in Otolaryngology: A Call to Action

Evan M. Graboyes, MD, MPH (moderator);
Nosayaba Osazuwa-Peters, MPH; Michael J. Brenner, MD;
Corinna G. Levine, MD, MPH

Session Description: Health care disparities are overwhelmingly driven by differences in social determinants of health

(SDOH)—the social, economic, and physical conditions in which individuals are born, live, work, and age (eg, income, education, race/ethnicity, social support, social norms). Disparities in access to care, treatment, and outcomes by race/ethnicity, socioeconomic status, and geography as a result of SDOH are pervasive in otolaryngology. In this call to action, we highlight the need to move beyond studies describing the existence of disparities and advance to rigorous, high-quality research that begins to address SDOH and improve equity in care and outcomes. We also discuss the role of education in enhancing care delivery by otolaryngologists. Although research addressing SDOH and disparities within otolaryngology remains in its infancy, there are nevertheless already practical steps that individual otolaryngology providers should take to understand and address SDOH within their clinical practice. This panel aims to (1) identify knowledge gaps about SDOH and what is known about the relationship of SDOH to disparities within otolaryngology, (2) engage American Academy of Otolaryngology—Head and Neck Surgery members in progress toward mitigating SDOH and disparities within otolaryngology, and (3) catalyze change through education and clinical approaches addressing the impact of SDOH into our clinical practice. This interactive forum emphasizes audience participation and case-based discussions. The focus is on practical, action-oriented information delivery. Panelists will engage the audience to (1) discuss research gaps in for SDOH in otolaryngology, (2) leverage data science to understand how SDOH mediate disparities in otolaryngology, (3) highlight the power of individual and collaborative action to address SDOH, and (4) propose clinical practice interventions that can improve patient outcomes.

Outcome Objectives: (1) Recognize the importance of SDOH and their contribution to observed disparities in health across a number of otolaryngologic conditions. (2) Describe opportunities to engage in high-quality research to understand and address social determinants of health in otolaryngology. (3) Improve equitable care delivery through the incorporation of strategies to measure and address social determinants of health in all types of clinical practice.

Systemic Steroids for Common ENT Diagnoses: Know the Evidence

Edward D. McCoul, MD, MPH (moderator);
Stephanie Joe, MD; Uchechukwu Megwalu, MD, MPH;
Daniel O'Brien, MD

Session Description: Corticosteroids are among the most frequently prescribed medications by the otolaryngologist. The indications for treatment are well defined for some diagnoses, such as sudden sensorineural hearing loss and nasal polypsis. For other diagnoses, such as allergic rhinitis and acute upper respiratory infections, the evidence is lacking. Recent studies have shown wide variation in steroid prescribing across the United States, in many cases against the dictates of evidence-based medicine. This panel presentation will address the most common indications for use of oral or

intramuscular steroids in the ear, nose, throat, and head and neck. The focus will be specifically on systemic steroids as distinct from topical steroids such as sprays or drops. The concept of steroid stewardship will be introduced as a responsibility of the clinician in providing optimal patient outcomes and minimizing harms.

Outcome Objectives: (1) Understand the most common indications for oral and intramuscular steroid use in comprehensive otolaryngology practice. (2) Recognize where there are gaps in evidence for the use of systemic steroids. (3) Understand the rationale for stewardship of systemic steroids in clinical practice.

Upper Airway Stimulation Tips, Tricks, and Pitfalls

Eugene G. Chio, MD (moderator); Jordan S. Weiner, MD; Ryan S. Nord, MD; Christopher G. Larsen, MD

Session Description: Since it became commercially available, upper airway stimulation has undergone many refinements in its surgical technique. This session will focus on surgical tips for upper airway stimulation surgery from 4 of the highest volume implant surgeons in the world. We will be covering surgical pitfalls and also discussing the pros and cons of the emerging 2-incision implant technique.

Outcome Objectives: (1) Recognize common pitfalls that can hinder surgeons who are new to upper airway stimulation. (2) Understand time-saving techniques that can maximize surgical efficiency. (3) Learn the pros and cons of a newer 2-implant technique.

What Are You Feeding That Baby? Managing Reflux Through Diet

Nathan J. Gonik, MD (moderator); Kristen Cares; Sheri A. Poznanovic, MD; Jennifer McLevy-Bazzanella, MD

Session Description: The American Academy of Otolaryngology–Head and Neck Surgery Complementary and Integrative Medicine Committee and Pediatric Otolaryngology Committee have identified managing reflux as an area of importance and asked us to present it to the otolaryngology community. There are new recommendations from the gastrointestinal community against empiric use of proton pump inhibitors in young children, and there is a black box warning against the use of ranitidine. There is also mounting evidence of improved outcomes with nutritional and dietary modification for common pediatric otolaryngology ailments, including reflux, sinusitis, chronic cough, and laryngomalacia. These issues are often discussed in the pediatric aerodigestive societies and need to be presented for the general otolaryngology community as they are less “alternative” and quickly becoming standard of care.

Outcome Objectives: (1) Identify food intolerances and allergies that may be mistaken as pediatric reflux or sinusitis. (2) Understand when it is appropriate to utilize reflux medications to manage children with spitting up/vomiting

complaints and when to look for alternatives. (3) Provide participants with an armament of nutritional changes they can offer patients instead of medications to improve outcomes in reflux and reactive upper aerodigestive diseases in children.

Endocrine Surgery

The A to Z of Intraoperative Laryngeal Nerve Monitoring

Catherine F. Sinclair, MBBS (moderator); Gregory W. Randolph, MD

Session Description: Intraoperative neuromonitoring (IONM) strategies for the recurrent laryngeal and the external branch of the superior laryngeal nerve have evolved over the past decade, and support for IONM continues to grow at both individual and organizational levels as new guidelines for standardization are published, prospective randomized controlled trials are reported, and structured training courses are established. Currently, many head and neck and general surgeons use neural monitoring in at least some of their surgical cases, although the way in which the monitoring is used (the so-called passive- vs active-monitoring techniques) varies widely between surgeons. Some barriers to active IONM implementation include inadequate training in the use and interpretation of nerve monitoring signals and unfamiliarity with the sequence of maneuvers involved in active monitoring and in troubleshooting for loss-of-signal (LOS) situations. In this expert series, the speakers will cover a range of topics related to IONM, including (1) tips and pearls for equipment setup including endotracheal tube placement, (2) how and when to map for the recurrent and superior laryngeal nerves, (3) troubleshooting and prognosis in the case of a LOS, (4) when to stage bilateral surgery, (5) advantages of continuous over intermittent IONM, (6) advances in continuous vagal IONM and implementation of continuous IONM into everyday practice, and (7) clarification of outcomes reporting and expectations from intermittent vs continuous IONM. These topics will be presented in a case scenario format with the aim of facilitating attendees’ understanding of the data being covered by incorporating them into everyday operative scenarios. Participants will be encouraged to ask questions throughout the discussion and to share opinions and experiences.

Outcome Objectives: (1) Enable participants to incorporate intermittent and/or continuous IONM into their own practice by advancing participants’ understanding of active- (vs passive-) monitoring protocols. (2) Demonstrate how IONM can be used to potentially avoid nerve injury, how to proceed when a LOS occurs, and the utility of IONM in promoting safe surgical techniques. (3) Compare and contrast the advantages and limitations of intermittent vs continuous IONM techniques, including realistic expectations of each form of IONM, and discuss future IONM developments.

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Advanced Thyroid Cancer: Molecular Testing and Therapeutic Options

Elizabeth Cottrill, MD (moderator);
Gregory W. Randolph, MD; David C. Shonka, MD;
Mark E. Zafereo, MD

Session Description: Advanced thyroid cancer is often encountered by otolaryngologists specializing in head and neck surgical oncology and occasionally by comprehensive otolaryngologists in the private practice setting. Management of patients with advanced thyroid cancer can present multiple challenges, including decisions about extent of surgical intervention as well as the order and timing of adjuvant therapies. Complicating the issue further, over the past 3 to 5 years, we have seen the development and approval of multiple new chemotherapeutic and immunotherapeutic agents with the potential to radically change our treatment algorithms for certain patients. Many of these drugs are still in clinical trials, but given the possibility of substantial clinical benefit for select patients, it is important that there is general knowledge of these options. The first goal of this session is to define advanced thyroid cancer and identify the diagnostic studies that are indicated to confirm advanced disease. The second goal is to discuss the specific molecular mutations and profiles that can be identified in advanced thyroid cancer and the targeted and nontargeted treatment options that are available depending on the results of molecular testing. Finally, the session will discuss and debate aspects of surgical decision making, appropriate surgical aggressiveness, and the role of adjuvant therapies and clinical trials. The session will use case presentations to illustrate state-of-the-art management of patients with advanced thyroid cancer.

Outcome Objectives: (1) Understand the definition of advanced thyroid cancer. (2) Identify the specific mutations that drive advanced disease and corresponding targeted treatment options. (3) Debate extent of surgical intervention and discuss the role of perioperative adjuvant therapy in the management of advanced thyroid cancer.

Beyond the Guidelines: Advanced Pediatric Thyroid Cancer Evaluation and Management

Anthony Sheyn, MD (moderator); Jeffery Rastatter, MD;
Lourdes Quintanilla-Dieck, MD; Brendan C. Stack, MD

Session Description: Pediatric thyroid carcinoma accounts for approximately 1.8% of all thyroid malignancies in the United States and 3% of all pediatric malignancies. Despite this, pediatric-specific guidelines have been developed only within the past 5 to 10 years for the evaluation and management of these patients. While the previously reported guidelines are a good starting point, they are not yet well developed because of the relative infrequency of pediatric disease relative to adult disease and the disparate approaches to treatment among institutions. In addition, patients often present with advanced disease, making it difficult to follow the currently available guidelines. This miniseminar will be an interactive session utilizing the expertise of pediatric otolaryngologists

and head and neck surgeons who have a high-volume thyroid practice and are engaged members of the American Head and Neck Society Pediatric Endocrine Committee to discuss advanced pediatric thyroid carcinoma patients that do not fit the previously reported guidelines. The panelists will demonstrate how utilizing a multidisciplinary approach can improve treatment outcomes and what outcome measures need to be monitored to continue to develop treatment pathways for even the most advanced disease. The panelists will discuss pitfalls they encountered when treating these patients and the steps necessary to avoid them in the future. Finally, the panelists will discuss how the newly developed American Association of Clinical Endocrinology/American Head and Neck Society (AACE/AHNS) guidelines affect treatment recommendations for advanced disease.

Outcome Objectives: (1) Identify the limitations of available pediatric thyroid guidelines in the management of advanced disease. (2) Discuss how the multidisciplinary approach can aid with pediatric thyroid carcinoma cases that have treatment elements that are not completely addressed by the current guidelines. (3) Discuss how the new AACE/AHNS guidelines for pediatric thyroid disease affect treatment of advanced disease.

Going Back in: Completion Thyroidectomy and Revision Cancer Surgery

Sarah L. Rohde, MD (moderator);
Gregory W. Randolph, MD; James L. Netterville, MD

Session Description: Invasive well-differentiated thyroid cancer is relatively common, yet there exist few guidelines to aid in surgical disease management. The 2015 American Thyroid Association guidelines provide little guidance in surgical decision making, especially with regard to recurrent or invasive disease. In this course, we will first examine the common symptoms associated with invasive thyroid cancer. The importance of prior laryngeal examination and guidelines for the use of advanced preoperative imaging will be discussed. The important anatomic relationships in the paratracheal space will be explored. How these relationships are altered in complex and revision surgery will be examined. The common locations of disease involvement including management of the strap muscles, recurrent laryngeal nerve, trachea, larynx, esophagus, and major vessels will be addressed. Multiple ways to approach and identify relevant anatomy will be reviewed with application to not only revision surgery but also complex initial surgeries. The American Head and Neck Society consensus statements regarding central neck dissection and invasive disease will be reviewed.

Outcome Objectives: (1) Recognize common symptoms associated with invasive thyroid cancer. (2) Understand the anatomical considerations in the paratracheal space and apply those to complex thyroidectomy, revision thyroidectomy, and revision cancer surgery. (3) Implement strategies to safely identify normal structures and achieve gross total resection in invasive thyroid cancer.

Parathyroid Imaging: Application, Advances, and Innovations

Phillip K. Pellitteri, DO (moderator); Julia E. Noel, MD; Elizabeth E. Cottrill, MD; David C. Shonka, MD

Session Description: The evolution of parathyroid surgery has realized an era during which parathyroid disorders are diagnosed earlier in the course of disease, accompanied by advances in technology that provide the capability for earlier definitive management of these disorders. Imaging protocols represent an important component of surgical management, both pre- and intraoperatively. This panel presentation will focus on the evaluation of contemporary imaging modalities and applications for parathyroid localization and identification available for the treatment of patients with hyperparathyroidism. The presentation will be structured in the form of presenters/discussants who will serve to present a comprehensive discussion of the various imaging modalities available for surgeons undertaking the management of hyperparathyroidism. Focus topics, concentrating on modalities and technology, will be individually presented by each participant. Case presentations will serve to describe and highlight implementation of these modalities. Specific topics to be addressed include (1) developments and alternatives in contemporary preoperative parathyroid localization, (2) implementation of imaging technology relative to clinical scenarios, (3) technology modalities available for intraoperative parathyroid gland identification, (4) application of intraoperative localization specific to clinical scenarios in hyperparathyroidism, and (5) advances, innovation, and value assessment in parathyroid imaging. The goal of this presentation is to familiarize otolaryngologists with the spectrum of imaging capabilities available for enhancing the conduct of parathyroid surgery. In doing so, the presentation aims to present a diverse and clinically practical panorama of modalities that may be selectively and appropriately implemented in the treatment of patients with hyperparathyroidism. Finally, this presentation will discuss and value assess innovations and future directions in parathyroid imaging technology that represent the forefront in advanced localization and identification modalities.

Outcome Objectives: (1) Demonstrate an understanding and value assessment of the alternative modalities available to the clinician for preoperative abnormal parathyroid gland localization. (2) Implement the appropriate application of both preoperative parathyroid gland localization and intraoperative gland identification in surgical practice. (3) Describe the advances and innovations in parathyroid gland imaging technology and their relevant clinical applications.

Thyroid Cancer Quality Care: Moving From Expert Opinion to Implementation

Gregory W. Randolph, MD (moderator); Jonathan C. Irish, MD; Louise Davies, MD, MS; Charles Meltzer, MD

Session Description: In 2015 the American Thyroid Association (ATA) released revised management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer. The ATA

guidelines inspired independent simultaneous initiatives at Kaiser Permanente Northern California (KPNC) and Cancer Care of Ontario (COO) to codify them into multidisciplinary workflow algorithms that enhance implementation by making daily use of clinical guidelines in practice easier. A panel of experts from key professional medical organizations involved in thyroid care in the United States and Canada harmonized the KPNC and COO versions into North American multidisciplinary workflow algorithms for the pre-, peri-, and postoperative care of patients with thyroid nodules. The panel also used a modified Delphi process to select 16 quality process and outcomes statements corresponding to the algorithms that address the quality domains of safety, access, appropriateness, efficiency, effectiveness, and patient-centeredness. The quality statements can be used to guide the development of quality metrics. The purpose of the resulting American Head and Neck Society North American evidence-based multidisciplinary workflow algorithms for the evaluation and management of thyroid nodules and associated quality statements is to help reduce unwarranted variation in care and improve overall quality of care for patients diagnosed with thyroid nodules. The panel will provide an overview of the quality statements as they apply to the workflows and discuss strategies for implementation in a variety of health care settings. Institutions can use the data to inform patients about quality and outcomes.

Outcome Objectives: (1) Understand the value of developing algorithms to simplify adoption of evidence-based medicine. (2) Understand the development and relationship of the quality statements embedded in the workflow algorithms. (3) Participants will preview how to use workflows and quality statements that can be applied across health care settings.

Thyroid Nodule Ablative Technologies: The Why, Who, and How

Catherine F. Sinclair, MBBS (moderator); Kepal N. Patel, MD; Jonathon O. Russell, MD; Ralph P. Tufano, MD

Session Description: Ultrasound-guided ablative techniques for thyroid lesions are minimally invasive treatment modalities that may be alternatives to surgery for patients with symptomatic benign thyroid nodules. Studies on radiofrequency ablation (RFA), initially from Korea and Europe and now from the United States, have demonstrated effective and safe management of solid thyroid nodule-related cosmetic problems and pressure symptoms, with an average nodule size reduction of 80%. Similarly, ethanol ablation alone or in combination with RFA is an effective treatment strategy for predominantly cystic nodules. In the United States, ablative techniques are in their infancy, although the past 2 years have seen increasing uptake among surgeons and endocrinologists. In this expert panel, the speakers will cover a range of topics related to thyroid nodules ablation by RFA and ethanol, including (1) patient selection for ablative techniques and choice of modality; (2) tips and pearls on how to perform RFA and ethanol ablation of thyroid lesions; (3) risk minimization,

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identifying potential complications and how to avoid them; and (4) starting out—how to integrate ablative techniques into your clinical practice. These topics will be presented in both didactic and case-based scenarios with the aim of facilitating attendees' understanding of the data being covered. Participants will be encouraged to ask questions throughout the discussion and to share opinions.

Outcome Objectives: (1) Examine the indications for, and utility of, ablative technologies in the management of benign thyroid nodules. (2) Describe technical aspects of RFA and ethanol ablation (eg, trans-isthmus approach, moving shot technique, probe angulation). (3) Discuss potential complications of ablative techniques and risk minimization strategies and how to start an ablation program.

When and How to Perform Bilateral Exploration for Hyperparathyroidism

Alice L. Tang, MD (moderator); David J. Terris, MD; Maisie L. Shindo, MD; David L. Steward, MD

Session Description: Primary hyperparathyroidism caused by a single adenoma is often a simple minimally invasive resection. However, bilateral exploration of the neck can be expected or unexpected while performing parathyroidectomies. Each cause of hyperparathyroidism, from the development of single-adenoma to multigland disease, has similar processes but distinct preoperative workup, medical and surgical management, and immediate postoperative surveillance. This expert panel will review the important aspects, nuances, and unique challenges of treating this multifaceted disease process, with particular focus on when and how to do a bilateral exploration with today's available tools.

Outcome Objectives: (1) Discuss when to consider or perform a bilateral neck exploration for primary hyperparathyroidism, including hereditary primary hyperparathyroidism, genetic syndromes, familial hyperparathyroidism, and familial hypocalciuric hypercalcemia. (2) Explain differences in surgical management of secondary/tertiary hyperparathyroidism and examine preoperative workup and postoperative care for the different disease processes. (3) Examine surgical techniques and intraoperative decision making, with an emphasis on principles of methodical, systemic approach to reduce risk of postoperative permanent hypoparathyroidism.

Facial Plastic and Reconstructive Surgery

2021 Minimally Invasive Nasal Valve Repair: New Techniques/CPT Codes/Reimbursement

Michael Friedman, MD (moderator); J. Pablo Stolovitzky, MD; Paul Schalch Lepe, MD

Session Description: Nasal valve collapse has long been recognized as an important cause of nasal obstruction despite corrective measures that address the septum and turbinates. Many patients who have had previous nasal surgery

are reluctant to undergo further major reconstructive surgery and are seeking shortcut procedures to improve vestibular function and to correct nasal valve collapse. In January 2021 new Current Procedural Terminology (CPT) codes designated for simplified nasal valve repair with a variety of minimally invasive office techniques were released. This course will review the panelists' experiences with these techniques and discuss the expected reimbursement for these new codes. The panelists will share their experiences with 3 minimally invasive techniques. The orbital suspension technique for reconstruction of the nasal valve is a simplified technique utilizing a soft-tissue anchor embedded in the orbital rim to support the nasal valve area. Dr Michael Friedman will demonstrate this technique and discuss his experience of more than 15 years and with more than 1000 patients. Complications and corrections will be discussed in detail. Surgical video will demonstrate the technique. A more recent technique using a small absorbable implant has been popularized. Dr Pablo Stolovitzky will present his experience treating nasal valve collapse with this technique. He will discuss advantages, disadvantages, and potential complications. Moreover, the latest innovation, a system that allows remodeling of the nasal valve area and creates stiffening and increased airway with the use of radiofrequency, will be reviewed and described. This system remodels the inferior turbinate, the swell body, and the valve area with a single disposable instrument. Experience with this technique will be discussed by Dr Paul Schalch. Finally, the panel experts will discuss their experiences and their thoughts on the alternative techniques and why they prefer each technique.

Outcome Objectives: (1) Learn the new CPT codes, released in January 2021, designated for simplified nasal valve repair for a variety of minimally invasive office techniques and expected reimbursements for these new codes. (2) Learn how to correct nasal valve collapse with the orbital suspension technique, with an absorbable nasal implant, and with radiofrequency technology. (3) Learn the pros and cons and complications of each technique.

Beyond Septoplasty: Functional Nasal Surgery for the General Otolaryngologist

Celeste C. Gary, MD (moderator); Scott B. Roofe, MD

Session Description: A general otolaryngologist can benefit from the use of adjunct procedures to address nasal valve compromise in patients who need more than septoplasty and turbinate reduction alone. Diagnostic pearls for nasal valve dysfunction will be shared, and the following adjuncts to septoplasty will be covered: closed (endonasal) spreader grafts, lateral wall implants, radiofrequency ablation, and batten grafts. The panel will also cover specific problems that are best served via open approaches such as severe caudal deviations.

Outcome Objectives: (1) List functional nasal procedures for a general otolaryngologist. (2) Identify ways to improve

diagnostic skills for nasal valve dysfunction. (3) Explain how to pinpoint when endonasal procedures will likely not be enough.

Contemporary Management of Pediatric Maxillofacial Trauma

Andrew R. Scott, MD (moderator); Krishna G. Patel, MD, PhD; David J. Chang, DMD

Session Description: Maxillofacial trauma in children is managed differently than in adults. When treating pediatric maxillofacial fractures, a thorough understanding of facial skeletal development is required to avoid pitfalls. Surgical options for rigid fixation may be limited by any number of factors, including long-term facial growth disturbances, incomplete eruption of permanent dentition, risk of temporomandibular joint ankylosis, a lack of skin folds to hide external scars, and the desire to avoid multiple or prolonged anesthetics in younger children. This panel will offer 3 perspectives representing the fields of pediatric otolaryngology, facial plastic and reconstructive surgery, and oral and maxillofacial surgery. All panelists regularly perform complex reconstructive maxillofacial procedures in children and cover maxillofacial trauma at a level 1 pediatric trauma center. A series of case presentations will allow attendees to gain a greater understanding of the nuances of treating frontal sinus, orbital, midface, and mandibular fractures in children and adolescents. Through complementary, multidisciplinary perspectives, a variety of topics will be covered, including a review of options for mandibular-maxillary fixation in young children (Ivy loops and circum-mandibular wiring), indications for stone modeling and fabrication of occlusal splints, when to involve orthodontics, the use of virtual surgical planning technology, low-cost in-house 3D-printed modeling, selection of fixation materials, use of resorbable plates, and soft-tissue approaches to minimize facial scarring.

Outcome Objectives: (1) Explain the limitations of permanent, rigid fixation materials in patients with incomplete skeletal and dental development. (2) Describe several approaches to the forehead, orbits, and midface in children that will avoid a noticeable scar. (3) Recognize the importance of collaboration between oral maxillofacial surgeons, otolaryngologists, and orthodontists.

Debating Fiscal Controversies in Head and Neck Reconstruction

Larissa Sweeny, MD (moderator); Mark K. Wax, MD; Joseph M. Curry, MD; Eric M. Genden Sr, MD

Session Description: There is growing concern regarding the fiscal sustainability of health care systems with an increasing need to better understand health care economics. Efforts to limit health care spending and provide efficient use of health care dollars has become paramount. This panel is designed to allow experts in the field to debate controversial fiscal topics in

head and neck reconstruction. These include use of the 3D modeling for reconstruction, free flap monitoring methods, and free flap reconstruction following palliative surgical ablation. Are these practice patterns cost-effective and justifiable, or are they going to be increasingly difficult to defend?

Outcome Objectives: (1) Understand the controversial topics in head and neck reconstruction. (2) Understand the data in support of certain practice patterns. (3) Understand which practice patterns are not cost-effective.

Facial Trauma Tips and Tricks

Kalpesh T. Vakharia, MD (moderator); Jessyka G. Lighthall, MD; Samuel L. Oyer, MD; Brian W. Downs, MD

Session Description: The treatment paradigms of facial trauma have evolved significantly over the years. Furthermore, there have been numerous advances in technology and surgical techniques that have improved patient outcomes. This session is meant to improve the understanding of the treatment options available to patients with facial trauma and highlight surgical techniques that can help the otolaryngologist maximize aesthetic and functional outcomes. Each panelist will present their approach to various facial fractures and highlight surgical techniques (tips and tricks) that the audience can incorporate into their practices. A variety of cases ranging in complexity will be presented to highlight the approaches and techniques discussed by the panelists. Audience participation will be encouraged.

Outcome Objectives: (1) Review treatment options of various facial fractures. (2) Identify surgical techniques that can be employed to improve aesthetic and functional outcomes when repairing facial fractures. (3) Demonstrate surgical techniques that can be used to prevent complications in facial fracture repair.

Gender-Affirming Facial and Vocal Surgery

Rahul Seth, MD (moderator); VyVy N. Young, MD; P. Daniel Knott, MD

Session Description: The face is one of our most important interactive means, as it carries social meaning, facilitates non-verbal communication, and enables a self-identity that includes gender identity. In facial feminization surgery, gender-typical characteristics are altered to reflect gender identification. This course aims to discuss the differences between the male and female face and the specific surgical techniques used to alter the sex of the face and voice. Surgical discussion topics will address commonly utilized techniques in gender-affirming surgery of the face with a focus on facial feminization surgery. Specifically, brow reduction and lift, hair line alteration, frontal table set back, mandibular reduction, and feminizing rhinoplasty will be described. Voice therapy and surgery techniques to feminize the face and alter the thyroid cartilage will be discussed. Importantly, discussion will center on the role of otolaryngology—head and neck surgeons to provide these services to the transgender community.

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Outcome Objectives: (1) Identify facial characteristics of the male and female face and recognize areas of the face that can be altered. (2) Appreciate and understand the surgical techniques used to perform gender-affirming surgery of the face and neck. (3) Appreciate and understand the role and indications for voice therapy and voice surgery.

Modern Orbital Fracture Management

G. Nina Lu, MD (moderator); E. Bradley Strong, MD; Nicholas Mahoney, MD; Nathan H. Calloway, MD

Session Description: The management of orbital fractures is widely varied and continually evolving. The timing for orbital fracture repair and the radiographic indications have shifted away from acute surgery for many fractures. In addition, there are a variety of implant materials available to surgeons, and new developments such as endoscopic techniques, image guidance, mirror image perfection, and custom implants can assist in complex cases. This panel is composed of experienced craniofacial surgeons and also includes insight from oculoplastic surgeons to provide a multidisciplinary perspective on this issue. The goal of this panel is to discuss updates in patient management and practical surgical techniques in orbital fracture repair for general otolaryngologists and craniofacial trauma surgeons alike.

Outcome Objectives: (1) Understand the absolute and relative indications for immediate vs delayed orbital floor repair in the context of both isolated orbital fracture and zygomaticomaxillary complex fracture. (2) Recognize radiographic characteristics and their relation to choice of surgical technique. (3) Explain to patients postoperative expectations of vision outcomes such as diplopia and enophthalmos.

Oral Cavity Reconstruction: Defining the Microvascular Tipping Point

Marianne Abouyared, MD (moderator); Kyle Hatten, MD; Richard Park, MD; Waleed H. Ezzat, MD

Session Description: Head and neck reconstruction has shifted to increasingly utilize microvascular reconstruction as the versatility and reliability of free flaps have improved over time. However, earlier steps of the reconstructive ladder are often optimal for smaller-volume defects of the oral cavity. Skin grafts, local flaps, and regional tissue transfer afford the benefit of minimal donor site morbidity and avoid the need for microvascular expertise with smaller volume defects. The panelists will review the appropriate indications for various oral cavity reconstructive defects and define the “tipping point” when a free flap may be required. In addition, the presentation will provide techniques for optimal outcomes for various reconstructive surgeries, including skin grafts, regional flaps, and microvascular reconstruction. This topic will be handled through a panel presentation that will include both didactic and interactive components. A brief introduction will review classification schemas of various defects of the oral cavity based on key features of the defects. This will be followed by a moderated 3-case discussion with expert input analyzing the

reconstructive subsite, including the oral tongue/floor of mouth, buccal mucosa, and hard palate. Discussion among the panelists regarding reconstructive options will result in a consensus statement on the tipping point for free flaps.

Outcome Objectives: (1) Identify the classification schemas of oral cavity defects. (2) Demonstrate reconstructive indications and limitations of local, regional, and free flap reconstruction of cutaneous defects. (3) Identify the tipping point for required for microvascular reconstruction of oral cavity defects.

Reconstructive Challenges in the Head and Neck

Aurora G. Vincent, MD (moderator); Weitao Wang, MD; Fiyin Sokoya, MD; Sameep P. Kadakia, MD

Session Description: This panel will present a series of cases of difficult head and neck reconstructions. Panelists will discuss different options for approaching each case and evaluate the reconstructive plan chosen. Cases presented will include large and complex head and neck wounds as well as wounds in patients who have had multiple previous head and neck surgeries, have vessel-depleted necks, have had radiation, and have other factors making reconstruction difficult. The goal of the panel and discussion will be to demonstrate and evaluate alternative and backup reconstructive methods when classic or initial methods fail. Many regional flaps that are overlooked in general otolaryngology education, including the nape-of-neck flap, pedicled latissimus flap, trapezius flap, and others, are relatively simple to learn and perform and are accessible to nonmicrovascular surgeons. Surgical techniques of these lesser-known regional flaps will be presented in addition to treatment algorithms for approaching difficult patients.

Outcome Objectives: (1) Recognize multiple different regional flaps, free flaps, and other reconstructive methods of repairing complex head and neck wounds. (2) Compare functional and cosmetic outcomes of different reconstructive options. (3) Understand reconstructive options for less-than-ideal patients, when traditional reconstructions are not possible.

Technical Considerations to Decrease Burnout in Microvascular Surgery

Andrea M. Park, MD (moderator); P. Daniel Knott, MD; Rahul Seth, MD

Session Description: This course will discuss the definition of professional burnout and methods the microvascular reconstructive surgeon can use to decrease burnout rates that have been inherent to the field. In particular, high complication rates and take-backs to the operating room cause significant stresses. The panel will discuss microvascular techniques and principles to increase success rates to well above 95%, including technical considerations, operating room functionality, and adjunctive tools. Ultimately, with improved success, the microvascular surgeon may enjoy a greater surgical longevity and balanced lifestyle, which is

important to ensure the success of microvascular surgery within our specialty. This presentation aims to demonstrate methods that may improve physician wellness for the microvascular surgeon.

Outcome Objectives: (1) Understand the negative effect of profession burnout. (2) Appreciate the challenges facing microvascular surgery. (3) Develop algorithmic methods to decrease burnout and increase microvascular success.

Head and Neck Surgery

Advanced/Recurrent Pediatric Differentiated Thyroid Cancer: Beyond the Guidelines

Ken Kazahaya, MD, MBA (moderator); Andrew J. Bauer, MD; Lourdes Quintanilla-Dieck, MD; Fernando Escobar, MD

Session Description: With the first guidelines for the management of pediatric thyroid nodules and differentiation of thyroid cancer from the American Thyroid Association in 2015 and the recent Association of Clinical Endocrinology/American Head and Neck Society consensus statement on pediatric benign and malignant thyroid surgery released in 2020, there is increasing guidance for the management of thyroid nodules and cancer in children. However, the recommendations are aimed more at the initial evaluation and management of nodules and radioactive iodine (RAI)-responsive differentiated thyroid cancer. There is a paucity of information and guidance for the management of pediatric patients who present with morbidly advanced disease or who develop progressive, RAI-refractory thyroid cancer. In a July 2020 article published in *JAMA Otolaryngology–Head & Neck Surgery*, a recommendation was made to consider a paradigm shift in the care for these patients using oral, systemic chemotherapy, either tyrosine kinase inhibitors and/or oncogene-specific targeted therapy, in an effort to reduce surgical and medical morbidity and improve outcome. This panel will discuss the management of advanced or recurrent thyroid cancer. The use of systemic therapy as well as surgical and non-surgical modalities for invasive thyroid cancer in children and adolescents will be presented.

Outcome Objectives: (1) Recognize and ensure complete evaluation of advanced thyroid cancer in children and adolescents. (2) Understand targets of action and clinical application of systemic, oral chemotherapy for advanced, progressive thyroid cancer and to define their clinical indication for use. (3) Compare surgical and nonsurgical management of persistent or recurrent disease in the neck and formulate a plan to optimize outcome and reduce treatment associated morbidity.

Controversies in Parotid Surgery: Is There Evidence? Part I

Samir Khariwala, MD (moderator); Richard V. Smith, MD; Bevan Yueh, MD, MPH; Derrick T. Lin, MD

Session Description: This miniseminar addresses controversial, but commonly encountered, issues in the management of benign and malignant parotid disease.

We will review the data regarding (1) capsular dissection for pleomorphic adenoma and other benign salivary tumors, (2) superficial vs total parotidectomy for both primary malignancy and cutaneous metastases, (3) indications for neck dissection with primary parotid malignancy, (4) management of the facial nerve in the setting of malignancy, and (5) complication rates and management. This session will allow for audience interaction and appeal to general otolaryngologists, academicians, and trainees, in addition to the head and neck oncological surgeon. It will cover the topics above using a combination of didactics, audience response queries, and case-based examples.

Outcome Objectives: (1) Use an evidence-based framework to determine appropriate use of capsular dissection in benign parotid disease. (2) Understand indications for superficial vs total parotidectomy as well as the use of neck dissection in parotid malignancy. (3) Understand the data-based approach for facial nerve management in malignancy and prevention/management of complications.

Controversies in Parotid Surgery: Is There Evidence? Part II

Richard V. Smith, MD (moderator); Samir Khariwala, MD; Carol R. Bradford, MD, MS; Michael G. Moore, MD

Session Description: This miniseminar addresses controversial, but commonly encountered, issues in the management of benign and malignant parotid disease. We will review the data regarding (1) capsular dissection for pleomorphic adenoma and other benign salivary tumors, (2) superficial vs total parotidectomy for both primary malignancy and cutaneous metastases, (3) indications for neck dissection with primary parotid malignancy, (4) management of the facial nerve in the setting of malignancy, and (5) complication rates and management. This session will allow for audience interaction and appeal to general otolaryngologists, academicians, and trainees, in addition to the head and neck oncological surgeon. It will cover the topics above using a combination of didactics, audience response queries, and case-based examples.

Outcome Objectives: (1) Use an evidence-based framework to determine appropriate use of capsular dissection in benign parotid disease. (2) Understand indications for superficial vs total parotidectomy as well as the use of neck dissection in parotid malignancy. (3) Understand the data-based approach for facial nerve management in malignancy and prevention/management of complications.

Controversies in Skull Base Surgery: A Multidisciplinary Discussion

Zain H. Rizvi, MD (moderator); Adam M. Zanation, MD; Martin J. Citardi, MD; Shirley Y. Su, MBBS, FRACS

Session Description: Treatment of skull base tumors requires making challenging decisions affecting critical structures that can have a lasting effect on function. Quality of life, oncologic outcomes, and treatment sequelae must all be taken into consideration. Through debate and discussion, this

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multisubspecialty panel aims to shed light and achieve a consensus on topics such as induction therapy, margin control, management of the functional eye, decision making for reconstruction, smell preservation, and other controversial areas in the field.

Outcome Objectives: (1) Recognize areas in which decision making in skull base surgery is not clear and considerations for oncologic outcome and quality of life may be at odds. (2) Understand and compare practices and management of skull base tumors. (3) Implement the management strategies outlined during the discussion into practice.

Elderly H&N Cancer Patients: To Operate or Not? Part I

Sidharth V. Puram, MD, PhD (moderator);
Nicole C. Schmitt, MD; Neal D. Futran, MD, DMD;
Jonas T. Johnson, MD

Session Description: As the average age of individuals across the world continues to rise, the elderly represent an increasing proportion of patients with head and neck cancer. Comorbid conditions, restricted life expectancy, and other factors must be carefully considered when exploring treatment options for these patients, including traditional modalities of therapy (surgery, radiation, and systemic therapy) and palliative options. However, these patients also pose unique challenges when undergoing treatment, as elderly patients are more likely to experience complications and treatment interruptions. In this seminar, we will provide an interactive but didactic introduction to the management of elderly patients with head and neck cancer followed by a tumor board-based panel. The didactic portion will provide an evidence-based summary of the options (including reconstructive techniques), challenges, outcomes, and complications associated with treating elderly head and neck cancer patients. Patient indices other than age, which can be helpful in the medical decision-making process, will also be discussed, along with palliative care and the surgeon's role in facilitating palliation. The tumor board discussion will provide a rich foundation of 6 patient cases, with discussion and debate by widely renowned panelists. Audience participation and feedback via live, interactive polling throughout the cases will be integrated to help shed further insight into practice patterns, audience preferences, and changes in opinion as the seminar progresses. Given the challenges posed by this unique set of patients, this topic should be of value to otolaryngologists across diverse practice settings.

Outcome Objectives: (1) Describe options, outcomes, and complications of surgically treated, elderly patients with head and neck cancer. (2) Incorporate measures other than age (eg, frailty) in the treatment selection process. (3) Define the role of the head and neck surgeon in end-of-life discussions and palliative care.

Equitable HNC Care: Improving Access, Decreasing Delays, and Addressing Disparities

Carol M. Lewis, MD (moderator);
Evan M. Graboyes, MD, MPH; John D. Cramer, MD;
Chanita Hughes-Halbert, PhD

Session Description: Two of the National Academy of Medicine's pillars of health care quality include the delivery of timely care and the delivery of equitable care. However, for patients with head and neck cancer (HNC), treatment delays across the cancer continuum from initial presentation and diagnosis through treatment initiation and completion of adjuvant therapy are highly prevalent and strongly associated with poor oncologic outcomes. Inadequate access to care and subsequent treatment delays among patients with HNC also drive profound racial disparities in HNC-related outcomes and mortality. In this panel, we highlight the oncologic and moral imperative to delivery of timely and equitable HNC care. We also synthesize existing data about the prevalence of treatment delays and their contribution to observed disparities in outcomes. We will then discuss strategies to address disparities and improve access to timely HNC care. Finally, we situate the issues of racial disparities in access to care and treatment delay among patients within HNC within the broader context of cancer disparities in the United States. This interactive forum focuses on enhancement of knowledge and delivery of practical, action-oriented information. Goals of the miniseminar include (1) characterizing how inadequate access to care and treatment delays across the head and neck continuum contribute to racial disparities in HNC outcomes, (2) enhancing ongoing efforts by American Academy of Otolaryngology–Head and Neck Surgery members to address racial disparities within head and neck oncology by providing them with the knowledge and tools to begin to effect change in their clinical practices and/or health systems, and (3) providing a framework for understanding how issues of inadequate access and treatment delays within head and neck oncology fit within the larger framework of disparities in oncology care and outcomes in the United States.

Outcome Objectives: (1) Recognize that treatment delays are highly prevalent across the head and neck treatment continuum, disproportionately burden racial minorities, and contribute to racial disparities in outcomes. (2) Examine the drivers of disparities in HNC outcomes and how quality improvement-based methodologies may improve timely access to HNC care across a broad range of clinical practice types. (3) Explain how racial disparities in access to care and timely care within head and neck oncology fit within the broader context of racial disparities in access to oncology care.

Head and Neck in a Pandemic: Lessons Learned From COVID-19

Caitlin P. McMullen, MD (moderator);
Vikas Mehta, MD; Evan M. Graboyes, MD, MPH;
Andrew G. Shuman, MD, FACS

Session Description: The COVID-19 pandemic brought many otolaryngology and head and neck practices into sharp focus. Critical resources were diverted to acute care specialties on the front lines. Head and neck cancer care was upended, and surgeons witnessed treatment delays resulting in worse oncologic outcomes and the exacerbation of

existing health care disparities. Caring for patients with head and neck cancer under severe acute resource constraint and infection risk of COVID-19 required health care systems and clinicians to develop innovative care delivery strategies to optimize timely, equitable, head and neck cancer care delivery. As a result, several approaches emerged to minimize treatment delays, develop ethical frameworks for prioritization of care and resources, enhance access, and minimize viral transmission; these important innovations are likely to persist into the foreseeable future. Lessons learned during this experience will prepare head and neck surgeons for potential subsequent events that may similarly strain health care resources. The goal of this interactive panel presentation is to understand important lessons learned about cancer care delivery and outcomes during the COVID-19 pandemic in various jurisdictions. These expert panelists will discuss the ethical considerations of surgical prioritization and the clinical practice changes that were implemented. The panelists will provide a framework for ongoing decision making with the goal of minimizing health care disparities and optimizing oncologic outcomes while resources are restricted.

Outcome Objectives: (1) Understand the effects of the COVID-19 pandemic on head and neck cancer patients in various health care systems and regions. (2) Recognize the components of attendees' health care systems that may contribute to inequities and demonstrate knowledge of the ethical considerations when caring for cancer patients during a pandemic. (3) Apply the lessons learned to address disparities and care gaps even after the resolution of the COVID-19 pandemic and in possible future disaster situations.

Immunotherapy for Cancer Treatment: I01

Larissa Sweeny, MD (moderator); Clint T. Allen, MD; Arun Sharma, MD, MS; Cherie-Ann O. Nathan, MD

Session Description: Head and neck cancer (HNC) is a heterogeneous disease, with advanced/recurrent disease having a poor prognosis with low survival rates. In recent years, immunotherapy has shown promise as a new therapeutic pathway, and pembrolizumab has been approved as a first-line agent in the treatment of recurrent or metastatic head and neck squamous cell carcinoma. Targeted therapies, such as those for immune checkpoints of programmed cell death 1 and programmed cell death ligand 1, have been the agents with the greatest therapeutic potential. Patients newly diagnosed with squamous cell carcinoma of the head and neck, whether by general otolaryngologists or head and neck surgeons, are also inquiring about immunotherapy with increasing frequency. Having a fundamental understanding of immunotherapy, its current indications, and its future possibilities can be useful for counseling patients. This panel, geared toward general otolaryngologist, head and neck surgeons, and trainees, will provide an overview of basic immunotherapy principals, followed by more in-depth review of immunotherapy agents for the treatment of mucosal and cutaneous malignancies of the head and neck.

Outcome Objectives: (1) Understand the basic principles of cancer immunotherapy. (2) Describe immunotherapies currently being used for the treatment of mucosal HNC. (3) Identify immunotherapies currently being used for the treatment of cutaneous HNC.

Immunotherapy for Cancer Treatment: I02

Larissa Sweeny, MD (moderator); Nicole C. Schmitt, MD; Eleni M. Rettig, MD; Daniel L. Faden, MD

Session Description: This is the second part of the popular course, Immunotherapy for Cancer: What the Otolaryngologist Needs to Know. In recent years, immunotherapy has shown promise as a new therapeutic pathway for the treatment of head and neck cancer. This second part of the course will focus on emerging biomarkers in oncology, ongoing clinical trials, and exciting future directions for the field. Understanding the current state and future directions of immunotherapy is valuable for counseling patients. This panel, geared toward general otolaryngologist, head and neck surgeons, and trainees, will provide an in-depth review of biomarkers, ongoing clinical trials, and potential future agents.

Outcome Objectives: (1) Understand new and emerging biomarkers for head and neck cancer (HNC). (2) Identify ongoing clinical trials evaluating immunotherapies for treatment of HNC. (3) Understand new and emerging immunotherapies for HNC.

Integrative Approaches for Healthy Survivorship in Head and Neck Cancer

Marilene B. Wang, MD (moderator); Cherie-Ann O. Nathan, MD; Chau T. Nguyen, MD; Malcolm B. Taw, MD

Session Description: Survivorship in head and neck cancer patients requires a multidisciplinary approach to address the sequelae of the intense treatment regimens of surgery, radiation, and chemotherapy. Although the cancer has been eradicated, patients must deal with the treatment's significant impact on their physical and emotional health. It is important for physicians to recognize the importance of maintaining well-being and quality of life for head and neck cancer survivors. In this expert panel, we will discuss integrative approaches to optimize both oncologic outcomes and quality of life for head and neck cancer survivors. Integrative treatments, including herbal therapies, dietary supplements, nutritional strategies, exercise, acupuncture, and mind-body techniques will be discussed. The rationale for incorporating integrative approaches for cancer survivors will be presented, with an emphasis on understanding the evidence for their potential harm and benefits.

Outcome Objectives: (1) Discuss issues faced by head and neck cancer survivors, including physical and emotional sequelae of treatment. (2) Discuss integrative treatments for head and neck cancer patients, including herbal and dietary supplements, nutritional strategies, and mind-body techniques, evidence, risks, and benefits. (3) Analyze the integrative approach to the care of the cancer survivor and its role in improving oncologic outcomes and quality of life.

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Is Bigger Really Better? The State of Surgical Margin Assessment

Daniel L. Faden, MD (moderator); Mark A. Varvares, MD; Jeremy D. Richmon, MD; Eben L. Rosenthal, MD

Session Description: The status of surgical margins in head and neck cancer is a key component driving outcomes and adjuvant treatment choices. Despite this, there is no consensus on many basic questions: What is considered a positive margin or close margin? When should a patient with close margins receive adjuvant therapy? Should margin sizes be the same in different subsites? In this panel presentation we will (1) review the evidence surrounding margin assessment in the oral cavity and decision making for adjuvant treatment, giving practical recommendations while highlighting areas of controversy and (2) review the emerging literature dealing with margin assessment in the oropharynx, with an emphasis on transoral robotic surgery and need for adjuvant therapy based on margins. Lastly, the field of surgical margin assessment is rapidly evolving with new technologies on the horizon. Here, we will discuss emerging technologies for assessment of margins, including light-guided surgery using fluorescent markers and intraoperative tongue ultrasound. The overarching purpose of this presentation is to present practical guidelines for margin assessment and utilization of this information for treatment choices in clinical practice, based on existing literature.

Outcome Objectives: (1) Summarize the literature surrounding appropriate margins in the oral cavity, use of adjuvant treatment, and areas of controversy. (2) Discuss how and why margins may differ between different anatomic sites, such as in the oropharynx vs oral cavity. (3) Recognize the emerging technologies in surgical margin assessment.

p16+ (HPV+) OPSCC: A Surgical Approach to Management

Sidharth V. Puram, MD, PhD (moderator); Jose P. Zevallos, MD; Ryan S. Jackson, MD; Wade L. Thorstad, MD

Session Description: With the increasing use of transoral robotic surgery, p16+ (human papillomavirus [HPV]+) oropharynx squamous cell carcinoma (OPSCC) is increasingly being managed surgically. However, the widespread adoption of transoral robotic surgery does not relinquish the general otolaryngologist or head and neck surgeon from following evidence-based medicine and demands even greater attention to disease attributes, institutional capabilities, and patient goals. Importantly, a clear understanding of the role for adjuvant therapy in the context of a more surgically focused management paradigm is critical to improve communication with patients and set appropriate expectations. This multidisciplinary panel will discuss a surgically focused approach to HPV+ OPSCC, including treatment options for HPV+ OPSCC as well as criteria for identifying ideal surgical candidates. Discussion will be presented in a tumor-board style and, when applicable, include images and videos from surgical cases

performed. An emphasis will be placed on evidence and previously published studies, as well as ongoing clinical trials (eg, Eastern Cooperative Oncology Group 3311). Our discussion will importantly extend to our institutional focus on surgical management and the rationale and patient management considerations that accompany this approach. In particular, we will focus on the options for adjuvant therapy and factors that determine the sites and dosage of radiation received. This important topic will be approached through case-based discussion, including live polling of the audience to help shed insight into state-of-the-art practice patterns, while incorporating the input of experts in head and neck oncology.

Outcome Objectives: (1) Understand the treatment options based on the National Comprehensive Cancer Network guidelines for p16+ OPSCC. (2) Describe the rationale and approach for surgically focused management of p16+ OPSCC. (3) Appreciate the major do's and don'ts of p16+ OPSCC treatment, including the role of adjuvant therapy.

Preventing and Treating Osteoradionecrosis: A Stepwise Approach With the Experts

Alice L. Tang, MD (moderator); Chad A. Zender, MD; Matthew O. Old, MD; Marita S. Teng, MD

Session Description: Osteoradionecrosis (ORN) and soft-tissue necrosis are causes of significant morbidity in head and neck cancer survivors. An evidence-based approach of the treatment of ORN continues to evolve with both surgical and nonsurgical management. For advanced ORN, the gold-standard treatment is surgical resection of the hypoxic and hypovascular necrotic bone with immediate reconstruction with vascularized tissue into the irradiated fields. However, there are special considerations for this type of intervention given that previously irradiated and/or operated environments offer unique challenges. Similarly, soft-tissue necrosis after radiation can be a diagnostic challenge, as tumor recurrence is always a consideration. Recognizing when to treat can also be problematic as it is difficult to determine if and when these ulcers will heal without surgical intervention with vascularized tissue. Experts will review the evidence and share their personal experiences of operating in these distinct conditions. In addition, this session will also analyze the conservative management options and review recently published protocols for early ORN.

Outcome Objectives: (1) Understand diagnosing ORN and soft-tissue necrosis in head and neck cancer survivors. (2) Understand conservative management for ORN and how to implement up-to-date protocols appropriately. (3) Understand the unique challenges in performing reconstructive surgery in the setting of ORN and soft tissue necrosis.

Reconstructive Showdown 2021

Blake Golden, MD (moderator); Kelly Michele Malloy, MD; Gina D. Jefferson, MD; Eben L. Rosenthal, MD

Session Description: Come join us for the 2021 Reconstructive Showdown! Here we will debate the best reconstructive

techniques for common cutaneous, mucosal, soft tissue, and traumatic defects. Cases will be presented in entertaining debate-style format by our expert reconstructive surgeons. The audience will ultimately decide which presenter is most convincing through audience polling. Participants will leave able to recognize which local, regional, or free flap works best for a variety of common facial, parotidectomy, and oral cavity defects. Additional perspective will be provided on what criteria should be used to drive intraoperative decision making. New this year will be a greater focus on best techniques to manage and indeed mitigate perioperative complications in reconstructive surgery. With panelists of diverse backgrounds and training, our session will provide insight into the various approaches to these reconstructive challenges and how to plan appropriately to optimize the chance of long-term success. Join us for this lively discussion to learn from our team and share your experiences as well.

Outcome Objectives: (1) Compare and contrast various local and regional flap options for common cutaneous, mucosal, and soft tissue defects. (2) Recognize when free tissue transfer/advanced reconstructive care may be necessary for more extensive head and neck defects, both from malignancy and secondary to trauma. (3) Manage early and late perioperative complications of common cutaneous and mucosal reconstructions.

Laryngology/Broncho-Esophagology

The Actor and Singer as Patients of the Laryngologist

Robert T. Sataloff, MD, DMA (moderator);
Michael S. Benninger, MD; Albert L. Merati, MD;
William Riley

Session Description: This course will use a panel discussion format supplemented by digital slides and video, as well as audio presentations, for ear training. This course will help practitioners become familiar with practical aspects of diagnosis and treatment in actors and singers.

Outcome Objectives: (1) Recognize special aspects of history taking and physical examination in professional singers and actors. (2) Describe common diagnoses in professional singers and actors. (3) Assess special aspects of treatment of professional singers and actors.

Avoiding Airway Disasters: Team Dynamics and Pearls

VyVy N. Young, MD (moderator); Milan R. Amin, MD;
Andrew J. McWhorter, MD; George Pasvankas, MD

Session Description: Operative airway management can occasionally be hazardous, whether expected or unexpected, related to infection, angioedema, malignancy, or airway stenosis. The otolaryngologist must be prepared to handle these situations. Through a discussion/question-and-answer format, this course will explore various options for handling these potentially emergent situations, including newer techniques such as

high-flow oxygenation and high-frequency jet ventilation. Emphasis will be placed on practical pearls and techniques that may be beneficial to participants in these situations—especially from the anesthesia perspective. Suggestions for how to develop a specialized airway anesthesia team as well as a daily “airway huddle” will be provided, including those from an anesthesiologist with pertinent firsthand experience and laryngologists with varied clinical experiences at their institutions.

Outcome Objectives: (1) Discuss multiple options for management of the challenging operative airway including recommendations from anesthesia perspective. (2) Describe tips for development of a specialized airway anesthetic team at your hospital and practical advice to optimize patient care and safety in the absence of such a team. (3) Develop and implement a preoperative airway huddle.

Avoiding the Challenging Airway: The Team Approach

Rebecca J. Howell, MD (moderator); Albert L. Merati, MD;
Anna M. Pou, MD; Stuart Bertsch, MD

Session Description: Shared airway management is fundamental to a successful operation in otolaryngologic surgery; how to communicate with your anesthesiologist to avoid unnecessary airway complications is imperative. The Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society (NAP4) demonstrated that 39% of major airway complications involved an acute or chronic disease of the head, neck, or trachea. Assessment, planning, and communication between teams were identified as contributing influences. Of those requiring a surgical airway, poor planning of an airway strategy and failure to change routine plans were recognized factors. As otolaryngologists, we face a unique relationship with our anesthesia colleagues in the shared airway. While in most circumstances this is a smooth transition, when airway complications arise, they are serious, rapid, and we are asked to perform the surgical airway. Unique patient populations in otolaryngology include acute and chronic head and neck cancer, professional voice, glottic and subglottic stenosis, and obstructive sleep apnea. Unique planning for airway management includes awake fiber-optic intubation, laryngeal mask airway, endotracheal tube choice, jet ventilation (supraglottic and subglottic), awake intravenous sedation, and sleep endoscopy. Induction and emergence of anesthesia are the critical check points for successful ear, nose, and throat surgery; improved preparation and communication between colleagues can make the climbing and descending smooth and avoid turbulence.

Outcome Objectives: (1) Identify unique patients at risk and critical members of the airway team. (2) Summarize pertinent medical history, goals of surgery, and early identification of the difficult intubation with anesthesia. (3) Describe the importance of induction, emergence, and recovery phases of anesthesia.

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Challenging Bronchoscopy: Do's and Don'ts for a Successful Procedure

Michel Nassar, MD (moderator); Kaalan E. Johnson, MD; Charles M. Myer IV, MD; Christina J. Yang, MD; Evan J. Propst, MD, MSc; Scott M. Rickert, MD

Session Description: Bronchoscopy is a common procedure but can be occasionally challenging. A panel of airway experts will present difficult cases they have encountered and ask for the audience's assistance in managing those cases. They will also discuss their techniques and rationale for a successful outcome. Simulation airway models will be used for live demonstration of the techniques described.

Outcome Objectives: (1) Recognize and manage difficult bronchoscopy cases while integrating tips from airway experts into the clinical algorithm. (2) Avoid common bronchoscopy pitfalls. (3) Showcase airway simulation as essential for learning and practicing safe airway surgery.

Challenging Voice Cases: Foundation to Finesse in Voice Disorder Care

Clark A. Rosen, MD (moderator); Milan R. Amin, MD; Douglas Roth, MM, MA, CCC-SLP; Lyndsay L. Madden, DO

Session Description: This panel will highlight both foundation principles of voice care and subtle but important concepts of voice care through the medium of challenging voice cases. Each panelist will present a challenging clinical case that will be educational for the participants. These will be drawn from the important laryngological topics of muscle tension dysphonia (functional voice disorders), vocal fold paralysis, and vocal fold lesions. The panel will also involve a speech-language pathologist who specializes in voice disorders to demonstrate the important role of multidisciplinary nature of voice evaluation and care in selected laryngological conditions. Each case will involve the presenting symptoms and recording of the voice and laryngeal examination, physical examination findings, and laryngeal examination video. The panelists and participants will be invited to ask further questions and develop a differential diagnosis using audience polling. The actual clinical care and outcome will be then presented and discussed. This approach will provide a great educational opportunity for the participants to learn from challenging voice cases in a real-life situation.

Outcome Objectives: (1) Explore the foundational principles of voice disorders diagnosis. (2) Evaluate the role of speech-language pathology care in the diagnosis and treatment of voice disorders. (3) Give examples of the various surgical options for treating voice disorders including the indications, results and complications.

Clinical Utility of HRM: How to Integrate Into Your Practice

Mark Fritz (moderator); Rebecca J. Howell, MD; Maggie A. Kuhn, MD; Ashli O'Rourke

Session Description: Patients often have difficulty describing their dysphagia symptoms. Sometimes they even have symptoms more related to globus sensation or chronic cough rather than solid food dysphagia. Our program goes in depth with how you can go further than just the standard instrumental assessments of swallowing (fiber-optic endoscopic evaluation of swallowing, video fluoroscopic swallow study) with the use of high-resolution manometry (HRM). We will present a case-based series of patients who benefit from their course of diagnosis and treatment with the use of HRM. We will also present several different practices and how HRM is used in workups, integrated into clinic flow, and ultimately billed. Providers do not have to have prior knowledge about HRM to attend, as this course is designed for providers to get a glimpse of how HRM can work in their individual practices for their specific patients with dysphagia symptoms unexplained by other standard methodologies. Through the cases, we will describe the basic results seen in HRM tests and how this can guide future care for the dysphagia patient. Brief mention will also be made for how HRM will possibly be used in the future of swallowing care with the use of pharyngeal manometry and biofeedback.

Outcome Objectives: (1) Recognize when HRM might be useful in the workup of a dysphagia patient. (2) Implement a practice pattern where HRM can be used. (3) Analyze and interpret an HRM result and how it affects further patient care.

Cost-effective Approaches to Laryngopharyngeal Reflux: American and European Perspectives

Lee M. Akst, MD (moderator); Jerome R. Lechien, MD, PhD; Marc J. Remacle, MD, PhD; Thomas L. Carroll, MD

Session Description: Diagnosis and treatment of presumed laryngopharyngeal reflux (LPR) remains controversial. Empiric medication trials remain widespread for suspected LPR, despite emerging evidence that questions both efficacy and safety of this approach—many patients with presumed LPR are nonresponders to proton pump inhibitor (PPI) trials, and these medications have significant cost and potential side effect profiles with prolonged use. Interestingly, because of different available tests and therapeutics, LPR treatment patterns are somewhat different between North America and Europe. By exploring differences and similarities between these regions, with a focus on both cost and effectiveness of both reflux diagnosis and subsequent treatment, this panel hopes to see what otolaryngologists from across the world can learn from one another in LPR care. Discussion will focus on both diagnostics and therapeutics and will emphasize a “personal medicine” approach where evaluation focuses on particular patient complaints rather than grouping all cough, throat clear, hoarseness, postnasal drip, and globus pharyngeus patients under the overly broad umbrella of “LPR.” Treatment discussions will similarly emphasize this personal medicine approach and encourage participants to think beyond PPI alone as we consider alginate therapy, lifestyle modifications, and

other treatments for what might be acid reflux, nonacid reflux, or mixed reflux. Finally, there will be discussion of testing (pH impedance, oropharyngeal pH probe, and pepsin assays) as they differ between North America and Europe.

Outcome Objectives: (1) Understand differences in LPR care between North America and Europe as they illustrate potential pearls and pitfalls in care of patients with presumed LPR. (2) Diagnose LPR within a framework that tailors workup and differential diagnosis specifically for each individual patient. (3) Apply cost-effective, personalized algorithms for treatment of presumed LPR, which may include lifestyle modifications and alginate therapy in addition to PPI.

Diagnostic Test Selection in Chronic Cough and Dysphagia

Gregory R. Dion, MD (moderator); Milan R. Amin, MD; Maggie A. Kuhn, MD; VyVy N. Young, MD

Session Description: Otolaryngologists are faced with an increasing array of diagnostic tests for patients with chronic cough and/or dysphagia. High-resolution manometry, aerodynamic analysis, dual pH/impedance testing, videofluoroscopy, videostroboscopy, and high-speed digital imaging provide varying information to traditional flexible endoscopy, pulmonary function studies, and computed tomography or magnetic resonance imaging studies. Each of these diagnostic tools measures specific variables involved in cough and deglutition. With increased scrutiny on cost-effective utilization of health care resources, it is crucial to explore the role of these diagnostic tools in efficiently diagnosing laryngologic conditions accurately and timely while exposing the patient to the lowest cost and risk. The purpose of this panel is to explore optimal implementation of these diagnostic tests in commonly encountered otolaryngology patients through case-based studies evaluating patients with complaints of chronic cough and/or dysphagia.

Outcome Objectives: (1) Examine the available diagnostic assessment tools for patients with chronic cough and/or dysphagia through case-based discussions. (2) Determine benefits and drawbacks of these diagnostic tools to include expediency, cost, radiation exposure or other risks, and clinical utility of these tests. (3) Compare diagnostic test utilization paradigms for the common laryngological disorders of chronic cough and dysphagia.

Emerging Technologies in Laryngology: Artificial Intelligence and More

Lee M. Akst, MD (moderator); Andres M. Bur, MD; Matthew R. Naunheim, MD; Kristina Simonyan, MD, PhD

Session Description: Artificial intelligence technologies are revolutionizing medicine, ushering in advances in personalized medicine and diagnostic imaging. These machine-learning approaches are being mirrored by other technological advances that are moving surgical treatment forward as well. These emerging technologies have potential to impact all of otolaryngology, just as they are already affecting other areas

of medicine. In laryngology in particular, recent advances include computational neural networks aiding in identification and characterization of laryngeal lesions; computer-aided measures of vocal fold motion; artificial intelligence techniques applied to imaging analysis, allowing for magnetic resonance imaging (MRI) diagnosis of laryngeal dystonia; potential for cooperative-control steady-hand robotic platforms to aid precision of microlaryngeal surgery; and additional evolutions in microlaryngeal surgery using force sensors attached to laryngoscopes to reduce operative complications and postoperative pain. These advances relate to nascent technologies; while none are in routine clinical practice at present, as these emerging technologies mature, they have the potential to change laryngology, both in the office and in the operating room. To inform otolaryngologists about the technological advances that will transform diagnostic and operative laryngology in the future, this panel will provide an overview of artificial intelligence approaches to medical innovation in general and then update participants about each of the individual topics mentioned above, taught by instructors who have participated in the studies that are helping to move the field forward.

Outcome Objectives: (1) Discuss how machine learning can be used to analyze images and review how this can be applied to laryngoscopy in computer-aided characterization of laryngeal pathologies and vocal fold motion. (2) Demonstrate how emerging advances in microlaryngeal surgery such as steady-hand robotic platforms and force sensors may improve precision and reduce morbidity of suspension laryngoscopy. (3) Examine how machine-learning applications in MRI analysis can improve diagnosis of spasmodic dysphonia.

Laryngeal Manifestations of Autoimmune Disease: Diagnosis, Evaluation, and Treatment Challenges

Inna A. Husain, MD (moderator); Paul C. Bryson, MD; Laura Dominguez, MD; Alexandra Villa Forte, MD, MPH

Session Description: Autoimmune diseases comprise a heterogeneous group of connective tissue disorders that can manifest in the larynx and trachea. Early diagnosis and proper management, both surgical and medical, are keys to preserving laryngeal function. This course will teach learners to identify the laryngeal and airway manifestations of a variety of rheumatologic conditions (including rheumatoid arthritis, systemic lupus erythematosus, Sjogren syndrome, relapsing polychondritis, sarcoid, and granulomatosis with polyangiitis) and proper next steps in workup and management. Both medical and surgical management will be reviewed. By the end of the course, participants will be able to recognize laryngeal manifestations of autoimmune disorders, describe appropriate workup, and identify management strategies.

Outcome Objectives: (1) Recognize the laryngeal and tracheal manifestations of autoimmune disease. (2) Identify the appropriate workup to screen and diagnosis autoimmune

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disease of the larynx. (3) Outline treatment options for laryngeal and airway pathology related to autoimmune disease.

Leuko Lot: A Lot of Laryngeal Leukoplakia

Priya D. Krishna, MD, MS (moderator); Nausheen Jamal, MD; Mark A. Fritz, MD; Ross Mayerhoff, MD

Session Description: Laryngeal leukoplakia is a common cause of hoarseness, and the differential diagnosis is vast. This presentation will attempt to provide a framework for workup of laryngeal leukoplakia. The panel, presented by 4 fellowship-trained laryngologists, is meant to discuss some of the more challenging cases in which it is difficult to distinguish between infectious and neoplastic etiologies and when repeat biopsy vs a more definitive resection is appropriate.

Outcome Objectives: (1) List the 3 most common etiologies of laryngeal leukoplakia in both infectious and noninfectious/neoplastic. (2) Categorize laryngeal leukoplakia into either infectious or neoplastic etiologies based on discrete history and laryngoscopic findings. (3) Implement a laryngeal leukoplakia algorithm in deciding observation vs treatment in a given patient.

Multidisciplinary Tracheostomy Teams: Transforming Care and Preventing Harm Amid the Pandemic

Brandon S. Hopkins, MD (moderator); Vinciya Pandian, PhD, MBA, MSN, RN; Tiffany P. Raynor, MD; Michael J. Brenner, MD

Session Description: A landmark study found that in intensive care units (ICUs), tracheostomy incidents accounted for up to half of all airway-related deaths and hypoxic brain damage. Multidisciplinary adult and pediatric tracheostomy teams have achieved dramatic reductions in adverse events and improved patient outcomes, but dissemination of highly reliable practices has lagged. This panel addresses this gap by providing a strategy for rapid performance improvement with specific building blocks for enhancing care. Five key drivers—multidisciplinary ward rounds, standardized protocols, interdisciplinary education and staff allocation, patient and family involvement, and using data to drive improvement—can result in transformative change. We present data from 4 institutions, providing turnkey solutions and lessons learned from the creation of teams. We cover from the index procedure to decannulation and discharge, discussing obstacles encountered and how they are overcome. After presenting institution-level experience, we report on the largest implementation of these principles to date, drawing on prospectively captured patient-level global data from nearly 10,000 cases. We take a deep dive into a 3-year-long, 20-hospital-wide multipronged implementation that involved mixed-methods analysis, data tracking, and benchmarking to demonstrate powerful, statistically significant effects of reducing hospital and ICU length of stay, ventilator duration, time to cuff deflation, time to first vocalization, time to first

oral intake, prevalence of anxiety and depression, and cost savings, projected at >\$15,000 per patient. While heterogeneity is a defining feature of tracheostomy, we demonstrate how across age and geographies, multidisciplinary teams are a game changer in tracheostomy care. In addition, the imperatives of the COVID-19 pandemic have necessitated additional measures in relation to aerosol-generating procedures. We curate salient data and present practical evidence-based recommendations.

Outcome Objectives: (1) Present building blocks and discuss obstacles to creating a multidisciplinary tracheostomy care team. (2) Leverage data-science and ongoing efforts to improve tracheostomy outcomes. (3) Compare the approaches of different hospital systems in the creation of tracheostomy care teams in the context of COVID-19.

Office-Based Steroid Injections for Management of Laryngeal Conditions

Matthew R. Naunheim, MD (moderator); Ramon Franco; Lindsay Reder; Guri Sandhu

Session Description: Serial intralesional steroid injection (SILSI) is a method for office-based management of inflammatory and rheumatologic disease of the larynx. Its use in subglottic stenosis has gained popularity in recent years, due to its ability to stabilize and improve airway narrowing, thus avoiding surgical procedures or working as an adjunct treatment after surgery. In addition, SILSI has the potential to be modified for use in other laryngeal conditions. The panelists will discuss what SILSI is, indications for use, and recommended treatment schedule. Detailed descriptions of the anesthetic required for SILSI and the procedural technique will be reviewed, with a renewed focus this year on the practical details. Objective outcome measures, including best practices for recording both spirometry and patient-reported outcomes, will be reviewed. Finally, the pearls and pitfalls of SILSI will be discussed, particularly as they pertain to alternatives to treatment (endoscopic or open treatment in the operating room). In conclusion, this panel will present SILSI as a practical and safe adjunct to airway management that can be implemented in otolaryngology offices.

Outcome Objectives: (1) Understand the physiology of airway stenosis/inflammation. (2) Describe practical details of in-office steroid injection. (3) Recognize limitations and patient factors that may limit the use of SILSI.

Practical Demystification of Dysphagia and Dysphonia in Parkinson's Disease

Gregory R. Dion, MD (moderator); Libby J. Smith, DO

Session Description: Otolaryngologists are faced with a growing population of patients with Parkinson's disease (PD), affecting 2% of patients older than 65 years and nearly 10 million people worldwide. These patients present with a diversity of conditions, from dysphagia and dysphonia to imbalance issues, medication side effects, sleep issues, and cognitive deficits that can make specific symptom

management challenging. Of PD patients, 82% demonstrate signs of dysphagia, worsening with later disease stage, and most have associated dysphonia. With traditional management occurring through an array of voice therapy techniques and specially designed utensils and drinking approaches, innovative new concepts and technologies for treatment have been recently developed. Vocal fold and esophageal procedures show promise in effective dysphonia and dysphagia management. This panel will explore the broad range of surgical and nonsurgical management of dysphonia and dysphagia by the otolaryngologist. Modern voice therapy advancements beyond LSVT (formerly Lee Silverman Voice Therapy), to include LSVT-LOUD, Speak-Out, and phonatory resistance training exercises (PhoRTE), as well as SpeechVive and expiratory muscle strength training, will be discussed alongside mounting evidence supporting vocal fold augmentation in select patients. The session will explain expectations of vocal fold augmentation for dysphagia and dysphonia and the potential impact of deep brain stimulation on voice and swallowing. Advances in diagnostics for esophageal function, including incorporation of esophageal high-resolution manometry, permit otolaryngologists to identify patients for whom cricopharyngeal intervention may be warranted.

Outcome Objectives: (1) Examine surgical and nonsurgical diagnostic and management approaches for dysphagia in Parkinson's patients. (2) Examine surgical and nonsurgical diagnostic and management approaches for dysphonia in Parkinson's patients. (3) Review breadth of otolaryngologic impact of PD.

Surgical Management and Pearls of Geriatric Dysphagia

Ozlem E. Tulunay-Ugur, MD (moderator); Karen M. Kost, MD, FRCSC; David E. Eibling, MD; Susan E. Langmore, PhD

Session Description: As medicine improves and there is increasing longevity, clinicians face an imminent need to understand physiological changes of aging. One of the most important is dysphagia due to significant quality-of-life implications as well as risk of mortality. In this panel, we aim to arm the otolaryngologist with the necessary tools to assess the geriatric patient with dysphagia. Emphasis will be on surgical options and patient selection, as well as perioperative care. Geriatric patients, who are not just old adults, have unique differences from younger adults. These differences require particular knowledge, as they will determine outcomes. Specifically, thorough preoperative evaluation is essential and unique in this population; therefore, concise information will be given to ensure easy application in any clinical setting. Prevention of delirium, which is also more common in this age group, will be explained. This panel will also review all surgical techniques and discuss each in detail. Technical refinements gained through years of experience will be shared.

Outcome Objectives: (1) Understand the differences between younger and older adults with regard to etiology of dysphagia and pertinent perioperative workup. (2) Understand how to

effectively diagnose and manage causes of dysphagia more commonly seen in the older population, such as cricopharyngeal dysfunction and Zenker's diverticulum. (3) Understand thoroughly all surgical techniques in the management of geriatric dysphagia and describe pearls and pitfalls of each.

Systematic Way of Diagnosing Vocal Fold Paresis

Mark S. Courey, MD (moderator); Diana N. Kirke, MD

Session Description: Vocal fold paresis is a relatively common diagnosis made by laryngologists, and this is largely due to increasing awareness of this particular phenomenon over the past 10 to 15 years. The diagnosis, however, may not always be clinically relevant, and thus one must always interpret it in the context of the presenting complaint. This session will focus on the how to diagnose vocal fold paresis based on consistent clinical findings, the investigations used to do so, and how to contextualize it within the patient's clinical presentation. In this way, we will aim to educate the attendees about which patients to intervene on, when to do so, and how.

Outcome Objectives: (1) Recognize the diagnosis of vocal fold paresis and when the diagnosis is clinically relevant. (2) Implement an appropriate treatment plan. (3) Recognize when not to intervene.

Vocal Fold Leukoplakia: Cases, Controversy, and Management

Lee M. Akst, MD (moderator); Kenneth W. Altman, MD, PhD; Matthew S. Broadhurst, FRACS; Vyas M.N. Prasad, MSc, FRCS

Session Description: This panel presentation comprehensively reviews evaluation and management of vocal fold leukoplakia. Updated from prior years, this iteration will explore management strategies through focus on a case-based approach. Though white vocal fold lesions are common, management remains challenging—doing too little may allow precancerous lesions to progress, while doing too much may create unnecessary scar and dysphonia. Using cases, panel discussion, and encompassing a variety of expert opinions and surgical techniques, this panel presentation will provide a framework for balancing oncologic with functional outcomes. It will highlight challenges, controversies, and emerging paradigms in vocal fold leukoplakia care. There will be a focus on surgical approaches, including use of potassium titanyl phosphate (KTP) and CO₂ lasers, that can be applied in current practice by any otolaryngologist, and also discussion of what techniques are appropriate in the absence of a laser. Discussion will also include future technologies and adjuvant care of laryngeal leukoplakia, encompassing narrow-band imaging, optical coherence tomography, chemotherapy, radiotherapy, and photodynamic therapy as they apply to current and future state-of-the-art management.

Outcome Objectives: (1) Understand risk of laryngeal leukoplakia progression to cancer, with a need to balance oncologic

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efficacy with function. (2) Review current and emerging techniques for accurate diagnosis, staging, and surveillance of laryngeal leukoplakia. (3) Discuss treatment alternatives for laryngeal leukoplakia in office and operating room, mentioning KTP, CO₂, and cold instrument techniques.

Zenker's Diverticulum: Do You Have All the Tools?

Rebecca J. Howell, MD (moderator); Milan R. Amin, MD; Brianna K. Crawley, MD; Philip A. Weissbrod, MD

Session Description: Treatment approaches for Zenker's diverticulum have multiplied over the past 20 years, as interventional gastroenterologists have applied their flexible endoscopic techniques to this pathology. Sufficient data have now been amassed to support the safety and efficacy of the flexible endoscopic approach. Although most otolaryngologists already possess the skills required to apply the flexible endoscopic technique, few have embraced this technology. This session presents the flexible, rigid, and combined approaches to Zenker's diverticulum, as well as the specific tools required, to ensure that otolaryngologists can offer all options to their patients. Patient selection and the advantages and drawbacks to each approach will be discussed. The goal of this session is to provide clinical information on preoperative, intraoperative, and perioperative (complications) for each technique and to introduce the flexible endoscopic approach to Zenker's diverticulum in an otolaryngology practice, ensuring patients receive the best care in each clinical scenario.

Outcome Objectives: (1) Plan and perform flexible, rigid, or combined endoscopic approaches to Zenker's diverticulum. (2) Recognize patient characteristics that favor one endoscopic approach over others. (3) Describe adverse events associated with each endoscopic and open approach.

Otology/Neurotology

The Challenging Cochlear Implant: How to Maximize Success

Richard K. Gurgel, MD (moderator); Neil S. Patel, MD

Session Description: The purpose of this session is to help cochlear implant surgeons and clinicians become more familiar with challenging clinical scenarios and how to best manage these challenges. The session will focus on clinical decision making, and pre-, intra-, and postoperative management. Clinicians will have a stronger understanding of cochlear implantation and troubleshooting problems. Topics will include but are not limited to (1) difficult anatomy—congenital malformations, CHARGE syndrome—in the setting of chronic ear disease, postmeningitis and the ossifying cochlea, and otosclerosis; (2) cochlear implant candidacy in the developmentally delayed child or adult with dementia; and (3) managing complications, such as device failure, infections, and facial nerve stimulation.

Outcome Objectives: (1) Recognize difficult clinical scenarios in cochlear implantation that require advanced decision making. (2) Treat cochlear implant patients who pose challenging clinical scenarios due to anatomy or medical conditions. (3) Manage appropriately the complications that can arise after cochlear implantation.

The Chronically Draining Ear—Why Management Fails

Peter Santa Maria, PhD, MBBS (moderator); Michael B. Gluth, MD; Wade Chien, MD; Adam Kaufman, MD

Session Description: Attendees will gain a better understanding of basic mechanisms and treatment options relevant to chronic ear disease to better plan treatment and avoid treatment failures. We will review key basic mechanisms underlying chronic otitis media with particular emphasis on underlying disease pathophysiology and histology, middle ear acoustic mechanisms relevant to diseased and reconstructed ears, and emerging concepts of microbiology and ototopical therapies.

Outcome Objectives: (1) Understand bacterial biofilm persister cells and ototopical and surgical strategies to treat these. (2) Explain mechanisms leading to the chronically draining ear. (3) Learn treatment algorithms for managing challenging chronic ears.

Cochlear Synaptopathy and Noise-Induced Hearing Loss

Marc L. Bennett, MD (moderator); Michael P. Avillion, MD; Samuel A. Spear, MD

Session Description: For decades, the hair cell or sensory component of sensorineural hearing loss (SNHL) has been at the forefront. Recently, however, animal studies are turning attention to the auditory nerve fiber (ANF), highlighting the vulnerability of the synaptic connection between the ANF and the inner hair cell to acoustic trauma. Numerous studies have demonstrated what is known as “cochlear synaptopathy,” in which acoustic overstimulation causing only a temporary threshold shift leads to permanent loss of ANF peripheral synapses while inner and outer hair cells, as well as audiometric thresholds, are preserved. To date, multiple laboratories and animal models have additionally demonstrated ANF synapse vulnerability related to aging and environmental factors, revealing synaptopathy as a possible common feature of SNHL in humans. The goal of this panel presentation is to expound on the current literature examining cochlear synaptopathy to promote better understanding of this pathology, its prevalence and impact on hearing abilities, and options for accurate clinical diagnosis.

Outcome Objectives: (1) Examine the current literature on cochlear synaptopathy in both humans and animals. (2) Evaluate the prevalence and impact on hearing abilities. (3) Discuss options for accurate clinical diagnosis and avenues for therapeutic treatment.

Conductive Hearing Loss—Not Always Otosclerosis

Meredith E. Adams, MD, MS (moderator);
Elizabeth A. Kelly, MD; Rex S. Haberman, MD;
Christopher A. Schutt, MD

Session Description: A negative middle ear exploration for otosclerosis is disappointing for the patient and surgeon alike. Perhaps worse is finding a pathology that the team is not prepared to manage or for which surgery is contraindicated. Accordingly, this panel presentation, sponsored by the American Academy of Otolaryngology–Head and Neck Surgery Foundation Otolaryngology and Neurotology Education Committee, will equip clinicians to successfully distinguish and manage the range of “can’t miss” diagnoses that mimic otosclerosis. Experienced panelists will be presented with clinical cases united by a chief complaint of conductive hearing loss (CHL). Cases will include acquired and congenital ossicular pathologies (eg, malleus head fixation), third window lesions (eg, canal dehiscence and enlarged vestibular aqueduct), occult chronic ear disease, neoplasms, pseudo-CHL, and coincident otosclerosis and another cause of CHL. Panelists will discuss, debate, and illustrate key elements of the history, physical exam, and audiometric test battery that point to specific diagnostic possibilities. They will also discuss their approaches to imaging acquisition and interpretation. Evidence-based surgical and nonsurgical management strategies for CHL will be presented for each case, including a proposal for a systematic approach to middle ear exploration when the diagnosis remains ambiguous.

Outcome Objectives: (1) Recognize the range of causes of conductive hearing loss that mimic otosclerosis. (2) Recognize key audiometric features that distinguish ossicular pathology from third window lesions. (3) Identify instances when surgical intervention is not warranted for conductive hearing loss.

Contemporary Comprehensive Management of Vestibular Schwannoma, Part I

Maroun Semaan, MD (moderator); Sarah Mowry, MD;
Alejandro Rivas, MD; Nauman F. Manzoor, MD

Session Description: The management options available for vestibular schwannoma (VS) have expanded, and a nuanced approach to the decision-making pathway is required. Patient factors influencing decision making include age, frailty, hearing status, dizziness, tumor size, morphology and growth kinetics, temporal bone anatomy, and personal preferences. A case-based discussion of the impact of these factors on the treatment algorithm will be conducted. In these patient scenarios, discussion will focus on how these factors are used to recommend observation, radiosurgery, or microsurgery. Each treatment choice is associated with benefits and risks that will be discussed in detail. Radiosurgery has been used for the treatment of VS since the 1960s and is an excellent choice for some patients. The rationale and a description of treatment planning will be presented. The open surgical approaches with the risks and benefits will be explored, including operative

videos. The multidisciplinary team counseling the patient is often guided by their training and experience; the panel consists of members with diverse training and practice backgrounds who will explore differences of opinion on various treatment options. The components and dynamics of a successful skull base team will be discussed as well.

Outcome Objectives: (1) Utilize a decision-making algorithm for VS. (2) List the surgical vs nonsurgical options for management of VS with expected outcomes. (3) Describe 3 surgical approaches to open surgical management of VS.

Contemporary Comprehensive Management of Vestibular Schwannoma, Part II

Sarah Mowry, MD (moderator); Cyrus Rabbani, MD;
Amy McMillin; Maroun Semaan, MD

Session Description: The management options available for vestibular schwannoma (VS) have expanded, and a nuanced approach to the decision making pathway is required. Care for the VS patient does not end after any of these treatment options are pursued. Posttherapy (or observational) management of VS sequelae is also particularly important to long-term patient success. The management of these problems involves a strong multidisciplinary team approach, including hearing rehabilitation, vestibular therapy, and facial nerve reanimation when necessary. Vestibular dysfunction in both the short and long term requires intervention to allow the patient to return to their daily activities. Vestibular therapy can greatly enhance and speed a patient’s recovery and will be discussed by a licensed and certified vestibular therapist. When hearing is compromised by the VS or treatment, rehabilitative hearing options are also appropriate to discuss with the patient, including various forms of amplification, osseointegrated devices, and possibly electrical stimulation of the auditory system via cochlear implantation or auditory brainstem implant. Facial nerve dysfunction after treatment is a devastating outcome for patients; however, numerous options for improved function and cosmesis are available and will be discussed by an expert in facial reanimation. A case-based approach will be discussed during the panel.

Outcome Objectives: (1) Identify 2 factors that impact on vestibular compensation after VS treatment. (2) List 3 different options for facial reanimation after VS treatment. (3) Describe the 3 different hearing rehabilitative options after VS management.

Developing a Cochlear Implant Programming Network of Private Practice Audiologists

Abraham Jacob, MD (moderator); Stephanie S. Bourn, AuD;
Cristi Moore, AuD; Michele Fusco, AuD

Session Description: Hearing loss is the most common human sensory disability, and while hearing aids are appropriate for most, cochlear implants (CIs) have become the gold standard for those with greater degrees of hearing loss and who lack benefit from conventional amplification. Despite the

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proven cost-effectiveness of CIs, market penetration remains <10%. There are many reasons for this lack of access, including racial, ethnic, socioeconomic, and geographic barriers; myths about the risks of surgery; and a lack of awareness about candidacy criteria by physicians and audiologists. A fraction of hearing aids sold in the United States are dispensed through a physician practice; therefore, the initial contact for most patients begins with an audiologist. In 2014 a pioneering effort began in Tucson, Arizona, aimed at creating a decentralized, hub-and-spoke model for cochlear implantation. The goal was to identify private practice audiologists with a track record for excellence and train them to both identify CI candidates and program recipients' devices after surgery. Prior to this program, 20 to 30 CIs were performed in Tucson per year. Now, this single-surgeon performs more than 100 CIs per year and has done so for the past 4 years. This unique panel brings together the surgeon (Abraham Jacob), CI center lead audiologist (Stephanie Bourn), and partnering community audiologist/practice owner (Cristi Moore) to discuss the program and its local/regional impact. Their evaluation and programming protocol will be shared, and specifics regarding reimbursement and financial viability will be discussed. To compare outcomes at the CI center vs partnering audiology practices, the panel will present audiometric outcomes and patient satisfaction data for 223 adult CIs performed between April 2017 and August 2019. Lastly, Michele Fusco, vice president for strategic growth channels at Cochlear Americas, will detail how Cochlear Americas has expanded this program to the national level, making tangible resources available to other otologists embracing this model.

Outcome Objectives: (1) Identify current barriers to CI access. (2) Recognize the impact of decentralized CI programming on access to surgery, patient satisfaction, and audiometric outcomes. (3) Analyze coding and reimbursement strategies that maintain financial viability for CI center audiologists as well as private practice audiology.

Dizziness: The Right Questions to Ask and Tests to Order

Meredith E. Adams, MD, MS (moderator);
Heather M. Weinreich, MD, MPH; Edward I. Cho, MD;
Jeffrey D. Sharon, MD

Session Description: How can we most effectively evaluate patients with dizziness within the confines of modern practice? During this panel, sponsored by the American Otological Society, experts in vestibular diagnosis will discuss how to integrate best evidence with clinical experience to efficiently formulate an accurate differential diagnosis for any patient with dizziness. Using illustrative cases, we will present the key questions—focused on timing, triggers, and associated symptoms—that elicit the pertinent history and minimize vague reporting. We will debate the merits of clinical questionnaires and the highest-yield physical exam elements that warrant incorporation into daily practice. With this diagnostic

framework established, we will guide clinicians in determining what tests to order, if any, by defining the specific questions that can and cannot be answered with the current array of audio-vestibular tests, imaging, and other physiologic investigations. We aim to provide approaches that clinicians can readily implement to make correct diagnoses in a timely fashion, thus expediting initiation of therapy and improving patient outcomes.

Outcome Objectives: (1) Gather efficiently an informative case history for a patient with dizziness. (2) Formulate a differential diagnosis for dizziness based on timing, triggers, and associated symptoms. (3) Select appropriate diagnostic tests that yield information necessary for patient management.

Endoscopic Ear Surgery in Clinical Practice

Michael S. Cohen, MD (moderator); Daniel J. Lee, MD;
Alicia M. Quesnel, MD; Sharon L. Cushing, MD

Session Description: This course will introduce otolaryngologists to the principles of endoscopic ear surgery (EES). Our target audience includes surgeons-in-training as well as established surgeons who wish to augment their existing surgical armamentarium with endoscopic techniques. Topics will include essential equipment, operating room layout, ergonomics, patient selection, safety, surgical techniques, pediatric and adult EES outcomes, common pitfalls, and barriers to entry. Extensive use of case videos will demonstrate how endoscopic techniques can augment, and in some cases replace, traditional microscopic approaches. Participants should leave this course with a greater understanding of how EES can be incorporated into an otologic surgical practice.

Outcome Objectives: (1) Understand the equipment, ergonomics, and patient selection necessary for getting started with endoscopic ear surgery. (2) Select cases and techniques for endoscopic ear surgery with an eye toward optimizing outcomes and minimizing complications. (3) Understand outcomes following transcanal endoscopic ear surgery in both pediatric and adult patients.

Endoscopic Ear Surgery: Tips and Pearls

Joao-Flavio Nogueira Jr, MD (moderator); Daniel J. Lee, MD;
Daniele Marchioni, MD; Muaaz Tarabichi, MD

Session Description: Endoscopic ear surgery (EES) is becoming very popular worldwide. Transcanal endoscopic-assisted procedures and combined endoscopic and microscopic surgeries have proven to be safe and effective to manage ear diseases in a minimally invasive way, preserving important anatomic structures, allowing functional approaches to well-known conditions. Moreover, endoscopes have provided a better view and understanding of traditional middle ear anatomy and physiology, allowing new landmarks, novel concepts of tissue preservation, ventilation routes, and management of other conditions within the middle ear and beyond. In this session, we will present the latest trends on EES, discussing

advantages, disadvantages, indications, results, and possible complications.

Outcome Objectives: (1) Review the endoscopic anatomy of the middle ear, discussing the important endoscopic anatomic landmarks. (2) Identify the actual indications and limitations of this minimally invasive approach, discussing the instruments and equipment needed. (3) Describe and demonstrate stepwise endoscopic middle ear approaches for several diseases of this area.

Essentials in Tympanoplasty: Present and Future

David H. Jung, MD, PhD (moderator);
Aaron K. Remenschneider, MD, MPH; Manuela Fina, MD;
John L. Dornhoffer, MD

Session Description: This course will describe surgical tympanoplasty methods. The emphasis will be on practical tips that can be used by the attendees to improve their surgical outcomes. A variety of approaches including microscopic, endoscopic, and in-office techniques will be discussed. In addition, cutting-edge research describing novel materials will be described to bring participants up to date.

Outcome Objectives: (1) Utilize the ideal tympanoplasty approach for a given size and location of perforation. (2) Understand the use of cartilage in tympanoplasty. (3) Evaluate when a microscopic vs endoscopic approach is most appropriate for tympanoplasty.

Going Rogue: The Big Tech–Driven Evolution of Acoustic Neuroma Management

Shawn M. Stevens, MD (moderator);
Calhoun D. Cunningham III, MD; Dennis I. Bojrab II, MD;
Nathan D. Cass, MD

Session Description: As our society traverses the 21st century, the influence of technology on all phases of life has been profound. However, the complexity and rapidity of technological evolution may at times become burdensome, especially in the practice of medicine. Of the recent Big Tech advances, perhaps none has been more impactful than the proliferation of online medical information and the influence of social media platforms. This panel will seek to explore the impact of these technologies specifically as they pertain to the management of patients with vestibular schwannomas. In the first part of the presentation, the panel will review current paradigms for managing vestibular schwannomas. Discussion will include advances in imaging technology, the impact of earlier diagnoses, refinements in operative technology, the influence of stereotactic radiation therapy, and the growing trend toward observation. The second portion of the presentation will address challenges emerging in acoustic neuroma management related to influences of the Big Tech era. Topics of focus will include the quality and influence of online medical information, management of the self-informed patient, and the effect of regional search engine optimization and social

media on referral patterns, patient decision making, and treatment selection. The panel is composed of neurotologists hailing from geographically diverse regions of North America and of varying career stage and generational influence. Otolaryngologists and other providers attending this session will receive a succinct review of contemporary standards in vestibular schwannoma management while engaging the panel on how technology is actively changing the face of patient care in skull base surgery. Focus will be given to helping general otolaryngologists optimize early phase care delivery to this population while highlighting unique challenges that are emerging in the treatment of younger generations of patients.

Outcome Objectives: (1) Explain modern management strategies for patients with a vestibular schwannoma. (2) Recognize emerging challenges in vestibular schwannoma care delivery related to the Big Tech era. (3) Implement strategies that may optimize early phase care delivery to younger generations of vestibular schwannoma patients.

Hearing Loss and Cognition: What Can We Do About It?

Richard K. Gurgel, MD (moderator);
Carrie L. Nieman, MD, MPH; Aaron C. Moberly, MD, MD;
Justin S. Golub, MD, MS

Session Description: As the largest potentially modifiable risk factor for dementia, hearing loss and dementia represent the intersection of 2 major public health issues. Our understanding of the potential relationship between hearing and cognition has grown considerably in the past decade. This presentation will review what is known regarding the association between hearing loss and cognitive impairment, including the latest research on potential mechanisms, risk factors, and the impact of treatment. We will also cover current understanding of the role cognition plays in otologic outcomes, specifically older cochlear implant users. Finally, the presentation will review the impact of hearing loss on the health and well-being of older adults who are already experiencing cognitive impairment. This session will be a tour of the cutting-edge research on hearing and cognition and equip the audience with key takeaways on how the current evidence translates to clinical practice.

Outcome Objectives: (1) Explain the potential mechanisms underlying the association between hearing loss and cognitive impairment. (2) Interpret current evidence of the impact of hearing treatment on cognition and the role of cognition in treatment outcomes. (3) Discuss how hearing loss affects older patients with cognitive impairment.

I'm Leaking—Diagnosis and Management of Spontaneous CSF Otorrhea and Rhinorrhea

Alexander G. Bien, MD (moderator); J. Walter Kutz, MD;
Ramandeep S. Virk, MD; Kibwei A. McKinney, MD

Session Description: Spontaneous cerebrospinal fluid (CSF) fistula is an important clinical entity that can be related to

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anatomical defects in the lateral or anterior skull base in conjunction with excess production or inadequate resorption of CSF. The recurrence rates for spontaneous leaks are higher than for other etiologies and may be related to underlying elevated intracranial pressure. Spontaneous CSF leaks generally present with otorrhea or rhinorrhea depending on the site of leakage in the anterior, middle, or posterior cranial fossa. Successful management requires accurate diagnosis and targeted surgical repair to minimize the risk of associated symptoms, including infectious intracranial complications. This panel is composed of otologists/neurotologists and rhinologists and endorsed by the American Academy of Otolaryngology–Head and Neck Surgery Foundation Otolaryngology and Neurotology Education Committee and Skull Base Surgery Committee. The presentation will comprehensively review the diagnostic and treatment algorithm for management of spontaneous CSF otorrhea and rhinorrhea. Salient pathophysiologic mechanisms will be discussed. The role of imaging studies, including computed tomography, magnetic resonance imaging, and radionuclide studies, will be outlined. Open and endoscopic techniques for repair of anterior (rhinologic) and lateral (otologic) skull base CSF leaks will be reviewed. The utility of various graft materials used in repair and the role of perioperative lumbar drainage will be explored. Long-term management strategies for increased intracranial pressure, including the use of diuretics and CSF shunting, will also be discussed. Postoperative evaluation and identification of idiopathic intracranial hypertension is essential to prevent long-term complications such as recurrent fistulas and vision loss. A multidisciplinary approach with close collaboration between neurosurgery, neurology, and ophthalmology will be stressed. A case-based format will be utilized to illustrate key clinical points.

Outcome Objectives: (1) Utilize available diagnostic modalities to diagnose and localize spontaneous CSF fistulas. (2) Describe the various lateral and anterior skull base approaches utilized for repair of CSF leaks. (3) Apply a multidisciplinary team approach for diagnosis and treatment of underlying conditions associated with CSF leaks.

Integrative Approach to Tinnitus

Ilka C. Naumann, MD (moderator); Noriko Yoshikawa, MD; Brian W. Blakely, MD, PhD, FRCSC; Michael Robinette, AuD

Session Description: After a brief review pathophysiologic concepts in the development of tinnitus, we will present a comprehensive review of the latest trends in treating tinnitus with focus on an integrative approach. Evidence-based treatment options such as the use of supplements, body-mind techniques, electromagnetic brain stimulation, and cognitive behavior therapies are discussed. Various options of maskers, sound generators, and sound therapies are presented by a tinnitus audiologist. As there is not a one-fits-all way, we will guide the attendees through a stepwise treatment algorithm in managing each patient based on their individual needs.

Outcome Objectives: (1) Gain an understanding of what happens when tinnitus becomes an unmanageable symptom. (2)

Learn about different modalities as potential treatment options. (3) Give treating physicians tools to manage patients effectively through an individualized algorithm.

Ménière's Disease: What's New in 2021?

Bruce L. Fetterman, MD (moderator); Habib Rizk, MD, MSc; Candace E. Hobson, MD; Janet S. Choi, MD

Session Description: Patients with Ménière's disease are frequently encountered by otolaryngologists, primary care providers, neurologists, and emergency department physicians. Many treatment options for patients with Ménière's disease are available, but the efficacy of each treatment is variable. This can make the management of these patients challenging and may contribute to a wide variability in practice. To address these issues, the Equilibrium Committee has created a panel to discuss the most recent American Academy of Otolaryngology–Head and Neck Surgery Foundation Clinical Practice Guideline for Ménière's disease. By doing so, the practitioner should become more knowledgeable about the current diagnostic and treatment options, which should lead to more uniformity of care, less usage of unnecessary testing, and better utilization of evidence-based treatments. This can lead to better outcomes and improved quality of life for patients with Ménière's disease. The panel will begin by discussing the evolution of thought concerning the pathogenesis of Ménière's disease and will review the overlap between it and vestibular migraine. In addition, the diagnosis of definite and probable Ménière's will be discussed, with an emphasis on which tests should (or should not) be used (ie, audiogram, video or electronystagmogram, electrocochleography, magnetic resonance imaging). The panel will then discuss treatment options for Ménière's: (1) diet/lifestyle (sodium, alcohol, caffeine, stress, sleep, etc), including managing allergies as appropriate; (2) medications (vestibular suppressants, diuretics, betahistine, antihistamines, steroids, benzodiazepines, etc); (3) surgical (intratympanic steroid, intratympanic gentamicin, sac surgery decompression, vestibular nerve section, labyrinthectomy, etc); (4) vestibular therapy (for chronic not acute); (5) hearing aids; and (6) alternative (acupuncture, positive pressure therapy, etc). The panel will conclude with a presentation of interesting cases.

Outcome Objectives: (1) Determine which tests are necessary in the workup of patients with suspected Ménière's disease. (2) Determine the appropriate medical therapy for patients with Ménière's disease and decide upon a reasonable, evidence-based treatment algorithm. (3) Recognize that not infrequently, there is overlap between symptoms of Ménière's disease and vestibular migraine.

Minimizing Clinician Exposure to SARS-CoV2 During Otologic Surgery

Pamela C. Roehm, MD, PhD (moderator); Alicia M. Quesnel, MD; Cuneyt M. Alper, MD; Rick F. Nelson, MD, PhD

Session Description: The COVID-19/SARS-CoV2 pandemic has highlighted concerns regarding disease transmission to

both surgeons and assisting staff during procedures that generate droplets and aerosols. Aerosol and droplet formation is known to occur during otologic and lateral skull base surgery, particularly when powered instrumentation is used. This expert panel will review both the basic science and clinical studies regarding risk identification. Recommendations regarding minimization of these risks will be thoroughly discussed in both scientific and practical terms that can be utilized by practicing otolaryngologists in real-life scenarios. In addition, the panel will address controversies regarding these risks and mitigation schemes and address real-life situations using case-based examples relevant to both the general otolaryngologist and neurotologic specialist. The discussion will focus not only on mitigation of spread of SARS-CoV2 virus but also on other currently identified pathogens of the middle ear and mastoid and future threats. This panel will address emerging pathogens that have not yet become threats in the United States and Western Europe but have affected otolaryngologists in other areas of the world. It will also provide guidance for hypothetical novel future threats that have not yet presented in clinical practice. This presentation is highly relevant to practicing otolaryngologists, including general otolaryngologists, pediatric otolaryngologists, and neurotologists and will provide the attendee with a thorough update clinical practice patterns, potential spread of contagion, and strategies of spread mitigation.

Outcome Objectives: (1) Examine the basic and clinical science of pathogens of the middle ear, mastoid, and cerebrospinal fluid and the patterns of spread of these pathogens during otologic and lateral skull base procedures. (2) Understand and implement strategies to mitigate spread of currently known pathogens in otologic and lateral skull base procedures, including limitation of the spread of SARS/CoV2. (3) Understand a framework of strategies and best practices for mitigation of spread of emerging pathogens and future pathogens.

Otologic Surgery—Pioneers, Frontiers, New Techniques, and Technologies

Abir Bhattacharyya, FRCS (ORL-HNS) (moderator);
Srinivasa Rao-Merugumala, FRCS, DLO

Session Description: Otology has intrigued us since time immemorial. The ear is the most important of the special senses that informs, connects, and sustains us in this world of motion and enhances emotions from the first cry of the baby to the sublime harmonies of Mozart. Absence of this perception by the ear in the first few years of life impedes vocalization that may progress to a doubly disabling deaf-mutism for life. The World Health Organization reports the current rate of global disabling deafness is nearly half a billion and predicts an increase to 1 billion by 2050. Otology has a very rich history, with important collaborators and personalities in the history of medicine. This session evaluates the progression of the science of this important and uniquely special sense of hearing and balance from the past to present and its progression into the future. This presentation will show the evolution of otological science through the ages, covering the significance of pioneers in the various aspects of otology that were practiced

in ancient cultures. The advancements of the new esthetic techniques, antibiotics, imaging, and new technologies enabled most of the new clinical and surgical innovations of 20th century. These aspects are in the cosmesis of the ear, otoplasty, and the preventable, treatable causes of hearing problems of chronic ear diseases otitis media, cholesteatoma, and otosclerosis and tumors such as vestibular schwannomas. Special attention will be given to hearing amplification for progressive hearing loss by various aids and implants, most commonly for congenital hearing loss and the loss of hearing by disease or after ablative surgery. The session will offer an understanding of the new frontiers of new technologies of precise imaging, appropriate anesthesia, and aids in surgery from microscope to the otoendoscope and beyond that are used in advanced techniques in otological science and practice. This enables progression to the current stage and frontiers that will take us beyond.

Outcome Objectives: (1) Enable attendees to analyze various aspects of the pioneers, to evaluate the progression of otological science in various cultures to understand the evolution of these concepts. (2) Empower attendees to perceive the new aspects of the frontiers that will lead the innovation of otological science in the future and for diffusion of these innovative techniques. (3) Allow attendees to comprehend the advantages of the new techniques and technologies in otological practice and to implement these in day-to-day practice.

Ototoxicity and the Otolaryngologist: Understanding Our Role

James G. Naples, MD (moderator); Syed F. Ahsan, MD;
Meredith E. Adams, MD MS; Joe Saliba, MD, MSc

Session Description: There are a wide range of medications that have ototoxic effects, and the list is growing with the introduction of new chemotherapeutic agents. It is important to recognize this condition early to offer early therapeutic intervention. Monitoring of ototoxic effects requires multidisciplinary coordination and appropriate baseline and posttherapeutic audiologic monitoring. The goals of this program will be to review many of the ototoxic medications and discuss the components necessary for establishing an ototoxicity monitoring protocol. In addition, we will review various therapeutic options. We aim to raise awareness about this significant issue and offer insights as to how to manage a complex clinical problem.

Outcome Objectives: (1) Recognize the growing list of ototoxic medication. (2) Recognize the multidisciplinary approach necessary to establish an ototoxicity monitoring protocol. (3) Demonstrate understanding of various therapeutic options.

Practical Efforts in Expanding Access to Cochlear Implantation

Abraham Jacob, MD (moderator); Samuel A. Spear, MD;
Darius Kohan, MD; Jacob B. Hunter, MD

Session Description: Disabling hearing loss affects >465 million globally, and while hearing aids are appropriate for most,

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cochlear implants (CIs) have become the gold standard for those patients with greater hearing impairment and lack of benefit from conventional amplification.

Despite the proven cost-effectiveness of CIs, however, market penetration remains <10%. Supported by the American Academy of Otolaryngology–Head and Neck Surgery Foundation Otolaryngology and Neurotology Education Committee, our panel brings together a diverse group of established CI surgeons from varied practice settings, including tertiary private practice (Abraham Jacob), military (Samuel A. Spear), academic university practice (Jacob B. Hunter), and an integrated corporate health system (Darius Kohan), to discuss ongoing and future steps toward improving CI access. Local, regional, and national perspectives will be considered during a series of concise presentations on the following topics: (1) a summary of existing audiometric criteria for cochlear implantation in children and adults; (2) expanding indications—decreased age at implantation, single-sided deafness, asymmetrical hearing loss, the advanced elderly, those with residual hearing, fluctuating hearing loss, and patients with unique anatomic considerations; (3) the role of objective and transparent hearing aid fittings—using the speech perception gap (observed difference between PBMax on audiometry and aided word recognition scores) to objectively identify poor hearing aid performers who might benefit from cochlear implantation; (4) efforts to improve CI access for active duty military and those in the Veterans Administration Healthcare System; (5) racial/ethnic disparities in cochlear implantation; and (6) successful establishment of partnerships with community audiology practices for identifying CI candidates and activating/programming devices postoperatively.

Outcome Objectives: (1) Describe evolving CI candidacy criteria for both general and special populations of adults and children. (2) Recognize the impact of decentralized CI programming on access to surgery, patient satisfaction, and audiometric outcomes. (3) Identify and discuss potential barriers to CI access.

Single-Sided Deafness: An Evidence-Based Review of Expanding Treatment Options

Daniel Zeitler, MD (moderator); Soha N. Ghossaini, MD; Samuel A. Spear, MD; Ashkan Monfared, MD

Session Description: With its diverse etiologies, demographic variability, and the already large and ever-expanding armamentarium of options available for its treatment, unilateral profound hearing loss (single-sided deafness [SSD]) becomes a difficult problem for otolaryngologists, audiologists, and advanced practice providers to treat, specifically as it relates to which rehabilitative option is best for their patients. This discussion will review the various management options for SSD in both the adult and pediatric populations with a special focus on an evidence-based approach through accumulated data and reported outcomes. Although we will briefly review

key elements of the workup necessary for patients with SSD, the primary emphasis will be placed on specific options available to treat. The review will include traditional amplification instruments (ie, contralateral routing of signal hearing aid), bone-conduction osseointegrated devices (including both transcutaneous and percutaneous options), and finally cochlear implantation.

Outcome Objectives: (1) Compare the variety of rehabilitative options available for the treatment of SSD. (2) Understand the differences in both speech perception and binaural processing outcomes between different devices. (3) Discuss the variables that may be predictive of success for cochlear implantation in the treatment of unilateral profound hearing loss/SSD.

The Spectrum of Implantable Hearing Devices, Part I: Indications, Techniques

Samuel P. Gubbels, MD (moderator); Elizabeth H. Toh, MD; Jack J. Wazen, MD; Jack A. Shohet, MD

Session Description: The number of US Federal Drug Administration (FDA)-approved implantable hearing devices (IHDs) available has increased in the past 2 decades. In addition, the indications for common IHDs such as cochlear implants continue to evolve and expand over time. As such, understanding the spectrum of IHD options and their respective indications can be challenging to otolaryngologists and neurotologists alike. Given recent findings of the connection between cognitive decline, hearing loss, and hearing rehabilitation, it is critical that providers seeing patients with hearing loss have a strong working knowledge of all aspects of hearing aids and IHDs so that they can optimally counsel and treat patients. In part 1 of this presentation, our panel of experienced neurotologists will review the IHD options currently available in the United States and discuss in detail the indications for each including cochlear implants, bone conducting hearing aids, and implantable middle ear devices among others. Details regarding the surgical procedures, complications, and insurance considerations will be reviewed to provide a complete framework for attendees to draw upon when counseling patients. This panel assumes little prior understanding of IHDs and will tailor the content to a broad audience encompassing trainees, advanced practice providers, practicing otolaryngologists, and neurotologists. This panel was very well received in its first 2 years of presentation, and we look forward to the opportunity to present it once again, having incorporated feedback from our previous sessions and expanded the breadth and depth of the topics covered by our panel of experts.

Outcome Objectives: (1) Describe the FDA-approved IHDs currently available and their mechanisms for hearing rehabilitation. (2) Summarize approved and experimental indications for each type of IHD currently on the US market. (3) Explain the surgical procedures and potential complications of each IHD.

The Spectrum of Implantable Hearing Devices, Part II: Selection, Outcomes

Samuel P. Gubbels, MD (moderator);
J. Thomas Roland Jr, MD; Bruce J. Gantz, MD;
Oliver F. Adunka, MD

Session Description: The number of US Federal Drug Administration (FDA)-approved implantable hearing devices (IHDs) available has increased in the past 2 decades.

In addition, the indications for common IHD such as cochlear implants continue to evolve and expand over time. As such, understanding the spectrum of IHD options and their respective indications can be challenging to otolaryngologists and neurotologists alike. Given recent findings of the connection between cognitive decline, hearing loss, and hearing rehabilitation, it is critical that providers seeing patients with hearing loss have a strong working knowledge of all aspects of hearing aids and IHDs so that they can optimally counsel and treat patients. In part II of this presentation, our panel of experienced neurotologists will build upon part I, which covered indications and surgical techniques. Specifically in this presentation, we will discuss appropriate device selection, patient counseling, and clinical outcomes for all types and indications for IHDs. While last year we were asked to combine all of the aforementioned topics into a 1-hour session, we received a great deal of feedback that having more time for case discussions to enable a comprehensive discussion of all of these areas would be of great value to attendees. This panel assumes little prior understanding of IHDs and will tailor the content to a broad audience encompassing trainees, advanced practice providers, practicing otolaryngologists, and neurotologists. Our panel was very well received in its first 2 years of presentation, and we look forward to the opportunity to present it once again, having incorporated feedback from our previous sessions and expanded the breadth and depth of the topics covered by our panel of experts.

Outcome Objectives: (1) Describe how to select the most appropriate IHDs for specific patterns of hearing loss. (2) Perform meaningful patient counseling regarding options for hearing rehabilitation using all types of FDA-approved IHDs. (3) Appraise the clinical outcomes of all of the types of FDA-approved IHDs.

Techniques in Difficult Otosclerosis Cases

Jason G. May, MD (moderator); Arnaldo L. Rivera, MD;
Andrew J. Fishman, MD

Session Description: The session will review the pathophysiology of otosclerosis and common stapedotomy techniques. Most of the session will review techniques in difficult otosclerosis cases. Review of techniques in difficult stapedotomy will include review of techniques, outcomes, and complications. It will include the use of laser and various prosthesis options. Challenging cases will include the following: malleus head fixation, revision surgery, footplate fixation, perilymph gusher, overhanging facial nerve, obliterative otosclerosis, and round window ossification. Review in techniques will include videos of difficult cases and revision stapedotomy.

Outcome Objectives: (1) Review the standard technique of stapedotomy. Review pertinent anatomy. Review risks vs benefits of the use of laser vs microdrill, different graft techniques, and different prosthesis. (2) Describe techniques and options when encountering difficult otosclerosis cases. (3) Review techniques and options in revision stapedotomy.

Techniques in Facial Nerve Exploration and Repair

Jason G. May, MD (moderator); Arnaldo L. Rivera, MD;
Andrew J. Fishman, MD

Session Description: The session will review the pathophysiology of idiopathic facial nerve injury, or Bell's palsy, and traumatic facial nerve injury. This session will also review anatomic considerations for facial decompression in cases of Bell's palsy, as well as review Academy guidelines for facial nerve decompression. Anatomic considerations that are most important in middle cranial fossa approach to the labyrinthine segment of the facial nerve will be covered. Techniques in facial nerve exploration and repair in cases of traumatic facial nerve injury will be reviewed and discussed. Injuries that result in deafness in combination with facial nerve injury have a major impact on options for exploration and possible repair of the facial nerve. The session will review techniques in difficult facial nerve exploration and repair. The role of electrophysiologic testing in decision making in cases of possible decompression will be discussed. The reconstruction of the facial nerve as a result of tumor growth necessitates different approaches for facial nerve reconstruction. Challenging cases will include the following: middle cranial fossa approach to the facial nerve in the setting of Bell's palsy, traumatic injury of the facial nerve at the internal auditory canal, indications for sacrifice of the greater superficial petrosal nerve in reconstruction, cable graft reconstruction of destruction of the vertical segment of the facial nerve, traumatic transection of the facial nerve, traumatic injury at multiple levels of the facial nerve, and the impact of tumors on facial nerve reconstruction. Review will include integrated video clips from challenging cases of facial nerve exploration and reconstruction.

Outcome Objectives: (1) Review anatomic considerations in facial nerve decompression of Bell's palsy and current guidelines.

Discuss important landmarks in middle cranial fossa approach to the facial nerve. (2) Review the most common types of traumatic facial nerve injury and indication for facial nerve exploration. Review also indications for facial nerve reconstruction. (3) Describe techniques and options when encountering difficult cases of traumatic facial nerve injury, exploration, and repair.

Temporal Bone Radiology: Basic to Advanced, Part I

Ashkan Monfared, MD (moderator); Brandon Isaacson, MD;
Andrea Vambutas, MD; Nikolas H. Blevins, MD

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Session Description: Through this interactive presentation, attendees are exposed to challenging temporal bone radiology cases and offered strategies to improve their interpretation. The first hour focuses on fundamentals of temporal bone imaging and the second hour on advanced case presentation. The emphasis is placed on subtle but pertinent findings on computed tomography and magnetic resonance imaging examinations and their importance in creating and narrowing a differential diagnosis. We will present guidelines to aid in the efficient acquisition and interpretation of imaging for patients with common otologic symptoms such as vertigo, congenital hearing loss, and pulsatile tinnitus as well as rare and more challenging disorders such as skull base, jugular foramen, and facial nerve tumors.

Outcome Objectives: (1) Understand fundamentals of temporal bone imaging. (2) Order appropriate radiographic tests and understand the strengths and limitations of different imaging modalities. (3) Interpret key radiographic findings for common pathologic conditions of the temporal bone.

Temporal Bone Radiology: Basic to Advanced, Part II

Ashkan Monfared, MD (moderator); Richard K. Gurgel, MD; Howard W. Francis, MD, MBA; Andrea Vambutas, MD

Session Description: Through this interactive presentation, attendees are exposed to challenging temporal bone radiology cases and offered strategies to improve their interpretation. The first hour focuses on fundamentals of temporal bone imaging and the second hour on advanced case presentation. The emphasis is placed on subtle but pertinent findings on computed tomography and magnetic resonance imaging examinations and their importance in creating and narrowing a differential diagnosis. We will present guidelines to aid in the efficient acquisition and interpretation of imaging for patients with common otologic symptoms such as vertigo, congenital hearing loss, and pulsatile tinnitus as well as rare and more challenging disorders such as skull base, jugular foramen, and facial nerve tumors.

Outcome Objectives: (1) Understand fundamentals of temporal bone imaging. (2) Order appropriate radiographic tests and understand the strengths and limitations of different imaging modalities. (3) Interpret key radiographic findings for common pathologic conditions of the temporal bone.

Temporal Bone Radiology for Surgical Decision Making

Cameron C. Wick, MD (moderator); Marc L. Bennett, MD; Meredith E. Adams, MD

Session Description: Learn pearls of reading temporal bone images and apply that knowledge to refine your surgical approach. This panel will walk you through anatomical considerations of the middle ear, mastoid, and skull base while reviewing different pathologies in those locations. Hear experts debate topics such as the application of endoscopic ear surgery for

cholesteatoma/chronic ear disease, transmastoid vs middle fossa approaches for cerebrospinal fluid leaks and superior semicircular canal dehiscence, cochlear implantation in abnormal ears, and factors that influence vestibular schwannoma approaches. Multiple cases and scenarios will be presented with tips relevant for everyone from trainees to neurotologists. Improve your radiographic interpretation of the temporal bone so you can choose the best approach for your patient.

Outcome Objectives: (1) Develop a checklist for interpreting temporal bone computed tomography and magnetic resonance imaging. (2) Analyze how variations in temporal bone anatomy and location of the temporal bone pathology can alter the preferred surgical approach. (3) Implement the best surgical approach to reach the disease while preventing complications.

Update on the Evaluation and Management of Pulsatile Tinnitus

Soha N. Ghossaini, MD (moderator); Syed F. Ahsan, MD; Cameron C. Wick, MD; Alexander G. Bien, MD

Session Description: Patients with pulsatile tinnitus could present a diagnostic challenge to the treating physician. Pulsatile tinnitus could be the first presenting complaint in patients with dural arteriovenous fistula or other serious conditions. Recent advances in noninvasive radiological technology revolutionized the diagnosis and management of patients presenting with pulsatile tinnitus. The purpose of this presentation is to define and review potential etiologies in patients with pulsatile tinnitus and to present an update on the radiological workup and treatment modalities available.

Outcome Objectives: (1) Differentiate between venous and arterial causes of pulsatile tinnitus. (2) Identify the role of different radiological modalities in the diagnosis of patients with pulsatile tinnitus. (3) Identify available treatment options of patients with pulsatile tinnitus.

Updates in Global Cochlear Implantation

Gregory J. Basura, MD, PhD (moderator); James E. Saunders, MD, MS; Marc K. Bassim, MD; Clemence Chidziva, MBChB, FC ORL (SA)

Session Description: Cochlear implantation (CI) has become more available at centers throughout the world. Establishing and sustaining CI programs in the developing world pose many challenges. Access to CI screening audiology, variability in CI candidacy metrics, surgical approach, and follow-up as well as CI programming all vary from location to location. It is very important to identify and, whenever possible, mitigate potential dilemmas that may affect CI programs. This diverse panel of international experts will discuss and summarize how they approach the CI programs in their specific locations and provide insight into strategies to optimize efficiency leading to successful sustainability.

Outcome Objectives: (1) Relate the clinical and socioeconomic challenges in establishing a CI program a variety of

economic and health care settings. (2) Discuss pearls to success in developing a CI program. (3) Describe the necessary essentials of implementing long-term, sustainable services.

Updates in the Management of Chronic Otitis Media

Christopher A. Schutt, MD (moderator);
Soha N. Ghossaini, MD; Walter Kutz, MD;
David Jung, MD, PhD

Session Description: Chronic otitis media remains prevalent despite advances in medical knowledge and improved medical care. This panel presentation will focus on updates in the diagnosis and management of chronic otitis media, including cholesteatoma. Medical and surgical management of chronic ear disease will be reviewed. Different surgical approaches, including endoscopic ear surgery, will also be discussed. Case presentations will be used to illustrate surgical decision making in complicated cases.

Outcome Objectives: (1) Review the surgical management of chronic otorrhea and cholesteatoma. (2) Examine different surgical approaches, including endoscopic ear surgery, in the management of chronic ear disease. (3) Demonstrate some controversies in the surgical decision making in complicated cholesteatoma cases.

Updates on Diagnosis and Treatment of Acoustic Neuromas

Ashkan Monfared, MD (moderator);
Matthew L. Carlson, MD; Roberto A. Cueva, MD;
Kostantina M. Stankovic, MD, PhD

Session Description: Despite the low incidence of acoustic neuromas in the general population, they exert their influence on the career of every otolaryngologist. From the daily diagnostic dilemma of when to obtain imaging studies for asymmetric sensorineural hearing loss, to symptomatic management of posttreatment patients, all otolaryngologists need to have familiarity with these tumors and their management. In this course we will cover a general overview of these tumors from diagnosis, management algorithm, and quality-of-life issues to new frontiers in management.

Outcome Objectives: (1) Have a general understanding of pathophysiology of acoustic neuromas. (2) Understand the best practice for diagnosis of acoustic neuromas and ordering imaging studies. (3) Understand the treatment modalities and quality-of-life issues surrounding each method.

Vestibular Migraine: 2021 Management Update

Soha N. Ghossaini, MD (moderator); Jeffrey D. Sharon, MD;
Courtney C.J. Voelker, MD, PhD; Ilka C. Naumann, MD

Session Description: Vestibular migraine is a common presenting cause of dizziness that remains fairly underdiagnosed. Otolaryngologists end up playing a major role in not only diagnosing but also managing those patients due to limited

access to other specialists. This panel presentation will review the clinical presentation, diagnostic techniques, and treatment strategies of vestibular migraine as well as its relationship to other common balance entities. Given the prevalence of this diagnosis and the impact of this disorder on our patients, this presentation is extremely relevant to current otolaryngology practice.

Outcome Objectives: (1) Discuss the clinical presentation and the differential diagnosis of vestibular migraines. (2) Describe new techniques used to diagnose vestibular migraines. (3) Review novel treatment modalities for vestibular migraine and its relationship to other common balance disorders.

Vestibular Testing 2021: What's Warranted, What's Wasteful

Manan Shah, MD (moderator); Hernan Goldshtein, MD;
Robert C. O'Reilly, MD; Ann M. Selleck, MD

Session Description: The growing array of available vestibular tests presents new possibilities for measuring the function of the vestibular system. However, it also invites debate and confusion as clinicians determine how best to use these tools to evaluate patients with dizziness. In this case-based panel presentation, sponsored by the American Academy of Otolaryngology–Head and Neck Surgery Committee on Equilibrium, panelists will be presented with a range of common clinical scenarios and will discuss how they would approach the evaluation, including which vestibular tests they would obtain (if any), how they would interpret them, and, most importantly, how having the results would change their management. Testing modalities discussed will include video head impulse testing, vestibular evoked myogenic potentials, videonystagmography, rotary chair, and posturography. The goal of this panel presentation is to equip clinicians to make wise choices about the use of vestibular testing when caring for dizzy patients.

Outcome Objectives: (1) Evaluate the benefits and limitations of the diverse array of vestibular tests available. (2) Determine what is a reasonable vestibular test battery for common clinical scenarios. (3) Recognize situations in which further diagnostic testing for dizziness may not be useful.

When the Ear Won't Stop Draining: Management of Persistent Otorrhea

Kevin A. Peng, MD (moderator); Samuel P. Gubbels, MD;
Calhoun D. Cunningham III, MD; Marc K. Bassim, MD

Session Description: Persistent and/or recurrent otorrhea may present a diagnostic and therapeutic dilemma to both the general otolaryngologist and otologist. The goals of this panel presentation are to provide a practical approach to the evaluation and management of problematic ear drainage in the adult patient. The differential diagnosis of persistent otorrhea will be discussed, including common etiologies such as cholesteatoma, refractory otitis externa, and chronic otitis media, in addition to less prevalent causes such as cerebrospinal fluid

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leak, skull base osteomyelitis, and vasculitides. Case presentations will be used to illustrate the decision-making process behind initial medical therapies, the utility of imaging, and the role of surgical intervention.

Outcome Objectives: (1) Describe the differential diagnosis for persistent otorrhea. (2) Discuss appropriate imaging in differentiating between etiologies of persistent otorrhea. (3) Recognize when surgical intervention is indicated for persistent otorrhea.

Patient Safety and Quality Improvement

Airway Emergencies: How to Avoid the Adrenaline Rush

Carol M. Bier-Laning, MD, MBA (moderator);
Ellen S. Deutsch, MD, MS; Karthik Balakrishnan, MD, MPH;
Ross Mayerhoff, MD

Session Description: As otolaryngologists, we have all been called to assist with airway problems, often after all other options have been exhausted. This panel presentation will focus on ways to both evaluate airway emergencies when they happen and decrease the occurrence of these devastating airway disasters. Evaluation of airway emergencies using concepts of Safety-I (how to stop things going wrong) and Safety-II (reinforcing the things that went right) will be discussed. The presentation will also include discussion of cognitive bias and the importance of standardization during airway emergencies, rationale for and tips to create a multifaceted, multidisciplinary airway quality improvement (QI) program including an airway QI conference, and how to get institutional buy-in to create a multidisciplinary difficult airway response team.

Outcome Objectives: (1) Understand Safety-I and Safety-II concepts and how to apply them to the evaluation of airway emergencies. (2) Understand cognitive bias and how these biases may affect reactions positively and negatively in stressful situations. (3) Understand the importance of multidisciplinary conferences and teams to reduce intrateam conflict and promote the effectiveness of difficult airway management.

Are Kids Getting Healthier? Pediatric Otolaryngology Practice Changes During COVID-19

Zhen Huang, MD (moderator);
Karthik Balakrishnan, MD, MPH; Soham Roy, MD;
Sarah N. Bowe, MD

Session Description: The COVID-19 pandemic has greatly affected health care practice on multiple levels. With many schools and day cares being closed as well as increased vigilance around hygiene and infection control, many otolaryngology clinics have noticed a decline in pediatric patients being seen for otitis media, tonsillitis, and associated complications. In this panel, experts in pediatric otolaryngology and health system care delivery will discuss the variations in

patient volumes as an effect of the global pandemic, using data from the Pediatric Health Information System database to facilitate a robust discussion of the impact on otolaryngology practices. In addition, panelists will discuss national trends in care delivery and the impact on care to children of varying socioeconomic and ethnic groups. Goals of the panel presentation will include (1) statistical analyses of the trend in diagnoses of common pediatric otolaryngology conditions and associated surgeries by region; (2) discussion of the pandemic's impact on pediatric otolaryngology practices, including volumes, case-mix index, revenue, and workforce implications; and (3) examination of differences in socioeconomics, including insurance status, median household income, and ethnicity, with the goal of improving the equity of care delivery during the pandemic and improving access to care for all patients.

Outcome Objectives: (1) Facilitate discussion among panelists and the audience on changes in pediatric otolaryngology diagnoses and volumes as a result of the pandemic in your practice region compared with others nationwide. (2) Compare and discuss the differences between subgroups of patients who sought care during the pandemic based on socioeconomics and demographics and the implications for equity in care delivery. (3) Consider what the new equilibrium will be. Examine future scenarios and how to engage both patients and the referral base to mitigate the impact of the pandemic and strategize ways to provide optimal postpandemic care.

Big Data Research in Otolaryngology: Does It Change Your Practice?

Andres M. Bur, MD (moderator); Jennifer A. Villwock, MD;
Evan M. Graboyes, MD, MPH; Elisabeth Ference, MD, MPH

Session Description: We live in an era of unprecedented explosion in data. Over the past 70 years, the doubling time of medical knowledge decreased from 50 years to just 73 days. The use of big data is becoming increasingly prevalent in the otolaryngology literature. Between 2005 and 2016, there was a 10-fold increase in database publications, and only 18% made clinical recommendations. Conclusions drawn based on analyses of big data sets are frequently difficult to interpret because of unaccounted confounding factors, bias, and lack of actionable recommendations. With initiatives such as RegentSM, big data will continue to play an important role in otolaryngology research and quality improvement efforts. New technologies, including artificial intelligence, will bring about new tools to process and incorporate vast quantities of data into otolaryngology practice. This panel will review the major data sets commonly used in otolaryngology research, including the National Surgical Quality Improvement Program. Data collection methods, quality assurance measures, and limitations of these data sets will be discussed. Our panel will present common pitfalls of database research from the perspective of a clinician reader to address the fundamental question, "Does this study change my practice?" The panel will address the future of big data in otolaryngology, including the use of

natural language processing and machine learning, to enable otolaryngologists to care for their patients using the best available evidence.

Outcome Objectives: (1) Develop a working familiarity with commonly used large data sets, their limitations, and common pitfalls in big data research. (2) Be an informed reader of big data studies to assess the effect of confounding factors and bias with the underlying goal of assessing whether a study is practice changing. (3) Understand the potential for artificial intelligence to automate extraction of clinical data, provide clinical decision support, and evolve based on the changing landscape of otolaryngology.

Creating, Training, and Assessing Difficult Airway Teams: Who Needs It?

Carol M. Bier-Laning, MD, MBA (moderator);
Matthew Smith; Charles Myer, MD;
Ellen S. Deutsch, MD, MS

Session Description: Otolaryngologists are frequently called upon to assist with emergent management of the airway throughout the hospital. This type of reactionary approach can lead to anxiety, stress, and harm events to patients. A more proactive, coordinated approach benefits health care providers as well as patients by providing systematic care in a safe and efficient manner. However, setting up such a clinical pathway can be overwhelming as it requires significant resources including expertise, time, and money. This panel will provide participants with a guide to creating a multidisciplinary difficult airway team, including lessons learned from a center that created such a pathway from the ground up, details about using simulation for training a multidisciplinary team, and methods to assess outcome measures. Participants will leave with knowledge and tools to promote the creation of this type of team in their practice site, including an understanding of the financial, quality, safety, and well-being benefits that an airway team provides in the uncommon but potentially disastrous circumstance of a difficult or lost airway.

Outcome Objectives: (1) Understand the components of a multidisciplinary difficult airway team. (2) Understand how simulation can be used to prepare and train teams. (3) Understand outcome measurement tools that can be used to assess the effectiveness of a multidisciplinary difficult airway team.

Development of a Comprehensive Quality Assurance Program

Rahul Seth, MD (moderator); Andrew N. Goldberg, MD;
Matthew S. Russell, MD

Session Description: The value of a quality assurance in an otolaryngology–head and neck surgery program, group, or department has become a necessity within most medical systems. This program will discuss the multiple roles and strategies that are needed to develop a comprehensive quality assurance program. This includes a systematic approach to complication

review (Morbidity and Mortality Conference), development of quality improvement projects, unit-based leadership teams, routine huddles for open communication improvement, assessment of patient feedback scores, and leadership roles in quality. The development of such a program at an academic medical center will be used as an example. Focus will be on process improvement.

Outcome Objectives: (1) Appreciate the different components to a quality assurance program in otolaryngology–head and neck surgery. (2) Understand the importance of structuring a review of quality metrics with continuous process improvement. (3) Development of quality improvement projects and unit-based initiatives.

Enhanced Recovery After Surgery: Optimizing Otolaryngology Outpatient Perioperative Management

Hannah N. Kuhar, MD (moderator); Matthew O. Old, MD;
Peter C. Revenaugh, MD; Brandon S. Hopkins, MD

Session Description: Enhanced recovery after surgery (ERAS) protocols are well established in various surgical subspecialties. ERAS is a relatively new phenomenon in otolaryngology. To date, ERAS in otolaryngology has been most described in the head and neck oncology literature. Otolaryngology surgical patients often present with poorly controlled pain and difficulty with speech, breathing, and/or swallowing. As a result, patients are typically malnourished and deconditioned. In addition, patients frequently face concurrent comorbidities and tobacco and/or alcohol dependence. Only recently were recommended guidelines developed for the implementation of head and neck oncology ERAS protocols. ERAS guidelines emphasize the need for perioperative nutritional care, patient education, pain management, and physical rehabilitation to optimize care delivered and patient outcomes. Interest in ERAS has grown recently among additional otolaryngology subspecialties, particularly in the setting of opiate prescribing patterns and outpatient perioperative optimization. Increasingly, otolaryngologists are integrating ERAS principles into protocols for the outpatient surgical setting across subspecialties. Identifying best practices for perioperative optimization of surgical patients specifically in the outpatient setting across otolaryngology subspecialties is crucial for enhancing quality of care delivered and patient outcomes. This panel will help to provide the audience with a framework to build multidisciplinary ERAS protocols for their outpatient surgical patients across various otolaryngologic subspecialties.

Outcome Objectives: (1) Describe relevance of and role for ERAS protocols in the setting of otolaryngology head and neck surgery subspecialties, specifically in the outpatient setting. (2) Identify key components and stakeholders that should be involved in ERAS protocols for each otolaryngology subspecialty. (3) Discuss lessons learned and best practices for operationalization of ERAS protocols.

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Global Surgical Skills Training: Can It Be Done Remotely?

Merry E. Sebelik, MD (moderator);
Gregory J. Basura, MD, PhD; Kaalan E. Johnson, MD;
Christina J. Yang, MD

Session Description: Simulation-based skills practice improves surgical skills, no matter the setting, whether the surgeon is a novice or whether one is in practice and wishes to continually improve existing skills or seeks to learn new techniques. Surgeons across the career spectrum benefit from skill acquisition and practice. Traditional skills courses often involve travel to distant meetings or universities for learners and teachers alike. The equipment and material for skills training can be complex and expensive and may require vendor support and special simulation centers. Skills training and practice in global surgery settings face many cost and equipment challenges. Just as in high-income countries, learning new surgical skills and techniques have evolved beyond the “see one, do one, teach one” model of yore. But the challenges of creating simulation models are already great. The global pandemic has sharply reduced opportunities for in-person courses. Endorsed by the American Academy of Otolaryngology–Head and Neck Surgery Foundation Simulation Education and Humanitarian Efforts Committees, the panelists, who are experienced in surgical skills training in global settings, will demonstrate creative and low-cost skills training methods using simple inexpensive materials. Each panelist will address a different aspect of otolaryngology surgical skill, including ear surgery, airway management, and sinus endoscopy. The concept of surgical coaching, which benefits novices and mid-career surgeons alike, will be discussed by the fourth panelist, and novel methods of long-distance coaching will be introduced. Further, the critical step of “training the trainers” will be discussed by each panelist, outlining the ways teachers across geographic distance can collaborate for the benefit of their trainees and colleagues.

Outcome Objectives: (1) Describe how to create a skill training model that compares favorably in cost and simplicity to traditional commercial trainers, with instructions provided. (2) Introduce the concept of remote and in-person surgical coaching. Explain how employing a surgical coach can enhance skills for novice surgeons as well as support lifelong learning. (3) Recognize that primary teaching is only the beginning and discuss the training-the-trainer concept so that surgical education becomes locally sustainable.

Guideline Management of Postoperative Pain and Opioids: A Case-Based Discussion

James W. Mims, MD (moderator); Michael J. Brenner, MD;
David E. Tunkel, MD; John D. Cramer, MD

Session Description: Evidence demonstrates that surgeons overprescribe opioids for postoperative pain, leading to opioid misuse and diversion that contribute to the opioid epidemic. This panel will use a case-based format to discuss the recommendations recently published in the American Academy of

Otolaryngology–Head and Neck Surgery Foundation *Clinical Practice Guideline: Opioid Prescribing for Analgesia After Common Otolaryngology Operations* (AAO-HNSF Opioid CPG) and how to apply them. Special attention will be given to areas where we should change our practices. The panel will discuss the practical clinical concerns and barriers that arise with implementation and seek to address questions and concerns of the audience. The panel is composed of AAO-HNSF Opioid CPG authors who represent different subspecialties within otolaryngology. Specific goals include the following: reduction of prescribed opioids, increased pain management counseling, increased use of nonopioid and multimodal pain management, identification of risks for opioid use disorder (OUD), strategies for patients at risk of OUD, and increased disposal of unused opioids.

Outcome Objectives: (1) Implement AAO-HNSF Opioid CPG action statements for postoperative pain. (2) Discuss practicalities of opioid prescribing in a case-based format. (3) Reduce postoperative opioid prescribing after otolaryngologic surgeries.

How Will You Be Graded in the Future

Frank G. Garritano, MD (moderator);
Carl H. Snyderman, MD, MBA; Elisabeth Ference, MD,
MPH; Kevin J. Contrera, MD, MPH

Session Description: Quality outcomes metrics are increasingly being recognized for their role in ensuring the delivery of high-quality, patient-centered care, as well as for their growing importance in surgical training and professional certification. There exists a wide variety of quality metrics being utilized in professional and clinical practices today, spanning the entire breadth of our field. Traditional patient safety and quality measures—such as institutional Morbidity and Mortality Conferences, the American College of Surgeon’s National Surgical Quality Improvement Program, and the American Academy of Otolaryngology–Head and Neck Surgery’s RegentSM data registry—are all important in tracking and ensuring patient safety and quality outcome. There are also metrics that are utilized across our professional lives as surgeons. Some measures of surgical competency, such as peer video assessments and measurement of surgical cognition, can be utilized as quality metrics during surgical residency training. Yet other of these measures are important for board certification—high-stakes certification examinations, CertLink assessments, and the use of standardized operative logs and photos. In addition, alternate quality metrics are increasingly being utilized by health care systems, government regulators, and commercial health plans, such as measures of patient satisfaction and measures of culturally competent care, especially when dealing with historically underserved or marginalized communities. The purpose of this panel presentation is to discuss the wide variety of metrics presently available, to review in detail the various measures and metrics currently being used in professional assessment and patient care, to discuss what the future holds as it relates to the use of these measures, and to review

in what fashion these metrics are likely to be utilized by governments, payers, and institutions in the future.

Outcome Objectives: (1) Demonstrate familiarity with the wide variety of quality and performance metrics that are currently available and currently in use in clinical practice and for professional certification. (2) Understand how these quality and performance metrics are increasingly being utilized by government regulators, private payers, medical providers, and patients. (3) Demonstrate understanding of how these metrics are likely to be utilized in the future, both as they pertain to obtaining and maintaining professional certifications as well as to clinical patient care.

Intraoperative Nerve Monitoring in Head and Neck Surgery State-of-the Art

Joseph Scharpf, MD (moderator);
Gregory W. Randolph, MD; Catherine F. Sinclair, MBBS;
Jennifer J. Shin, MD, SM

Session Description: This panel will cover the scope of cranial nerve monitoring of all cranial nerves that are of practical importance in head, neck, and thyroid surgery with the exception of the intratemporal bone seventh and eighth cranial nerves that have been covered by the prior task force in the American Otological Society. Neural stimulation and monitoring encompasses a range of actual techniques and may use a range of muscle and/or electromyography endpoints. We will review the extratemporal bone facial nerve (CN VII), glossopharyngeal nerve (CN IX), vagal/recurrent laryngeal nerve (CN X), spinal accessory nerve (CN XI), and hypoglossal nerve (CN XII). Complete and applied understanding of the neurophysiological principles facilitates the surgeon's ability to monitor any nerve. This electrophysiologic data set is additive to knowledge of anatomy and excellent surgical technique. It allows a surgeon to go beyond simple appreciation of the anatomic integrity of a nerve and realize the overarching goal of ascertaining knowledge regarding a nerve's functional status. Electrophysiological assessment of the pertinent nerves is within the scope of an otolaryngology-head and neck surgical practice. Otolaryngologists have been trained to perform, interpret, and utilize strategically intraoperative cranial nerve monitoring and nerve stimulation testing, which are surgically applicable to cranial nerves of the head and neck and can serve as effective adjuncts to anatomic knowledge and surgical technique.

Outcome Objectives: (1) Achieve the current need of providing an educational source for both practicing surgeons and surgeons in training to optimize patient surgical outcomes. (2) Recognize the value of nerve monitoring and its additive effect to a practice. (3) Implement a surgery incorporating nerve monitoring including troubleshooting techniques for practice.

The Measure of a Surgeon: Assessing Competency

David H. Chi, MD (moderator); John W. Werning, MD, DMD;
Steven T. Kmucha, MD, JD; Carl H. Snyderman, MD, MBA

Session Description: The qualities of a competent surgeon encompass a solid knowledge base, surgical technical skills, and sound judgment. While written examinations and recertification testing help to maintain fundamental knowledge, measures of surgical competency are more challenging and difficult to define. The importance of quality and safety in patient care is increasingly a priority with high expectations from medical professionals, societies, and the public. This emphasis has resulted in evaluations of competency that affect an otolaryngologist from their training years and spans the entire career. The Joint Commission has also created an expectation for departments to have an ongoing objective process of evaluating health care providers that addresses issues with safety and quality of outliers, low-volume providers, and new procedures. Lastly, surgeons in the later stages of their careers may now have expectations to demonstrate competency to provide the high standards of patient care and quality expected from our specialty and the public. This panel will discuss controversial topics such as those that follow. (1) Surgical volume and credentialing: Is there a minimum number of cases necessary for maintaining privileges? Should we measure individuals or groups of surgeons? Are lower volumes associated with increased complications/use of hospital resources? What are legal implications for residency program directors or hospital administrators? (2) Low-volume surgeries: Who should be doing them? How does a young surgeon gain sufficient experience? How are new techniques introduced? (3) Methods to measure surgical competency: Who should provide oversight? How do we measure competency? Should an impaired surgeon have periodic review of practice? What is fair? The session format will be case presentations followed by panel discussion with audience participation.

Outcome Objectives: (1) Recognize the current issues of competency in surgeons with low-volume practices and those introducing new procedures. (2) Examine the controversies with evaluating competency in surgeons. (3) Understand future directions to evaluate and measure competency.

Near Misses, Never Events, and Just Plain Scary Cases

Nausheen Jamal, MD (moderator); Matthew Smith, MD;
David M. Cognetti, MD; Stephen C. Maturo, MD

Session Description: The wrong ear was implanted. A needle was left in the child's neck. A man is in septic from retained nasal packing after sinus surgery. A woman's face is burned after a fire fueled by prep solution. A healthy baby coded in recovery after tympanostomy tube insertion. Otolaryngologists believe these events could never happen in their operating rooms. Yet, never events such as wrong-site surgery, wrong-patient surgery, unintentional retained foreign objects, operating room fires, or immediate postoperative death in a healthy patient are more common than they should be in head and neck surgery. Even in the absence of a distinct never event,

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these factors periodically align to result in near catastrophic patient outcomes. Such events are caused by myriad interacting elements, including systems deficiencies, human factor or decision-making errors, and team failures. Near misses, sentinel events, and horrific complications affect patients and families often irreversibly. They also increasingly draw scrutiny to surgical practices and systems, surgeon technical competencies, and evidence-based decision making. In the past decade, numerous programs or hospitals have been gravely affected by the failure to prevent, recognize, or respond to major surgical errors or complications. In this audience-interactive panel, we present real-life cases that went wrong, how these problems were addressed, and potential solutions to avoid or mitigate these crises in the future. Through these case presentations, we emphasize key principles of root cause analysis, health system safety, institutional safety culture, and quality improvement interventions to address these types of events in otolaryngologic surgery.

Outcome Objectives: (1) Recognize the wide range of unexpected catastrophic adverse events that can occur in otolaryngology–head and neck surgery through actual case discussions and storytelling. (2) Learn specific interventions that may be able to reduce the likelihood or mitigate these never and near miss adverse events. (3) Highlight system and human factors that lead to never events and outline performance improvement strategies to mitigate occurrences.

Opioid-Sparing Strategies in Otolaryngology: Approaches to Reduce Opioids

Marisa A. Ryan, MD, MPH (moderator); Grace Tan, MD; Peter S. Vosler, MD, PhD; Alyson Russo, MD

Session Description: The ongoing opioid crisis and opioid-related fatalities have been exacerbated by the COVID-19 pandemic. Although opioids are sometimes necessary to manage pain, they carry substantial side effects as well as serious risks including abuse, misuse, diversion, addiction, overdose, and even death. Even short-term postoperative prescriptions can lead to chronic opioid use or an opioid use disorder. As surgeons and otolaryngology providers, we must contribute to safely reducing the use of opioids and their associated risks. There are evidence-based approaches to reduce postoperative opioid use, utilize multimodal nonopioid pain management, and administer opioids safely when they are necessary. The purpose of this session is to review the evidence around these perioperative strategies in both children and adults. Specific and practical strategies to apply opioid-sparing techniques as well as how to safely provide opioids will be provided. Tips to incorporate these strategies into everyday otolaryngology practice will be discussed. Evidence-based strategies utilized by anesthesiologists and pain medicine physicians will be shared along with recommendations for collaborating with these colleagues regarding your patients' pain management. Time will be available for questions regarding safe and effective perioperative pain management.

Outcome Objectives: (1) Evaluate the current evidence and knowledge gaps for opioid and multimodal nonopioid postoperative pain management strategies. (2) Implement evidence-based strategies to reduce opioid use while effectively managing pain after otolaryngology procedures. (3) Apply safe practices when prescribing opioids and caring for patients taking opioids.

Otolaryngologists as Agents of Change in Hospitals and Health Systems

Romaine F. Johnson, MD, MPH (moderator); Jennifer M. Lavin, MD; Jonathan B. Ida, MD; Soham Roy, MD

Session Description: Using quality and safety (Q&S) principles for the evaluation, performance, and follow-up care of patients is a critical component of otolaryngology. Despite its importance, the best methods and how to become Q&S change agents are not widely known. We will discuss the principles of Q&S as they relate to pediatric otolaryngology and airway management, including the most effective methods of reducing practice variability, in-hospital complications, and unplanned readmissions. We will also describe how pediatric otolaryngologists can act as change agents. Finally, we will discuss how COVID-19 has affected airway practices, emphasizing Q&S principles. This miniseminar has been endorsed by the American Academy of Otolaryngology–Head and Neck Surgery Patient Safety and Quality Improvement Committee and the American Society of Pediatric Otolaryngology Quality and Safety Committee.

Outcome Objectives: (1) Describe the fundamentals of quality and safety principles of practice, including quality intervention design and data analysis. (2) Understand the characteristics of leadership and how otolaryngologists can be change agents across an institution. (3) Recognize the challenges of practicing otolaryngology safely while maintaining quality in a COVID-19 world.

Patient Safety: Alternatives to Blaming the Surgeon

Ellen S. Deutsch, MD, MS (moderator); David E. Eibling, MD; Heather M. Weinreich, MD, MPH

Session Description: This panel will provide a refreshing evidence-based perspective that explores principles of patient safety that value the abilities and contributions of surgeons and other health care workers. After all, humans compensate for flawed systems that put patients at risk. For surgeons, the “sharp end” of patient care occurs literally at the end of a scalpel. But as we enlarge our perspective to include the surgical team, the operating room environment, and the organization in which they function, we find a multitude of factors affecting the safety and quality of patient care. Despite many obstacles, health care delivery usually succeeds because of, rather than despite, the capabilities of health care workers. Using a Safety-II lens, we seek to understand “what went well” and nurture adaptability, in contrast to the Safety-I

approach, which seeks to identify “what went wrong” and implement barriers to prevent recurrence. Safe, effective health care delivery requires a combination of these approaches. Understanding and improving work system dynamics can contribute to improving patient outcomes. Enhancements may be local, such as attention to physical ergonomics during procedures, or may be on a larger scale, such as nurturing programs that facilitate learning and collaboration. Humans have unique abilities, including pattern perception that informs diagnostic and treatment skills and the capacity to anticipate the consequences of interventions. We will address interventions such as integrating success analysis with root-cause event analysis and discuss the capacities of resilient organizations. Surgeons work in complex, high-risk, dynamic environments; we can optimize patient care in these environments by understanding system dynamics, compensating for our limitations, and taking advantage of our many abilities.

Outcome Objectives: (1) List 3 human capabilities that contribute to safe patient care. (2) Describe how to integrate success analysis and root cause analysis. (3) Apply principles of Safety-II to practices.

Portable Technology Platforms for Global Outreach

Merry E. Sebelik, MD (moderator); Greg J. Basura, MD, PhD; Jonathan Clark, MD

Session Description: Millions of people across the world suffer from disabling head and neck disease and hearing loss. In remote or very low-resource settings, there may be little access to traditional bulky, fixed diagnostic equipment or clinicians to perform and interpret studies. In recent years, there has been tremendous development of smaller and smaller devices that can fit in the palm of one’s hand and produce equivalent diagnostic information as an older piece of equipment that may have taken up most of a room. Further, current portable diagnostic equipment may have real-time connectivity to allow collaboration between specialists and locations. This session will focus on using currently available and developing technology to bring diagnostic abilities into global health settings. Two of the panelists bring their skills and knowledge to hearing impaired patients in remote and low-resource settings and will discuss the need for simple, accessible, and accurate hearing testing. This technology has wide applicability outside the global health arena, serving as adjunct technology for satellite clinics or rural areas. The third panelist will describe the striking lack of diagnostic imaging equipment and radiologists in some parts of the world. Portable, handheld ultrasound equipment can serve as the “stethoscope for the fingers” and produce valuable diagnostic information in real time. Similar to portable hearing assessment devices, portable ultrasound can reveal high-quality images, and many devices have connectivity features that allow collaboration and consultation. Endorsed by the American Academy of Otolaryngology–Head and Neck Surgery Foundation Humanitarian Efforts Committee, and enriched by the authors’

extensive personal experience, this diverse panel of experts will summarize currently available platforms/technology available for effective identification of head and neck disease and hearing loss in low-resourced areas of the world.

Outcome Objectives: (1) Estimate the global burden of hearing loss and other head and neck disease and describe how portable devices can enhance diagnosis and management in low-resource settings. (2) Compare pros and cons of portable platforms, including cost, clinical equivalence, and availability in global health settings. (3) Describe how to implement portable technology and devices, with a special focus on hearing screening and head and neck diagnostic imaging.

A Primer for Assessing Your Clinical Practice Using Quality Improvement

Sarah N. Bowe, MD (moderator); Karthik Balakrishnan, MD, MPH; Nausheen Jamal, MD; Brian Nussenbaum, MD, MHCM

Session Description: To build sufficient capability and capacity in quality improvement (QI), otolaryngology providers must be proficient in its key principles, yet it can be difficult to obtain training due to time and resource constraints. This panel presentation will provide a high-intensity introduction to QI, including methods for (1) identifying and targeting an improvement effort, (2) performing process analysis, and (3) displaying and analyzing data. During the session, audience members can begin working through a QI initiative with guidance from presenters and will be given handouts and resources to take back to their clinical practice.

Outcome Objectives: (1) Describe the necessary components for a successful quality improvement initiative. (2) Develop and select an aim statement, measures, and change concepts to drive improvement work. (3) Understand both run and control charts and interpret each for common cause and special cause variation.

The Science Behind Vaping: Empowering Patients to Quit

Zainab Farzal, MD, MPH (moderator); Ilona Jaspers, PhD; Meghan Rebuli, PhD; Phillip Clapp, PhD

Session Description: Electronic cigarette (e-cigarette) vaping was deemed a public health “epidemic” in 2018, and the prevalence of vaping has continued to increase among adolescents and young individuals. Tobacco regulation was among the 4 key legislative priorities for American Academy of Otolaryngology–Head and Neck Surgery in recent years, and data continue to demonstrate harm to respiratory epithelial cells by e-cigarette vapor. Since otolaryngologists see patients for many primary care complaints, we are often at the health care portal of entry for many young individuals whom we may be able to counsel about the adverse effects of vaping. In addition, potential long-term side effects of vaping are unknown and may lie within the realm of otolaryngologic care. This panel will review the magnitude of e-cigarette use in the United States and

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the emerging data on associated adverse effects. This panel will empower otolaryngologists in both private and academic settings to educate patients about presently known adverse effects of vaping and promote vaping cessation alongside pediatricians and addiction specialists. This expert panel will include lead National Institutes of Health-funded vaping researchers from 1 of 14 Centers for Tobacco Regulatory Science and Lung Health in the United States who will educate otolaryngologists about known deleterious effects of vaping and how vaping prevention and cessation can be addressed in clinical settings.

Outcome Objectives: (1) Examine the emerging research on the deleterious effects of vaping to promote e-cigarette related patient education. (2) Discuss the effects of vaping and how they specifically apply within the realm of otolaryngologic care. (3) Discuss how otolaryngologists can take a multidisciplinary approach (working with pediatricians and addiction specialists) to screen patient for vaping and encourage vaping cessation.

Shared Decision Making in Pediatric Otolaryngology

Mathieu Bergeron, MD, FRCSC (moderator);
Margo K. McKenna Benoit, MD; James M. Ruda, MD;
Anatoli F. Karas, MD

Session Description: Shared decision making (SDM) is a collaborative process in which patients, families, and clinicians jointly establish a treatment plan. It is considered the intersection of evidence-based medicine and patient-centered care, as constructive decision making is reliant on sound, evidence-based options. The aim of this approach is to empower patients and families to express their values and preferences, to pose questions, and to be active participants in making decisions regarding their health care. Although this collaborative process has been widely discussed and documented in a broad spectrum of medical and surgical specialties, research assessing its use in otolaryngology is limited. Specifically, in pediatric otolaryngology, studies have evaluated either the impact or the perception of SDM for common ear, nose, and throat problems—such as children with persistent sleep apnea—for the decision for tympanostomy or adenotonsillectomy, and for the need of pediatric otolaryngologic consultations. Recently, the American Academy of Otolaryngology—Head and Neck Surgery Foundation also covered this topic with an article about evidence-based medicine in otolaryngology and SDM, stating that SDM can potentially “decrease decisional conflict and decisional regret” as well as increase adherence to treatment plans and health care savings. The article also noted that barriers to SDM exist, although initial reports suggest that the practicalities of implementation are feasible in our field. During this session, attendees will be able to identify the pros and cons of shared decision making and will be introduced to several tools available to incorporate SDM into one’s busy clinical practice.

Outcome Objectives: (1) Learn how to make shared decision making relevant to our practices. (2) Identify tools that are available for SDM. (3) Understand the benefits and limitations of using SDM in one’s clinical practice.

Sustainability in Otolaryngology—Addressing Climate Health and Improving Cost Efficiency

Natalie A. Krane, MD (moderator); Amanda E. Dilger, MD;
Neelima Tummala, MD; Julie Moyle, RN, MSN

Session Description: Climate change is a significant global public health threat. Without reductions in current greenhouse gas (GHG) emissions, the World Health Organization estimates that 250,000 deaths per year from 2030 to 2050 will be attributable to climate change. In the United States, the health care sector is responsible for 10% of GHG emissions, which has increased by 30% over the past decade. Surgery in particular is cost, energy, and waste intensive—with operating rooms (ORs) using 3 to 6 times more energy than other areas of a hospital and generating two-thirds of a facility’s hazardous waste. As surgeons, we aim to improve the lives of our patients yet paradoxically contribute to the deleterious environmental changes that perpetuate their health conditions. The good news? There is a growing body of literature that demonstrates the efficacy and cost-efficiency of sustainability initiatives, particularly for the OR. During this panel presentation, you will hear from otolaryngologists who have increased climate change awareness in their communities and are actively developing sustainability committees at their institutions. You will also hear from an expert in greening the OR from Practice Greenhealth, who will share industry best practices and describe the cost savings that can be incurred from implementing sustainability initiatives. Discussion points will include the public health burden of climate change, the effects of climate change and air pollution on allergic rhinitis, the carbon footprint of surgery, mitigation strategies for the OR, and the economic benefits of “going green.” Although there is a wide range of options for data-driven and cost-effective sustainability initiatives in the OR, this panel will focus on 3 high-yield, accessible options: tray reformulation, anesthetic choices, and reusable equipment. Otolaryngologists at all levels of training should leave this session feeling empowered to integrate evidence-based sustainability initiatives into their practices and/or propose the development of a sustainability committee at their institutions.

Outcome Objectives: (1) Provide an overview of the contribution of the health care sector to climate change with strategies for mitigating our carbon footprint as surgeons. (2) Describe the existing literature on the effects of climate change and air pollution on the pathogenesis and increasing prevalence of allergic rhinitis. (3) Provide evidence for the cost-effectiveness of integrating sustainability initiatives in the operating room.

Unequal Treatment: How Health Care Disparities Negatively Impact Our Otolaryngology Patients

Sarah N. Bowe, MD (moderator);
Karthik Balakrishnan, MD, MPH; Regan W. Bergmark, MD;
Uchechukwu C. Megwalu, MD

Session Description: Health care disparities refer to variation in disease occurrence and outcomes between socioeconomic

or geographically defined groups. Disparities are commonly viewed through the lens of race and ethnicity, but they occur across a broad range of dimensions, including insurance status, age, socioeconomic status, geography, citizenship status, language, disability status, gender, and sexual identity and orientation. In 1999 Congress requested that the Institute of Medicine assess the extent of racial and ethnic disparities in health care, controlling for access-related factors such as insurance status and affordability of care. Despite this, evidence of racial and ethnic health care disparities remained remarkably consistent across a wide range of diseases and services. This panel will start with an overview of health care disparities, including a discussion of the current literature in the context of the broader evidence base on disparities. Then, speakers will address key contributing factors to health care disparities, including the (1) structure and function of health care systems and the legal and regulatory climate in which they operate, (2) impact of social determinants of health, and (3) influence of cognitive and implicit bias. In addition, each speaker will frame their discussion using examples from within their subspecialty field of expertise, including rhinology, head and neck oncology, and pediatric otolaryngology, to maximize direct clinical relevance for a broad audience. Finally, the speakers will also incorporate reflections from the coronavirus pandemic, which has served to exacerbate many of these preexisting issues of health care disparities.

Outcome Objectives: (1) Understand the ways in which health care system organization, social determinants of health, and biases lead to disparities. (2) Assess their own practices settings for health care disparities. (3) Implement strategies to detect, understand, and reduce inequities between their own otolaryngology patients.

Using Big Data in Otolaryngology

Derek J. Lam, MD, MPH (moderator);
Nikhila P. Raol, MD, MPH; Jennifer J. Shin, MD, SM;
David O. Francis, MD

Session Description: Big data databases are ubiquitous in health care, where they offer a unique and powerful resource in understanding current practices and assessing treatment outcomes, costs, and value on a broad population level. With the increasing emphasis on evidence-based practice, value, and quality improvement, the databases available for research or quality improvement opportunities are ever-expanding, along with the types of questions that can be addressed. This panel presentation will provide an overview of some of the large databases available to researchers and clinicians, offering insight and experience from researchers who have published studies using these databases. We will discuss how to identify databases relevant to specific questions, examine strengths and limitations, and provide practical advice in accessing and working with these data sets. The following specific databases will be discussed. (1) National Surgical Quality Improvement Program Pediatric (NSQIP), a nationally validated, risk-adjusted database with data generated

from patient-level chart extraction by trained clinical reviewers that measures surgical complications and 30-day postoperative outcomes. (2) Pediatric Health Information System (PHIS) and Kids' Inpatient Database (KID), pediatric databases drawn from children's hospitals across the country, including inpatient, ambulatory, and emergency department encounters (PHIS), and national estimates of hospital inpatient stays based on discharge all-payer insurance claims data (KID). (3) MarketScan database, a national insurance claims database with individual-level claims data from employers, health plans, and hospitals in inpatient, outpatient, emergency department settings. (4) National Ambulatory Medical Care Survey (NAMCS), data sampled across the US population, based on surveys of individuals or households, providers, birth and death certificates, standardized physical exam, and medical records. (5) Reg-entSM, an otolaryngology-specific clinical data registry focused on quality improvement and patient outcomes.

Outcome Objectives: (1) Recognize commonly utilized large databases in health care and the data they can provide. (2) Discuss the strengths, limitations, and pitfalls of using large databases. (3) Understand how to interpret and apply the results of big data analysis.

Viral Spread Mitigation in Skull Base Surgery: Emphasis on COVID-19

Ashutosh Kacker, MD (moderator); Erin L. McKean, MD;
Jose L. Mattos, MD, MPH; Eric W. Wang, MD

Session Description: The current pandemic of the SARS-CoV-2 (COVID-19) virus has led to heightened awareness of clinical spread of virus, particularly during operative procedures involving aerosol generation. Data are limited on extent of spread during various anterior and lateral skull base surgical procedures, particularly those procedures using powered instrumentation (with the resultant increase in aerosolization of viral particles). We will review contagion spread with the help of established clinical spread models and discuss applicability to the current pandemic. Evidence-based practices, highlighted by case-based examples, will be emphasized in both anterior and lateral skull base surgery. Principles for planning for and managing future epidemics and/or pandemics will be discussed. This panel is highly relevant to the practicing otolaryngologist and will provide the attendee with a thorough update on clinical practice patterns, potential spread of contagion, and strategies of spread mitigation. Urgent cranial base operations often continued to be performed during the pandemic, and review of these cases can help to plan for less urgent operations in ongoing and future epidemics.

Outcome Objectives: (1) Examine the spread of COVID-19 clinically and review mitigation strategies. (2) Examine and recognize international controversies among providers and institutions in formulating those mitigation strategies and the execution of the strategies. (3) Implement evidence-based practice patterns specific to COVID-19 in skull base surgery.

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What Matters in the End: Otolaryngologic End-of-Life Care

Andrew J. Redmann, MD (moderator);
Andrew G. Shuman, MD; Susan D. McCammon, MD;
Roger D. Cole, MD

Session Description: Otolaryngologists often care for patients at the end of their lives but are rarely comfortable with switching from curative treatment to a palliative treatment paradigm. In addition, otolaryngologists are often uncomfortable treating common conditions that arise in this patient population, including chronic pain, depression/anxiety, and decision making at the end of life. Discussions surrounding end-of-life issues often arise in residency, but current residency education models provide little formal education on how to approach patients at the end of life. Recent evidence suggests that only about 5% of terminal otolaryngology patients receive palliative care consultation, indicating an opportunity for quality improvement in this setting. This session will describe the most current research on end-of-life care and discuss how the principles of palliative care can be applied to patients to improve the quality of care otolaryngologists provide. Foundational ethical principles of autonomy, beneficence, nonmaleficence, and justice will be described so that surgeons have tools to approach difficult patient encounters. A case-based approach will be used to illustrate how otolaryngologists experienced with treating terminal patients approach patient care in this situation. Cases will be used as a springboard to discuss the unique considerations for otolaryngology patients at the end of life, such as disfigurement, communication difficulties, and dysphagia in head and neck cancer, and issues of substituted judgment in terminal pediatric patients. Cases on how COVID-19 affects care at the end of life will also be discussed. Finally, a framework on how to approach terminal patients will be shared as a practical takeaway for improving care at the bedside.

Outcome Objectives: (1) Understand the principles of medical ethics as they relate to terminal otolaryngology patients. (2) Recognize the unique challenges in otolaryngology patients at the end of life. (3) Explain the role of palliative care in the treatment of otolaryngology patients at the end of life.

Pediatric Otolaryngology

Addressing Otolaryngology Disparities in Children: A Discussion of Multilevel Interventions

Jad R. Jabbour, MD, MPH (moderator);
Dana M. Thompson, MD, MS, MBA; David J. Brown, MD;
Matthew L. Bush, MD, PhD, MBA

Session Description: A panel of experts who have used various approaches to address disparities observed in their practices will discuss their experiences, as well as insights into how individuals, departments, and institutions can develop interventions to improve health equity for those they serve.

Discussion topics will include (1) how specific disparities were identified, (2) how interventions were developed and implemented, (3) how those interventions are evaluated, (4) what lessons were learned during those processes, (5) how other providers, departments, and institutions can apply those lessons, and (6) how otolaryngology in general and pediatric otolaryngology in particular can continue to develop, implement, test, and refine interventions that can improve health equity in otolaryngology conditions in children. The program will include an emphasis on the multilevel approaches that are needed to address the complex problem of health care disparities, using examples ranging from patient-level interventions that improve access to care to systemic strategies for workforce diversification and cultural humility training that build trust and communication with diverse populations. The discussion will highlight the integral role these interventions play in increasing overall patient safety and quality of care.

Outcome Objectives: (1) Describe the need for multilevel and systemic interventions to address health care disparities in pediatric otolaryngology. (2) Recognize the challenges and opportunities related to developing interventions that promote health equity in your own practice, department, and/or institution. (3) Analyze how otolaryngology in general and pediatric otolaryngology in particular can better address health care disparities as part of our overall efforts to improve patient safety and quality of care.

Clinical Practice Guideline: Tympanostomy Tubes in Children Update

Richard M. Rosenfeld, MD, MPH, MBA (moderator);
David E. Tunkel, MD; Seth R. Schwartz, MD, MPH;
Diego A. Preciado, MD, PhD

Session Description: Insertion of tympanostomy tubes is the most common ambulatory surgery performed on children in the United States. The tympanostomy tube is placed in the child's eardrum to ventilate the middle ear space. Each year, 667,000 children younger than 15 years receive tympanostomy tubes, accounting for more than 20% of all ambulatory surgery in this group. Tympanostomy tubes are most often inserted because of persistent middle ear fluid, frequent ear infections, or ear infections that persist after antibiotic therapy. All these conditions are encompassed by the term *otitis media* (middle ear inflammation), which is second in frequency only to acute upper respiratory infection as the most common illness diagnosed in children by health care professionals. The frequency of tympanostomy tube insertion combined with variations in accepted indications for surgery creates a pressing need for an evidence-based clinical practice guideline (CPG) to aid clinicians in identifying the best surgical candidates and optimizing subsequent care. This CPG is an update of the original published in 2013, which was widely circulated and downloaded. For the updated CPG, we reaffirmed the original action statements, updated the evidence in support of those statements, and addressed the use of adjuvant adenoidectomy, prophylactic ear drops, long-term

tubes, and follow-up. The primary purpose of this clinical practice guideline is to provide clinicians with evidence-based recommendations on patient selection and surgical indications for and management of tympanostomy tubes in children. This guideline is intended for any clinician involved in managing children, aged 6 months to 12 years, with tympanostomy tubes or children being considered for tympanostomy tubes in any care setting as an intervention for otitis media of any type. The target audience includes specialists, primary care clinicians, and allied health professionals, as represented by the multidisciplinary guideline development group.

Outcome Objectives: (1) Provide clinicians with updated evidence-based recommendations on patient selection and surgical indications for and management of tympanostomy tubes in children. (2) Identify quality improvement opportunities to improve care related to tympanostomy tubes in children. (3) Empower clinicians to educate families about tympanostomy tubes and to engage them in shared decision making.

Controversies in Pediatric OSA 2021: Let's Debate

Cristina M. Baldassari, MD (moderator);
Norman M. Friedman, MD; Derek J. Lam, MD, MPH;
Erin Kirkham, MD, MPH

Session Description: Obstructive sleep-disordered breathing (SDB) and obstructive sleep apnea (OSA) are common in children presenting for otolaryngology evaluation. In the past decade, there have been numerous innovations and advances in the field of pediatric OSA. However, controversies persist regarding the evaluation and management of SDB and OSA in children. Published guidelines from national otolaryngology, sleep medicine, and pediatric societies differ significantly in their recommendations. Thus, it can be challenging for otolaryngologists to determine the most appropriate management strategies for children presenting with SDB. Our primary aim is to identify and discuss controversies in the evaluation and treatment of children with SDB and OSA. Regarding pediatric OSA diagnosis, panelists will debate the utility of home polysomnogram and biomarkers. The following controversial topics related to pediatric OSA management topics will also be included: (1) role of adenotonsillectomy (AT) for primary snoring, (2) optimal drug-induced sleep endoscopy (DISE) sedation protocol, (3) utility of DISE at the time of AT, (4) effectiveness of turbinate surgery in pediatric OSA treatment, (5) role of multilevel sleep surgery at the time of AT, and (6) AT vs continuous positive airway pressure therapy for treatment of OSA in obese adolescents. This miniseminar will feature a debate among panelists on these topics in a point-counterpoint format. Clinical cases will be presented to frame the discussion. Panelists will provide evidence-based “pro and con” arguments for each controversy. To provide the best care to pediatric patients presenting with OSA, otolaryngologists must be familiar with the most up-to-date management options and be able to incorporate the current literature into their practice.

Outcome Objectives: (1) Understand common controversies in the management of pediatric OSA. (2) Become familiar with new evidence-based literature that addresses pediatric OSA controversies. (3) Incorporate innovative diagnostic and treatment advances in the management of children with OSA.

Evaluation and Management of Pediatric Dysphagia

Sukgi S. Choi, MD (moderator);
Reza Rahbar, DMD, MD; Michael J. Rutter, MD,
FRACS; Romaine F. Johnson, MD, MPH

Session Description: Awareness of swallowing dysfunction is growing in the pediatric population. As many as 50% of parents report their otherwise healthy children have a feeding problem. This incidence is even higher in premature infants and in children with complex medical problems. There has also been increasing availability of diagnostic modalities and speech and language pathologists who specialize in dysphagia. Thus, dysphagia is increasingly diagnosed in the pediatric population, especially as advances in health care improve the survival of extremely premature infants and children with complex congenital anomalies. The aim of this panel is to familiarize the audience with the diagnosis and management of pediatric dysphagia. We will discuss the evaluation of dysphagia with a focus on clinical feeding evaluation, fiber-optic endoscopic evaluation of swallowing, and modified barium swallow study (MBS). Medical management, including the duration of feeding therapy and indications for/timing of endoscopic evaluation in the operating room, will be reviewed. Surgical management of established anatomic etiologies of dysphagia, including vocal fold immobility, laryngomalacia, and type 1 laryngeal cleft, will be presented. Finally, we will underscore the importance of multidisciplinary approach to management of these complex patients and appropriate timing and use of specialty consultations such as neurology evaluation. Panel members are from different institutions, chosen to present and highlight differing points of view.

Outcome Objectives: (1) Understand the evaluation of infants and children with dysphagia. (2) Understand the role of feeding therapy and timing of MBS and other consultations. (3) Understand the surgical options and timing of intervention.

Exploring Pediatric Sinusitis: Updates in the Management of Pediatric Sinusitis

Patrick C. Walz, MD (moderator); David A. Gudis, MD;
Amanda L. Stapleton, MD; Naweed I. Chowdhury, MD

Session Description: The goal of this panel presentation is to address challenges facing the otolaryngologist managing pediatric rhinosinusitis and provide an evidence-based update in the care of this disease process. Through case-based discussions with practicing pediatric otolaryngologists and rhinologists, the panelists will discuss patient care challenges, review the current evidence, and debate areas of controversy. Medical and surgical management of pediatric rhinitis will be discussed, with consideration of what to do with the stuffy, snotty nose

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after adenoidectomy when computed tomography is clear. The panel will also cover pediatric rhinosinusitis and its medical and surgical management, with special focus on (1) the use of biologics in pediatric rhinosinusitis, including patient selection, timing, risks; (2) the role of allergy evaluation; and (3) management of special populations including patients with cystic fibrosis and those in an immunocompromised state. Pediatric complicated sinusitis and the management of orbital and intracranial complications of acute sinusitis will be addressed.

Outcome Objectives: (1) Recognize the clinical and radiographic findings separating pediatric rhinitis, rhinosinusitis, and complicated sinusitis. (2) Implement evidence-based management strategies, including both medical and surgical therapy for pediatric rhinosinusitis, and understand the differences in treatment for special populations. (3) Recognize the indications for allergy/immunology evaluation and biologics in the pediatric rhinosinusitis patient.

Kids Today: Rapid Review of Guidelines and Consensus Statements

Debra G. Weinberger, MD (moderator);
Jennifer J. Shin, MD, SM; David E. Tunkel, MD;
David H. Darrow, MD, DDS

Session Description: This panel presentation efficiently reviews the most critical aspects of the clinical practice guidelines, consensus statements, and position papers endorsed by the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS). Key concepts in pediatric otolaryngology are discussed, along with related controversies and challenges. The agenda includes the most up-to-date, evidence-based management for otitis media, tympanostomy tubes, pediatric rhinosinusitis, obstructive sleep apnea, tonsillectomy in children, and epistaxis. In addition, the important overall differences between practice guidelines, consensus statements, and position papers and their respective influence on clinical decisions are highlighted. The faculty includes the chair of the AAO-HNS Guideline Task Force and leadership from the development groups of key publications from the AAO-HNS and American Academy of Pediatrics.

Outcome Objectives: (1) Explain the difference between clinical practice guidelines, consensus statements, and society-endorsed position papers. (2) Identify best practices for otitis media, rhinosinusitis, obstructive sleep apnea, tonsillectomy, and epistaxis. (3) Examine potential controversies and challenges associated with implementation of these best practices.

Management of Nontuberculous Mycobacterial Cervical Lymphadenitis: Pearls and Controversies

Mathieu Bergeron, MD, FRCSC (moderator);
Joshua P. Wiedermann, MD; Heather C. Nardone, MD;
Jennifer McLevy-Bazzanella, MD

Session Description: Nontuberculous mycobacterial lymphadenitis is a common cause of subacute and chronic cervicofacial masses in children younger than 5 years. The natural

history of such disease involves slowly enlarging lymphadenopathy of the cervicofacial region. Most patients will not have systemic symptoms, and the infection itself will remain isolated to 1 region. With time, the classic violaceous skin discoloration can occur as the infection extends beyond the lymph node capsule. The infection can progress to a draining fistula as the latest stage. There is no universally accepted workup or treatment algorithm. Common workup options involve lab tests, ultrasound, and biopsy. Current treatment options include observation, antibiotic therapy, curettage, fine-needle aspiration, incision and drainage, and complete surgical excision. Each option comes with benefits and possible complications. The management decision is highly dependent on the medical center, as no consensus exists. Several gray zones exist for this topic. What, if any, are the highest yield tests? How can we predict spontaneous resolution? Who should undergo surgery, and if indicated, does complete excision of involved nodes provide better outcomes than curettage? Should antibiotics be given at the same time? Should adjacent cervical nodes be addressed? This session will cover the workup and management options of nontuberculous mycobacterial cervicofacial lymphadenitis and will help the clinician to decide which therapy might be more appropriate for each patient. This panel of experts will be composed of 4 pediatric otolaryngologists skilled in the management of such patients.

Outcome Objectives: (1) Describe the presentation and workup of nontuberculous mycobacterial cervicofacial lymphadenitis. (2) Compare the current management options of nontuberculous mycobacterial cervicofacial lymphadenitis. (3) Explain the benefits and downsides of each treatment modality.

Management of Pediatric Cranial Nerve Injury due to Trauma and Tumors

Amy L. Dimachkieh, MD (moderator);
Julina Ongkasuwan, MD, FACS, FAAP; Tessa Hadlock, MD;
Claire Miller, PhD, CCC-SLP

Session Description: Trauma and tumors are responsible for significant morbidity in children and subsequent physical and emotional deficits may affect children for a lifetime. Trauma is the leading cause of death in children, and pediatric head and neck malignancies account for 12% of all pediatric cancer. It is not always possible to restore preinjury structure and function, but collaboration between pediatric otolaryngologists, facial plastic reconstructive colleagues, and experienced physical therapists/speech language pathologists can help guide medical and surgical decision making to provide the best outcome. This session provides an overview of the complexity and morbidity of cranial nerve deficits in children and encourages participants to engage experienced colleagues and institute multidisciplinary care for these difficult patients. Surgical management of skull base tumors and brainstem lesions can result in complete unilateral pharyngolaryngeal paralysis, which carries significant morbidity and mortality. Multiple management options

are available to the otolaryngologist, including laryngoplasty, thyroplasty, palatal adhesion, pharyngeal plication, and laryngeal reinnervation. We will discuss the advantages and disadvantages of these options in the setting of lower cranial nerve injury as well as the importance of early intervention with speech-language pathology. Facial nerve injury from tumor or trauma can be devastating to a pediatric patient, yielding both physical deformity and important functional deficits, including those involving eye closure, nasal breathing, oral competence, speech, and facial expressions/nonverbal communication. Facial rehabilitation options are numerous; we will discuss treatment options and special considerations in pediatric patients. The functional and psychosocial impact of pediatric cranial nerve injury is extensive. This session activates conversation between subspecialties in otolaryngology and familiarizes us with the possibilities for reanimation, reinnervation, and restoration of structure and function.

Outcome Objectives: (1) Assess the functional impact of lower cranial nerve injury in children with unilateral pharyngolaryngeal paralysis and employ therapeutic interventions to address sensorimotor impairments. (2) Compare the surgical options for treatment of pediatric unilateral pharyngolaryngeal paralysis due to high vagal nerve sacrifice, including pharyngeal and glottic interventions. (3) Describe the goals of facial reanimation, special considerations in pediatric patients, and treatment options for restoration of facial symmetry, tone, and movement, including free muscle transfer.

Management Options for Pediatric Patients With Single-Sided Deafness (SSD)

Anita S. Jeyakumar, MD, MS (moderator); Sarah Mowry, MD; Maura K. Cosetti, MD

Session Description: The objective of our panel is to discuss currently available treatment modalities for pediatric single-sided deafness (SSD), highlighting educational, functional, and audiometric outcomes. The increasing number of options available for children with SSD necessitates a methodical approach to diagnosis, monitoring, treatment decisions, and outcomes assessment in these children.

Outcome Objectives: (1) Understand the potential impact of pediatric SSD, including educational achievement, spatial hearing, and speech understanding. (2) Recognize the current technology available for a pediatric patient, including bone conduction devices, contralateral routing of signal hearing aids, and cochlear implantation. (3) Implement a systemic method to monitoring and managing pediatric patients with SSD.

Medical Workup of Pediatric Sensorineural Hearing Loss—Case Presentations

Oliver F. Adunka, MD (moderator); Daniel Choo, MD; Craig A. Buchman, MD; Margaret Kenna, MD, MPH

Session Description: The management of pediatric sensorineural hearing loss requires a coordinated team approach between a diverse group of professionals. These include

audiologists, speech-language pathologists, early intervention specialists, physicians, educators, and many others. While the approaches and the details of the clinical algorithm vary dramatically across the country, the managing physician often plays a central role. This session aims to detail the physician's perspective of the team approach by discussing various common clinical scenarios applying evidence-based guidelines. This seems especially pertinent given the diverse clinical population served by hearing loss professionals. The panelists also plan to detail imaging, surgical aspects in the management of pediatric hearing loss, established and new trends in cochlear implantation, and alternative technology.

Outcome Objectives: (1) Summarize general principles involved in the medical and audiological workup of pediatric hearing loss. (2) Discuss various clinical scenarios commonly encountered in the management of pediatric sensorineural hearing loss. (3) Review genetic, audiometric, and radiologic aspects of pediatric hearing loss.

Pediatric Thyroid Nodules: Beyond the Guidelines

John P. Dahl, MD (moderator); Margo K. McKenna Benoit, MD; Jeffery C. Rastatter, MD; Andrew J. Bauer, MD

Session Description: The incidence of thyroid cancer in young children and adolescents has risen over the past 20 years. For males, the rate per 1,000,000/persons rose from 2.77 in 1990 to 9.63 in 2009. For females, the rate per 1,000,000/persons rose from 18.35 in 1987 to 50.99 in 2009. With the increased incidence of pediatric thyroid cancer, otolaryngologists are more commonly seeing younger patients with thyroid nodules and concern for malignant disease. In addition, a delay in management or inappropriate management may lead to worse outcomes for a disease that traditionally has a high 5-year survival rate. A team-based approach can lead to streamlined processes for timely diagnosis, evidence-based treatment decisions, and adherence to current guidelines. This panel will highlight specific aspects of caring for children with thyroid nodules in a case-based format, drawing on the expertise of pediatric otolaryngologists and a pediatric endocrinologist. Panelists will briefly review current literature supporting a multidisciplinary team approach for pediatric thyroid patients as well as highlights from the 2015 American Thyroid Association (ATA) guidelines. The focus of this panel will be challenging patient scenarios that fall outside standard practice and ATA recommendations. This will include laboratory evaluation, imaging modalities, and biopsy methods, in addition to medical and surgical treatment algorithms. In addition, each patient scenario will illustrate models of how different institutions across the country practice team-based care. Special focus will be placed on emerging concepts in the field of pediatric thyroid diseases, including oncogene analysis, targeted therapies, and best practice for surveillance in the treatment of thyroid cancer. We will conclude with a review of gaps in the 2015 ATA guidelines and potential research opportunities.

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Outcome Objectives: (1) Understand the initial steps in evaluating a child with a thyroid nodule, including imaging modalities, laboratory tests, and biopsy techniques. (2) Understand the medical and surgical approaches to treating a child with a thyroid nodule, including both benign and malignant pathologies. (3) Understand and discuss the optimal mechanism for surveillance in children treated for thyroid cancer via an interdisciplinary thyroid program.

Pediatric Tonsillectomies: What You Need to Know for Pain Control

Heather M. Weinreich, MD, MPH (moderator);
David H. Chi, MD; Patrick C. Walz, MD;
Christina J. Yang, MD

Session Description: Tonsillectomies are one of the most common procedures in the United States and are considered one of the most painful procedures, with most individuals rating pain 8 to 9 out of 10. With regard to pediatric tonsillectomies, pain control can be challenging as there is still a sentiment that nonopioids may not provide adequate pain control and may increase likelihood of postoperative bleeds. More concerning is that even with black box warnings regarding codeine in pediatric populations, clinicians still prescribe codeine to their patients. The goal of this session is to establish evidence-based strategies to provide perioperative pain control and minimize the risk of abuse after tonsillectomy. This session was born out of a previous panel discussion on opioid management. Member feedback from that session requested more information regarding pediatric pain control. This session will provide an overview of the evidence of the harm opioids can cause in the pediatric population, provide data regarding the risk and benefits to use of nonopioid medications in this population—specifically looking at use of nonsteroidal anti-inflammatory drugs—and, finally, provide strategies to reduce opioid prescribing and protocols that can be introduced into practice. Significant time will be devoted to questions and answers as well as sharing tips and tricks to address perioperative pain in a safe manner.

Outcome Objectives: (1) Discuss the history and harm of using opioids in pediatric populations. (2) Evaluate the evidence regarding use of nonopioid medications in posttonsillectomy pain management. (3) Implement strategies and protocols for nonopioid pain management in pediatric tonsillectomies.

Perioperative Airway Management at Time of Craniofacial Surgery: Otolaryngologists' Perspectives

Andrew R. Scott, MD (moderator); Brianne B. Roby, MD;
Lauren A. Bohm, MD; Scott M. Rickert, MD

Session Description: As the airway experts in children, pediatric otolaryngologists treat multiple levels of airway obstruction, including stenosis within the nasal cavities, midface hypoplasia, and micrognathia. Numerous techniques exist for

treatment of airway obstruction, but goals are to relieve the airway obstruction, make feeding more efficient, and improve quality of life. Distraction osteogenesis is a technique that generates new bone formation, allowing for rapid growth and correction of the underlying craniofacial skeleton. This technique has been adapted for use in a variety of craniofacial abnormalities to improve upper airway obstruction. This panel will include in-depth discussion the variety of distraction techniques to treat obstruction at different airway levels. The panel will discuss airway management that might be necessary with the following procedures: mandibular distraction, infant surgically assisted rapid palatal expansion (iSARPE), maxillary distraction, and craniostylosynostosis, including emergency airway management, indications for surgery, workup that should be completed, and controversies in management.

Outcome Objectives: (1) Review different techniques that might be incorporated in airway management in both an emergency and surgical situation for complex craniofacial patients. (2) Understand site airway obstruction that can be treated with distraction osteogenesis, including mandibular distraction, midface/LeFort distraction, and craniostylosynostosis. (3) Appreciate the indications for distraction osteogenesis, including controversies on patient selection, and recognize ways an otolaryngologist–head and neck surgeon is involved in management.

Resurgence of Common Vaccine-Preventable Diseases Encountered by the Practicing Otolaryngologist

James M. Ruda, MD (moderator); Matthew Washam, MD, MPH;
Jagadisharaje Urs, MD; Bernhard Wiedermann, MD, MA

Session Description: Vaccine-preventable diseases (VPDs) are diseases of viral or bacterial origin that can be prevented by vaccination. It is estimated that 2 to 3 million deaths per year are prevented by the practice of vaccination. Currently, 27 viral and bacterial diseases are considered vaccine preventable by the World Health Organization. Despite this, VPDs are still responsible for 1.5 million deaths per year. Overall, VPDs preferentially affect infants and children as well as those >65 years old. The most common and serious VPDs tracked by the World Health Organization include diphtheria, haemophilus influenzae serotype b infection, hepatitis B, measles, meningitis, mumps, pertussis, poliomyelitis, rubella, tetanus, tuberculosis, and yellow fever. VPD resurgence occurs for multiple reasons that include waning herd immunity, vaccine failure, antivaccination sentiment, distrust in vaccines and governmental programs, alternate vaccination schedules, childhood underimmunization/non-immunization, and failure of timely vaccine delivery. With increasing global transportation and travel, VPDs that were thought nearly eradicated or extinct within the United States have begun to reemerge, especially in underimmunized communities across the United States. Since 1963 when the measles vaccine was first introduced within the United States, VPDs have made a steady resurgence in the United

States and have primarily involved pertussis and measles. With measles, a vaccination rate approaching 95% of the community is required to achieve passive herd immunity and prevent disease resurgence. With the increasing incidence of various VPDs in the United States, many clinicians likely have no prior experience with the diagnosis or management of any VPDs within their own clinical practice. During this session, attendees will be able to review common VPDs within the United States, vaccination practices that contribute to VPDs, standard vs delayed vaccination schedules, and the clinical presentations, complications, and consequences of exposure to patients with VPDs that may be increasingly encountered by the practicing otolaryngologist.

Outcome Objectives: (1) Recognize the common VPDs within the United States as well as factors contributing to the resurgence of VPDs. (2) Understand the difference between routine vs delayed vaccination schedules within the United States as well as medical vs nonmedical exemptions to the standard vaccination schedule. (3) Understand the clinical presentation, associated complications, and consequences of exposure to patients with common VPDs within the United States.

Ultrasound in the Pediatric Patient: A Primer for the Otolaryngologist

Nikhila P. Raol, MD, MPH (moderator);
Julina Ongkasuwan, MD; Merry E. Sebelik, MD;
Elton M. Lambert, MD

Session Description: Initially limited to identification of thyroid pathology, ultrasound use in otolaryngology has increased substantially over time. The past decade has seen a significant increase in use of this imaging modality in the pediatric population, both in the clinic and operating room setting. Indications for use include identification of suppurative lymph nodes, vocal fold motion, thyroid lesions, salivary gland pathology, tongue base anatomy, and subglottic and tracheal dimensions and abnormalities. Point-of-care ultrasound is ideal for rapid imaging of acute head and neck problems and avoids the time, expense, and radiation associated with more traditional cross-sectional imaging. However, when initially deciding to use this imaging modality, the learning curve can be steep and the device options can be overwhelming. The goals of this panel discussion are to introduce the otolaryngologist to the versatile use of ultrasound in the pediatric population as alternatives to more invasive diagnostic modalities. This panel will discuss key concepts in ultrasound use in the pediatric population, including (1) appropriate indications and potential pathology for ultrasound imaging, (2) techniques for performing interventional and diagnostic ultrasound in the head and neck, (3) barriers and pitfalls of ultrasound use in the pediatric head and neck, and (4) similarities and differences between various ultrasound machines, including cost and resolution, as well as current coding and reimbursement practices. These concepts will be illustrated using high-quality studies from otolaryngology, as well as other specialties.

Outcome Objectives: (1) Understand basic ultrasound technique in pediatric head and neck pathology. (2) Recognize the limitations to ultrasound use in the pediatric population. (3) Introduce ultrasound use into practices for diagnostic and procedural applications.

Updates in Pediatric Cochlear Implant Candidacy

Maura K. Cosetti, MD (moderator); David H. Chi, MD;
Anita S. Jeyakumar, MD MS; Daniel Zeitler, MD

Session Description: Indications for cochlear implantation in children have been evolving over time, including recent changes in US Federal Drug Administration (FDA) criteria. Beyond the bilaterally deaf child, evidence has rapidly accumulated supporting cochlear implantation in children with greater degrees of residual hearing who still struggle in educational and social settings. This program will review current indications for cochlear implantation in children and the evidence for expanded indications, including children younger than 12 months, those with unilateral sensorineural hearing loss, children with poor speech understanding and excellent low-frequency hearing, as well as late-identified children and those with anatomic malformations. Emerging data have demonstrated significant benefits of cochlear implantation in these populations with substantial benefits on both speech and language. This program will provide an updated, evidence-based discussion of the candidacy and outcomes of cochlear implantation in pediatric populations with greater degrees of residual hearing, either in the implanted ear or the opposite ear.

Outcome Objectives: (1) Identify current indications for cochlear implantation in children, including recent changes in FDA approval. (2) Recognize the impact of cochlear implantation on speech and language development and the importance of timely intervention. (3) Appreciate the various aspects of the candidacy evaluation that support cochlear implantation in the pediatric population.

Upper Lip Tie: Evidence, Controversy, and Shared Decision Making

Margo K. McKenna Benoit, MD (moderator);
Jonathan M. Walsh, MD; Sheri A. Poznanovic, MD;
Heather C. Herrington, MD

Session Description: The diagnosis and impact of oral ties, including lip and tongue tie, have been topics of exponentially growing interest, largely driven by parent demand. Despite a growing body of evidence regarding upper lip ties (ULT), there remain many questions about the impact of ULT on infant feeding, what constitutes a symptomatic lip tie, and whether releasing the ULT is advisable. Consensus among pediatric otolaryngologists is scarce. Several early clinical studies showed a benefit to releasing ULT, but these studies often combined release of tongue and lip tie in the same setting, making the outcomes of ULT release difficult to determine. In a recent study including a cohort of 100 healthy

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newborns, the anatomical presence of a more pronounced ULT did not correlate with feeding difficulty. Another recent study on isolated ULT showed an improvement in feeding outcomes for symptomatic infants who underwent upper lip frenotomy; however, a systematic review of articles published from 1946 to 2018 concluded that the evidence for routine ULT release in infants is poor. While clinicians may wish to take a wait-and-see approach for the literature to bear out, parents continue to make appointments asking what we can do for their babies who are struggling to breast-feed. This seminar is designed to prepare clinicians with adequate information to undertake shared decision making with parents and caregivers as well as to promote informed dialogue with other professionals involved in infant feeding.

Outcome Objectives: (1) Discuss the normal anatomy, evolving criteria, and staging systems for diagnosis of symptomatic ULT. (2) Understand the controversial and contradictory literature currently available on this topic. (3) Approach ULT in an evidence-based mind-set with parents and other professionals (lactation consultants, dentists, pediatricians, early intervention feeding specialists).

Professional and Personal Development

#HeForShe: How to Be an Advocate for Your Women Colleagues

Brette C. Harding, MD, MS (moderator);
Christine B. Franzese, MD; Alexander G. Chiu, MD;
Sujana S. Chandrasekhar, MD

Session Description: While we continue to make strides for women in otolaryngology, recent literature has shown that women in this field are continuing to face discrimination and sexual harassment at all levels, from medical students to attendings. Frustrating situations that women experience on a daily basis can range from smaller incidents, such as patients or consulting teams addressing a male medical student rather than the female chief resident or attending, to inappropriate sexual comments and blatant sexual harassment. In addition, it is important to note that minority women face further discrimination. Improvements in the work environment that have been achieved so far have been due not only to strong women but to men in the field who have recognized injustices and work hard to correct these. Men and women will need to work together to decrease the inequalities that are still facing women in otolaryngology today. This panel aims to provide participants with the ability to recognize mistreatment of women and give them the tools needed to address these inequalities in the moment.

Outcome Objectives: (1) Understand the state of gender disparities in otolaryngology today. (2) Recognize and address real-life scenarios of discrimination against women otolaryngologists. (3) Develop strategies to create an inclusive working and learning environment.

#What? 3.0 Social Media in Otolaryngology: Creating Your Brand

Hayley L. Born, MD (moderator); Leslie R. Kim, MD;
Clarice Brown, MD; Steven M. Gold, MD

Session Description: Social media presence is becoming an increasingly important aspect of building a successful medical practice and professional network. In this panel, cosponsored by the American Academy of Otolaryngology—Head and Neck Surgery’s Section for Residents and Fellows (SRF), Young Physicians Section (YPS), and Women in Otolaryngology (WIO) Communications Committee, we will introduce the many social media outlets and how they are used in medicine. Moderated by a #millennial SRF member, we will hear from 3 representatives within this field: an academic facial plastic surgeon with an Instagram following of more than 22,000 people, a young female pediatric otolaryngologist who has helped establish a vibrant online community for female black otolaryngologists, and a self-identified social media novice whose Instagram @drbooger has more than 69,000 followers. Building on successful panel discussions of the past 2 years, this year’s panel will focus on building a brand and an online community. These panelists will discuss the varied ways they utilize social media in their professional lives and how to refine your online presence.

Outcome Objectives: (1) Understand the different modalities of social media and the uses of social media in the context of medical practice. (2) Gain insight into expert perspectives of residents, fellows, young physicians and prominent women in medicine. (3) Learn about best practices for building a brand and a community through social media.

Bullying in the Workplace: How to Recognize and Respond

Katherine Kavanagh, MD (moderator); Ellen M. Friedman, MD;
Jo A. Shapiro, MD; Eugenia M. Vining, MD

Session Description: Bullying and undermining behavior occur with regularity in the workplace, including hospitals, office settings, academics, and medical education. In surgery, some bullying and undermining behaviors have been normalized as difficult personalities, workplace hierarchy, or simply the status quo, which makes recognizing and addressing these behaviors difficult. Despite seeming “normal,” bullying and undermining behavior have negative consequences on wellness, surgical education, and even patient safety. Although unprofessional behavior is not uncommon, surgeons may feel ill-equipped to recognize and respond to bullying or undermining. Bystanders are often unsure of how to respond and may be concerned about becoming a victim themselves or negatively affecting their own career advancement. In this panel discussion, we will discuss how bullying and undermining may present in a range of practice environments—academics, private practice, and the hospital (operating room, consults, emergency room)—making this panel relevant to all practicing

otolaryngologists, advanced practitioners, and trainees. Our panelists will discuss how to identify bullying and undermining behaviors that may be encountered in each of these practice areas and will provide strategies to address and respond to unprofessional behavior. We will present examples of bullying and undermining behavior and discuss responses to these difficult situations.

Outcome Objectives: (1) Discuss bullying and undermining in the workplace and list examples that may be encountered in varying practice types. (2) List ways to address bullying such as communication techniques, conflict management, and peer feedback. (3) Apply skills in identifying and addressing bullying and undermining behaviors to example situations.

Centering URiM Clinicians: A Road Map to Enhancing Diversity in Otolaryngology

Michael J. Brenner, MD (moderator);

Dana M. Thompson, MD, MS, MBA;

Valerie A. Flanary, MD; Erynne A. Faucett, MD

Session Description: Underrepresented in medicine (URiM) practitioners are pivotal as we strive for inclusive excellence amid an increasingly diverse health care and societal landscape. As surgical subspecialists, otolaryngologist–head and neck surgeons have traditionally defined excellence narrowly in terms of diagnostic acumen, technical prowess, and patient outcomes. While such meter sticks are critical for mastery, failure to recognize the context in which care takes place is limiting. For example, it can obscure the connection of our daily work and professional identity to national efforts around diversity, inclusion, and racial justice. This panel seeks to bridge this gap, explaining the rationale and strategies for diversifying the otolaryngology workforce. The panelists consider why a specialty more reflective of society strengthens the profession and advances patient-centered care. The session draws on evidence not only from the scientific literature but also the literature of diverse disciplines—from the work of Pulitzer Prize–winning author Isabelle Wilkerson to the work of Camara Phyllis Jones in advancing the science and practice of anti-racism to the jurisprudence legacy of Kimberlé Crenshaw, whose seminal work in critical race theory demonstrated how race, class, and gender inequities are inextricably intertwined. While many otolaryngologists celebrate the legacy of Ruth Bader Ginsberg in advancing women’s rights, far fewer recognize the parallel work across over 3 decades on intersectionality, which underpins the strategy for centering URiM women in diversity efforts. This panel identifies structural barriers to improving diversity within the specialty and solutions. Otolaryngology continues to have an underrepresentation of racial and ethnic minorities. The specialty must therefore redouble efforts, becoming more purposeful in mentoring, recruiting, and retaining underrepresented populations. The concept of an AIM (all-inclusive multiculturalism) workplace is discussed as a strategy to foster trust, internal motivation, and satisfaction and resources are offered.

Outcome Objectives: (1) Describe evidentiary basis and rationale for centering URiM otolaryngologists in efforts directed at cultivating a more diverse, equitable, and inclusive specialty. (2) Reveal how contemporary thinking on race and medicine derived from public health, sociology, and economics can inform efforts to enhance diversity and inclusive excellence in otolaryngology. (3) Identify structural interventions that can enhance patient care and diversity, with emphasis on practices and policies that mitigate bias, promote anti-racism, and improve recruitment and retention.

Counseling, Shared Decision Making, and Palliative Surgery

Larissa Sweeny, MD (moderator); Susan D. McCammon, MD; Norman D. Hogikyan, MD; Andrew M. Coughlin, MD

Session Description: As physicians, our goals are to practice beneficence and nonmaleficence. When it comes to patients facing terminal or unrecoverable illnesses or those at high risk for morbid outcomes following treatment, the best path to these goals becomes less clear. There is a lack of professional practice standards for physicians to follow in these difficult clinical and ethical scenarios. Through collective experience and expertise this program hopes to provide ethical guidance for surgical decision making. This panel will include case examples, direction on how to balance surgical outcomes and patient quality of life, and tools and resources for informed and shared decision making by all parties.

Outcome Objectives: (1) Offer guidance so participants can consider evidence-based best practice in the context of the patient’s values and prognosis. (2) Inform so participants can describe clinical and ethical considerations to maintain balance between surgery and quality of life. (3) Provide resources to facilitate informed discussions with patients and families.

Defining and Achieving Professional Equity in Different Financial Models

Robin W. Lindsay, MD (moderator);

Cherie-Ann O. Nathan, MD; Michael G. Stewart, MD, MPH;

Eric J. Moore, MD

Session Description: The Association of American Medical Colleges report *Promising Practices for Understanding and Addressing Salary Equity at U. S. Medical Schools*, published in 2019, identified the gender wage gap in academic otolaryngology to be 77 cents on the dollar. A pay gap was identified to exist across all academic ranks. Over a career, this wage gap compounds to a multimillion dollar wealth gap. We must all take an active role in eliminating this pay gap for the future of our specialty. The report highlighted several best practices to ensure salary equity and discusses recommended first steps to take to kick-start a salary initiative. Commitment from institutional leadership to understand and address salary inequity is a vital first step to correcting salary inequities. This panel brings together leaders in otolaryngology from diverse institutional financial models whose departments have made

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salary equity a priority. We will discuss various compensation models from salaried, to relative value unit based, to cash models and the many variations of each of these plans. Recognizing that there is no perfect model, we will discuss the importance of transparency and the benefits and the negatives of each of these different compensation models. The panelist will discuss how non-revenue-generating activities are accounted for in their compensation plan to incentivize clinical, administrative, and unfunded research activities. In addition, we will discuss different institutional financial models and how these models affect individual departments. Lastly, we will discuss the importance of not only initiating a equitable compensation policy but also developing and using a system of interval equity review processes to identify outliers and how to proactively correct inequities that are discovered.

Outcome Objectives: (1) Analyze the differences between compensation models. (2) Be able to explain the importance of salary equity and a transparent compensation plan. (3) Understand how to implement a reoccurring equity review process.

Developing Professional Expertise: Plan, Publish, and Present

Rachel A. Georgopoulos, MD (moderator);
Stacey L. Ishman, MD, MPH; Bevan Yueh, MD, MPH;
Daniel C. Chelius Jr, MD

Session Description: In the article “The Making of an Expert,” K. Anders Ericsson et al stated, “Consistently and overwhelmingly, the evidence showed that experts are always made, not born.” Developing professional expertise is very feasible, but it does require choosing an appropriate career niche, developing innovative research, and being able to demonstrate knowledge and proficiency. This is attainable with the right mentorship, dedication, and perseverance. The panelists will discuss practical aspects of identifying and developing a career niche. In addition, technical aspects of presenting nationally, whether as a panelist or expert lecturer, will be discussed. This includes practical tips on how to choose a topic to present, how to seek presenters, and techniques for successfully moderating panels. Lastly, the experts will discuss how to develop a research portfolio, including maturing projects into publications.

Outcome Objectives: (1) Understand how to choose a niche for career development. (2) Demonstrate ways to develop a research portfolio aimed toward reinforcing career goals. (3) Identify opportunities to present and demonstrate expertise in a chosen career niche.

Diversity, Inclusion, and Equity in Practice: Divisions to the Institution

Erynne A. Faucett, MD (moderator);
Carrie L. Nieman, MD, MPH; Cristina Cabrera-Muffly, MD;
David J. Brown, MD

Session Description: For decades, otolaryngology–head and neck surgery (OHNS) has lagged behind other specialties in terms of racial and ethnic representation throughout the

field—from residents to faculty to departmental and national leadership. Black, Indigenous, and other people of color are traditionally considered to be underrepresented in medicine. OHNS has not significantly increased representation among these groups at the same rate as other specialties. In part due to limited numbers, it has been difficult to create an inclusive culture with an emphasis on recruitment, retention, and career advancement for underrepresented groups. National events around social justice have refocused the need for continued efforts to build capacity around diversity, inclusion, and equity within OHNS to strengthen our institutions and improve patient care. Multiple studies demonstrate the importance of ethnic and racial representation among physicians to improve patient outcomes and mitigate health care disparities. This presentation will cover tangible examples of how to imbue and sustain a commitment to diversity, inclusion, and equity within daily practice at an organizational level. The speakers will cover ongoing efforts within the context of a residency program, department, and institution that can be applied more broadly to any organization or practice setting. Efforts include processes to reduce bias in applicant selection and interviewing and build an anti-racist culture with a focus on allyship. The role of top-down leadership will also be discussed. The presentation will serve as a primer to understanding the role of the individual and the organization in advancing a culture committed to inclusion and equity within OHNS.

Outcome Objectives: (1) Summarize current standing of racial and ethnic representation within OHNS. (2) Identify practical approaches to integrate efforts around diversity, inclusion, and equity into your organization. (3) Discuss your individual and organization’s role in supporting an inclusive culture through allyship and anti-racist actions.

Don’t Be Duped! Sussing out the Science in Outcomes Research

Derek J. Lam, MD, MPH (moderator); David O. Francis, MD;
Erin Kirkham, MD, MPH; Jay F. Piccirillo, MD

Session Description: Although the quantity of published research continues to grow rapidly, quality has not necessarily kept pace. Low-quality studies with problems in study design, statistical methods, and interpretation of results are unfortunately fairly common. This session offers a brief review of common methodological problems, with specific examples drawn from published studies. What are common sources of bias that are rarely mentioned or addressed? Why is a *P* value not the best way to report (or interpret) results? What is an effect size and how is it measured? How can you detect whether results have a high probability of being false negatives or false positives? These and other questions will be addressed

Outcome Objectives: (1) Recognize limitations in study designs and methodologies common in otolaryngology. (2) Discuss strategies to avoid common errors in study design and statistical analysis. (3) Interpret study quality based on

effect size measures and confidence intervals rather than *P* values.

Effective Sponsorship Is Essential for Career Advancement and Increased Diversity

Mark E. Prince, MD (moderator);
Cherie-Ann O. Nathan, MD; Carol R. Bradford, MD, MS;
Kelly Michele Malloy, MD

Session Description: Effective sponsorship is essential to career development and increasing diversity in our field. It is vital that current leaders and aspiring leaders understand the factors that result in successful sponsorship. There continues to be significant challenges to increasing diversity in many medical fields, including otolaryngology, as well as in leadership positions. Mentorship is consistently recognized as an important factor in assisting individuals with diverse backgrounds to achieve their career goals. Sponsorship is less well understood and less often discussed as a mechanism to ensure career success and to increasing diversity in leadership. Sponsorship, in addition to mentorship, is critical for successful career advancement and is essential for increasing diversity in our field. Sponsorship requires a different set of skills and is conducted in a framework that is unique from mentorship. It is essential that current leaders and others utilize sponsorship as a purposeful and carefully conducted career advancement strategy. This panel will provide an evidence-based review of sponsorship, demonstrate the differences between mentorship and sponsorship through a discussion of representative cases, and provide practical advice for sponsors and those seeking sponsorship. The information provided will be important to a large audience, including otolaryngologists in private and academic practice, young physicians, researchers, residents and medical students, advanced practice providers, and leaders.

Outcome Objectives: (1) Compare important differences between mentorship and sponsorship. (2) Recognize sponsorship opportunities and their potential impact. (3) Implement more effective sponsorship strategies.

Finding the Right Practice 101: Know Your Options

Danielle C. Warner, MD (moderator); Simone Bridges;
Matthew Brown; Susan R. Cordes, MD

Session Description: The presentation is designed to help both senior residents and established physicians navigate the job market. We will discuss the questions you should be asking when looking for a job and the resources that are available to make the process easier. The panel will include industry representatives involved in physician recruitment for both temporary and permanent positions. We will explain various practice models and the pros and cons of each. Finally, the panel will discuss LocumTenens and how it can be used as a tool to learn about different systems, geographic locations, and even vet a potential practice. The moderator will draw from personal

experiences in different practice environments and hopefully help others avoid the mistakes made along the way.

Outcome Objectives: (1) Analyze different practice environments, examine the pros and cons of each, and determine which environment would best achieve your personal career goals. (2) Learn the right questions to ask when vetting a practice group or hospital and how to recognize red flags. (3) Demonstrate knowledge of the available career resources, including those from online, medical societies, mentorship, and networking.

Gender, Sex, and the Otolaryngologist in the 21st Century

Minka L. Schofield, MD, MPH (moderator);
Ryan Nesemeier, MD; Scott R. Chaiet, MD, MBA;
Noriko Yoshikawa, MD

Session Description: Terminology and understanding of the spectrum of gender identities and expression has evolved throughout the years and challenges “traditional norms.” Furthermore, most undergraduate and graduate medical education programs lack formal instruction on how the current medical environment affects those who exist outside the binary and how to best reduce inequities. This is an issue that affects not only patients but also providers and staff and often leads to discomfort, isolation, and marginalization. It is important as health care professionals to be aware of this changing landscape and how best to improve comfort for all.

Outcome Objectives: (1) Delineate the spectrum of gender identity, expression, biological sex, and sexual orientation. (2) Discuss the importance of this issue as it relates to health care delivery and disparities. (3) Present best practices to improve inclusivity within medical environments.

How to Develop New Device or Treatment Ideas in Otolaryngology

Peter Santa Maria, PhD, MBBS (moderator);
Robson Capasso, MD; Anaïs Rameau, MD;
Ashley Seehusen, PhD

Session Description: Otolaryngologists are innovative thinkers, and with the right know how, they can understand whether their idea is worth pursuing and then how to implement it into a potential new treatment or device. We will take the attendees through a process to get involved in becoming innovators within the specialty, prototyping new ideas, implementing these into the clinic, and interacting with industry. Attendees will be encouraged to bring their ideas to the session so they can walk through the process using their own examples. We will give examples of ways to protect ideas when interacting with an industry and also how to engage industry to become involved.

Outcome Objectives: (1) Explain the components that go into the implementation of getting a new idea to the clinic. (2) Discuss and practice a method for evaluating an idea that can impact otolaryngology practice. (3) Recognize the way to interact with industry to protect your idea.

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Incorporating Allyship/Anti-bias Programs Into Otolaryngology: The Tennessee Commitment Initiative

Sandra Stinnett, MD (moderator);
Jennifer McLevy-Bazzanella, MD; Neal Beckford, MD;
Anas Eid, MD

Session Description: The diversity of the United States continues to increase at a rate far beyond that of the medical workforce. Otolaryngology consistently ranks significantly lower in gender and ethnic diversity compared with other subspecialties. To date, there is scarce literature characterizing the number and extent of diversity and inclusion initiatives and their impact on the field of otolaryngology. The surgical and clinical environment can allow conscious and unconscious bias to become prevalent due to the inherent automaticity that frequently takes place during rapid, and under stressful, conditions. The Tennessee Commitment Initiative is a program we have incorporated at University of Tennessee Health Science Center—Memphis that provides tools for identifying implicit and explicit biases, as well as teaching skills on countering bias through allyship. These competencies play an integral role in fostering a supportive environment and initiating open dialogue for all members of our specialty. Through this panel, we will discuss our experience and aim to (1) teach otolaryngology practitioners ways to identify implicit and explicit biases (both internal and external) via assessment tools that have been validated utilized in literature, (2) understand current anti-bias and allyship literature as it pertains to otolaryngology, and (3) identify opportunities to incorporate allyship as well as diversity and inclusion programs in otolaryngology practices and otolaryngology departments.

Outcome Objectives: (1) Understand that initiatives to improve diversity, equity, and inclusion in otolaryngology inevitably require self-reflection and professional development of everyone involved. (2) Access resources for building self-awareness as it relates to implicit and explicit bias. (3) Appreciate common barriers to confronting bias and understand the importance of providing the foundational skills to facilitate allyship in a flexible, accessible manner.

Leadership Lessons: Strategies for Success

Mona M. Abaza, MD, MS (moderator);
Carol R. Bradford, MD, MS; Jennifer J. Shin, MD, SM;
Lee D. Eisenberg, MD, MPH

Session Description: While we are trained as surgeons to be leaders in the clinical realm, we can sometimes struggle in our other responsibilities—administrative, didactic, and so forth. Our expert panel discusses different strategies to develop your skills as a leader. This session will offer advice on important aspects of leadership and resumé building. Speakers will address analysis and understanding personality traits, tips on how to be prolific in scientific publications, negotiating skills, and emotional intelligence.

Outcome Objectives: (1) Recognize personality types to know how to use this knowledge to lead and collaborate. (2)

Use techniques on how to be prolific with scientific publications and learn negotiation skills and techniques to meet your contractual needs. (3) Understand emotional intelligence and how to use this knowledge to lead and collaborate.

Making an Impact: Slides That Sell!

Ellen S. Deutsch, MD, MS (moderator);
Christine B. Franzese, MD; Jennifer A. Villwock, MD

Session Description: Have you ever wondered how to create a good hook to catch your audience's interest? During a slide presentation have you ever said to your audience, "I know this is hard to read, but . . ."? Will a pie chart or bar graph or some other image present your data in the most meaningful manner? Should you speak quickly or slowly? How can you make the best use of speaker's notes? Whether your presentations are for academic, organizational, or practice management purposes, there is an art to getting your message across successfully. This presentation will address effective communication principles that will engage your audience and provide ideas to help you create informative graphs, figures, and visual abstracts. We will work through problematic examples together, demonstrating choices in color, font, layout, and other factors. Many techniques to enhance visual display for text, data, and videos are simple to implement using Microsoft Excel and PowerPoint, but there are other software options, such as LucidChart, Biorender, Tableau, and QIMacro, that can be used to create beautiful graphs and figures. Display formats such as Prezi can be used to create dynamic presentations. We invite you to join us in learning to create "slides that sell."

Outcome Objectives: (1) Create more engaging and persuasive presentations. (2) Manipulate graphs and figures to improve their effectiveness. (3) Select the optimal format for your own presentations.

Mentorship and Sponsorships: Utilizing Your Relationships to Succeed in Practice

Sarah Mowry, MD (moderator); Robert Cullen, MD;
Candace E. Hobson, MD; P. Ashley Wackym, MD

Session Description: Several key relationships can be developed to facilitate career advancement. These relationships can be either mentorship or sponsorship affiliations. Mentorship involves transfer of knowledge and guidance from an experienced person to a less experienced person or novice. Mentorship relationships often discuss lived experiences to impart wisdom. Different types of mentorship relationships are recognized as including structured vs informal, short term vs long term, and active vs passive; the benefits of each type will be discussed. Sponsorship uses the resources of the experienced partner to actively promote and advocate directly for their junior partner. Sponsors use their social and professional networks to "open doors" for the sponsored partner. Some professional relationships involve aspects of both sponsorship and mentorship. Mentorship and sponsorship are important for all physicians and can be formative for those just entering practice, private and academic alike. Key features of successful

mentorship and sponsorship partnerships will be discussed. Panelists include a senior academician, a seasoned private practitioner, and a junior faculty member. Each panelist will discuss their experiences as mentors, mentees, and sponsors/sponsored partners. The difference between academic and private practice relationships will also be explored. Audience polling will be utilized to assess the broader experiences of the group. Attendees will learn 3 key behaviors they can apply to their own mentorship and sponsorship relationships to facilitate their own career advancement.

Outcome Objectives: (1) Define and differentiate between mentorship and sponsorship. (2) List behaviors in the mentor–mentee relationship that foster success of the partnership. (3) Identify key personality traits in successful mentors and mentees.

Minding the Gap: How COVID-19 Widens Gender Disparities, Actionable Solutions

Erynne A. Faucett, MD (moderator);
Carol R. Bradford, MD, MS; Maie A. St. John, MD, PhD;
Sarah N. Bowe, MD

Session Description: Gender differences in reimbursement and career development are deeply rooted in surgery. Relative to their male counterparts, women surgeons have been paid lower mean incomes, shouldered more work at home, and experienced slower career advancement. Female otolaryngologists are paid 77 cents on the dollar relative to male colleague, are underrepresented in leadership positions, and have significantly lower average academic rank. The pandemic has greatly widened this professional chasm between men and women surgeons, hindering advancement of women physicians' careers and stymieing leadership growth. Compared with male colleagues, women in medicine bear substantially more responsibility for dependent care, teaching of children, and performing domestic duties during the COVID-19 pandemic. These structural differences impede women physicians' clinical and academic productivity, creating a formidable barrier to career advancement or to achieving equal compensation. These challenges also have potentially corrosive effects on morale, affecting well-being, resilience, and risk of burnout and other aspects of mental health. It is therefore imperative for organizations to recognize the unbalanced effects of the pandemic and work-life ramifications for women physicians across the career continuum. Whereas the past decade has witnessed progress in narrowing gender inequities, the pandemic has placed such gains on unstable footing, with the possibility of a precipitous fall without anticipatory measures. This session will present data on the current state of the gender gap and will cover strategies for organizations and their leaders to manage the widening of disparities in career/professional advancement, compensation, and productivity for women within otolaryngology and medicine.

Outcome Objectives: (1) Summarize data on prepandemic gender inequities within otolaryngology–head and neck surgery (OTO-HNS). (2) Identify the impact of COVID-19 pandemic on women in OTO-HNS at home and at work. (3)

Present strategies for institutions and their leaders to prevent widening of disparities in career advancement, productivity, and compensation for women within OTO-HNS.

New Age Mentoring: Navigating the Uncharted With Vision and Equity

Michael J. Brenner, MD (moderator);
Carol R. Bradford, MD, MS; Sonya Malekzadeh, MD;
Howard W. Francis, MD, MBA

Session Description: This panel explores the changing face of mentorship and professional development amid technological disruption, virtual learning, and calls for racial justice.

For individuals aspiring to a career in otolaryngology–head and neck surgery, mentorship can shape destiny. Mentorship helps assure safe passage into the specialty, and it influences the arc of professional development across the career continuum. Even before the novel coronavirus disease 2019 (COVID-19) pandemic, technology and social networking were transforming mentorship in otolaryngology. Now, in an increasingly virtual world, where in-person interactions are the exception, mentorship plays an even more pivotal role. Mentors serve as trusted guides, helping learners navigate accelerating trends toward early specialization, competency-based assessments, and key milestones. However, several structural barriers render the playing field unlevel. For medical students, cancellation of visiting clerkships, in-person rotations, and other face-to-face interactions may limit access to mentors. The pandemic and virtual landscape particularly threaten the already-leaky pipeline for underrepresented medical students. These challenges may persist into residency and later career stages, where structural inequities continue to subtly influence opportunities and pairings of mentors and mentees. Hence, overreliance on serendipitous encounters can exacerbate disparities, even amid societal mandates for equity. The decision to take deliberate steps toward mentoring outreach and engagement has profound implications for what otolaryngology will look like in years to come. This session introduces the concept of new age mentoring, shining a light on how to modernize practices. The key shifts are from passive to active engagement, from amorphous to structured relationships, and from hierarchical dynamics to bidirectional mentoring. Success is predicated on intentional outreach and purposefulness in championing diversity, equity, and inclusion within the progressively technology-driven landscape.

Outcome Objectives: (1) Understand the potential barriers to mentorship and professional development, encompassing challenges of work–life balance, limited access to mentors of diverse backgrounds, and structural factors. (2) Identify how new mentoring paradigms surmount traditional barriers through providing structured mentoring frameworks, embracing the vision of the mentee, and allowing for reverse mentoring. (3) Describe multifaceted interventions that promote inclusivity in a virtual mentoring landscape, including leveraging social media platforms, local and national forums, and networking resources.

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The Partnership Between High-Quality Self and High-Quality Care

Soham Roy, MD (moderator);
Heather M. Weinreich, MD, MPH; Ellen S. Deutsch, MD, MS;
David E. Eibling, MD

Session Description: Delivery of safe, high-quality care remains a primary guiding principle in otolaryngology. However, it is more challenging to provide optimal surgical care when the physician delivering care is in suboptimal personal, emotional, or physical condition. Physician wellness can positively or negatively affect ongoing safety and quality care efforts in patient care delivery, as patient safety and outcomes significantly affect physician wellness. In this panel, otolaryngology experts in quality, safety, and physician wellness will discuss the significance of physician wellness and how bad outcomes and near misses can adversely affect both physicians and patients. Physician wellness emerges from a combination of personal coping processes and system supports. The panelists will identify system barriers and cultural impedances along with facilitators to improve wellness and resiliency. They will also discuss “second victim syndrome” and describe organizational factors that affect many practicing otolaryngologists. While otolaryngologists can take steps to help themselves and colleagues cope with the stressors and challenges of patient care, health care systems are also vital in supporting efforts to improve wellness and increase quality and safety. Compelling personal stories, coupled with strategies for personal and institutional growth, will be utilized to help attendees develop awareness of the impacts of quality and wellness in ongoing patient care.

Outcome Objectives: (1) Examine and analyze the integrated relationship between physician wellness, safety, and quality care delivery. (2) Develop strategies for personal growth in dealing with adverse or suboptimal outcomes in manners that increase physician wellness and improve safe, quality care. (3) Identify institutional approaches that can be implemented to improve surgeon and system cultures, including peer-to-peer support, enterprise support systems, and adaptive systems for health care delivery.

Pathways to Parenthood: Shared Challenges in Family Planning and Otolaryngology

Catherine Kennedy, MD (moderator);
Mona M. Abaza, MD, MS; Debbie A. Aizenberg, MD;
Leslie R. Kim, MD, MPH

Session Description: Otolaryngology is a profession that requires years of intense training and practice that peak during family-planning years. Female otolaryngologists face difficulty balancing a busy surgical career with their potential desire to have children and often encounter multiple roadblocks. Women surgeons face double the infertility rates over the general population, report increased use of assisted reproductive technologies, and have higher rates of complications during pregnancy. Logistical obstacles further complicate the problem, including lack of universal leave policy and expected strain on colleagues

and the department. In a survey of American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) Women in Otolaryngology members, 44% believe their department leaders are not supportive of women starting families during training. All these factors may explain why women surgeons are older at the time of first birth and have fewer children when compared with the average American woman. The consequences of delaying childbirth can be life altering for many women, their babies, and their families. This presentation will bring to light the challenges that women otolaryngologists face with fertility and family planning. The panel features 3 women who will share their experiences, reflect on their decisions, and provide practical suggestions for how they balance parenthood with their careers. The panel will highlight findings from a recent survey of women AAO-HNS members on pregnancy and fertility and comment on the American Board of Medical Specialties’s announcement to offer 6 weeks of protected parental leave during residency, effective July 2021. We invite women and men in otolaryngology, in all practice types and settings, including trainees, program directors, leaders, and allies to be part of this important discussion on how we can eliminate the real and perceived barriers to parenthood to create a supportive environment.

Outcome Objectives: (1) Recognize the challenges that women otolaryngologists face with pregnancy and fertility. (2) Examine the different approaches to balancing an otolaryngology career with parenthood. (3) Understand policy changes for protection of parental leave and discuss strategies to support the growing number of female otolaryngologists who desire both a career and a family.

Practical Tips to Kick-Start Your Academic Career

Jeffrey C. Liu, MD (moderator); Cristina M. Baldassari, MD;
Samantha Anne, MD; Daniel C. Chelius Jr, MD

Session Description: This panel will be presented by 4 past chairs of the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) Young Physicians Section (YPS) who will discuss their career paths. As these past chairs age out of YPS, pathways for their activities and leadership in academia will be presented. Topics will include accomplishing successful research, establishing focused clinics programs, valuing lessons learned from YPS leadership, and furthering involvement in AAO-HNS leadership after YPS. Equally important, suggestions on balancing a fulfilling family/home life will be shared. All panelists are married with young children; the difficulties met daily in supporting work–life balance while meeting academic expectations will be explored. Pitfalls to avoid and what we learned from our failures will also be discussed.

Outcome Objectives: (1) Recognize how AAO-HNS participation can help support an academic career. (2) Explore specific challenges to work–life balance in the early career. (3) Identify pitfalls and mistakes experienced by others in their early careers as a cautionary tale.

Put Me in Coach: Importance of Mentorship, Coaching, and Sponsorship

Claire M. Lawlor, MD (moderator);
Rahul K. Shah, MD, MBA; Carol R. Bradford, MD, MS;
Dana M. Thompson, MD, MS, MBA

Session Description: This panel explores the role of mentorship, coaching and sponsorship as they pertain to career development. American Academy of Otolaryngology–Head and Neck Surgery President Carol Bradford will discuss the role sponsorship played in her career and in becoming dean of The Ohio State University College of Medicine, as well as how she sponsors mentees. Dr Rahul Shah will address the role professional coaching played in his path to hospital administration, as well as how to seek professional assistance. Dr Dana Thompson will discuss mentorship and sponsorship, with emphasis on their importance for those underrepresented in medicine (URM). Patti J. Ayers is an executive coach specializing in health care and president and founder of Turning Point Consulting. She will share her 29-year coaching experience, including coaching models, benefits, and practical tips for finding a coach who meets your needs.

Outcome Objectives: (1) Learn to identify sponsors to help you reach your professional goals, whether they are within your specialty, hospital leadership, or other areas. (2) Explore how to become a sponsor for others, including URM colleagues. (3) Discuss what professional coaches offer and how to engage a coach.

Recognition and Remediating Microaggressions in the Workplace: Building Better Diversity

H. Steven Sims, MD (moderator); David J. Brown, MD;
Gina D. Jefferson, MD; Troy Woodward, MD

Session Description: A working definition of microaggressions is “brief and commonplace daily verbal, behavioral, and environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative slights and insults to marginalized individuals and groups.” Even if unintentional, this behavior produces harm and undermines a healthy work community. This session will help clinicians identify and address microaggressions not only to create a “safe” space, but to foster a brave space. The panel will discuss personal histories with microaggressions and offer advice about how to remedy this workplace and societal illness.

Outcome Objectives: (1) Familiarize the audience with microaggressions, implicit bias, and harm. A shared understanding of the language is the basis for meaningful conversation. (2) Use personal experiences to teach about the events themselves and the enduring harm they can cause. The panelists will provide example vignettes and share the important aspect of how they responded. (3) Discuss strategies to identify and remedy this behavior. We want to promote not only a safe space, but a brave space to build genuine community.

Shared Decision Making Across Otolaryngology in a Post-COVID World

Kara D. Meister, MD (moderator); Lauren A. Bohm, MD;
Andrew G. Shuman, MD; Paul Hong, MD

Session Description: There is growing literature describing the application of shared decision making (SDM) in otolaryngology. This course will present the significance of SDM in today’s otolaryngology practice, introduce guiding ethical principles, and suggest models for practice. Decision support tools, such as decision aids, websites, and app-based programs, will be reviewed. The panel will describe how the COVID-19 pandemic and emergence of telehealth influences how we can continue to communicate and make decisions effectively. Differences in SDM across cultural, social, and age groups will be discussed. Finally, the panelists will identify facilitators and barriers to implementing SDM into everyday practice.

Outcome Objectives: (1) Understand the principles and ethical underpinnings of SDM in medical and surgical otolaryngology care. (2) Recognize and suggest strategies to overcome challenges in SDM, including time constraints, cultural and professional barriers, and inexperience. (3) Promote a multimedia model for SDM in the otolaryngology clinic, including providing information and supporting deliberation.

She’s Going to Sue—20 Years After Dr. Brodsky’s Pay Equity Lawsuit, the Gender Gap Wages

Valerie A. Flanary, MD (moderator);
Sujana S. Chandrasekhar, MD; Carol R. Bradford, MD, MS;
Kathleen Yaremchuk, MD, MSA

Session Description: In 2001 Dr. Linda Brodsky successfully sued the State University of New York at Buffalo for pay inequity in violation of the Civil Rights Act of 1964 and the Equal Pay Act of 1963 and for retaliation because she complained. “Winning” resulted in some financial restitution, but the personal repercussions from pursuing legal action were significant, and, 20 years later, our specialty continues to see salary and career advancement inequity for women and others that are underrepresented in medicine. In 2020 women physicians made less than men in all medical specialties, but the gender salary gap was the largest in otolaryngology, where women make 77.9% of what men earn (22.1% wage gap), and the gap was higher than in the previous year. There are many contributors to this gender gap, including various remuneration models, unfair distribution of procedures, and unrecompensed roles. These can be deliberate or arise from common misconceptions; they will be discussed and debunked. Institutional and departmental strategies for transparency and opportunities to gain equity will be discussed by legal, human resource experts, and women otolaryngology leaders with stories to tell. Diversity, inclusion, and equity should not just be

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the buzz words of the time. Acting deliberately to shape our workforce so that it represents our patients and draws from varying experiences is the way to strengthen our specialty.

Outcome Objectives: (1) Discover current data surrounding gender wage gap in medical specialties. (2) Know Title VII of the Civil Rights Act of 1964 and the Equal Pay Act of 1963 protect against retaliation for complaining about pay inequity. (3) Raise the issue of gender salary parity and how to obtain information within their institutions regarding salaries and public disclosure in state and not-for-profit institutions.

Systemic Bias and Workforce Inequity: Care Quality and Value Effects

Brooke M. Su, MD, MPH (moderator);
Karthik Balakrishnan, MD, MPH; Emily F. Boss, MD, MPH;
David J. Brown, MD

Session Description: Themes of inequity, injustice, and health disparities are woven through the history of medicine. The national and specialty-wide conversation about these critical problems has evolved in the past year in parallel with major social movements around the world. In combination with the COVID-19 pandemic, these conversations have shed light on ways in which privilege, disadvantage, and systemic biases have contributed to diminished quality of medical care and exacerbated disparities in health outcomes. This panel, sponsored by the American Academy of Otolaryngology–Head and Neck Surgery Patient Safety and Quality Improvement Committee and featuring national experts in health care quality, value, and diversity, justice, and inclusion will complement other sessions at this meeting addressing inequities in health care. In this panel, we will focus specifically on how systemic bias and workforce inequity directly contributes to disparate, low-quality, and low-value health care. We will focus on racism, sexism, and anti-LGBTQ+ bias in both the workforce and in treatment of patients, providing a review of current knowledge on the effects of these biases on the quality of surgical care in the United States, including effects on provider–patient interaction, treatment recommendations, and adherence to these recommendations. We will then address ways in which inequities in the otolaryngology workforce further limit opportunities for patient–physician racial concordance and exacerbate disparities in patient outcomes and strategies to begin addressing workforce diversity and inclusion problems. These issues will be examined for both academic and nonacademic practice settings. We will connect quality to costs of care to discuss how systemic bias affects the value of surgical care delivered to patients of different privilege and how this difference in value perpetuates injustice in health care.

Outcome Objectives: (1) Define privilege, bias, equality, equity, inclusion, and justice as individual constructs in the context of medical, and specifically otolaryngologic, care. (2) Summarize current knowledge of the effects of systemic racism, sexism, and anti-LGBTQ+ bias on workforce equity and quality of care in otolaryngology. Demonstrate specific

examples in otolaryngology. (3) Relate the effects of these biases to the value of otolaryngologic care.

Understanding Concepts of Gender and Developing a Supportive Gender-Affirming Practice

Rahul Seth, MD (moderator); P. Daniel Knott, MD;
VyVy N. Young, MD; Seth Pardo, PhD

Session Description: Transgender patients may have unique medical, surgical, and social circumstances. Otolaryngologists may not be accustomed to these circumstances or the evolving concepts and terminologies associated with gender identity, gender dysphoria, and self-perception. This panel aims to develop or increase diversity awareness so that the clinician may provide inclusive and knowledgeable care to transgender patients. Often, transgender patients have experienced health care disparities and negative biases in their health care. We provide data demonstrating these issues and suggest improved tactics to promote an inclusive environment. A key aspect of the discussion will focus on transgender health and community. Specifically, we will discuss the importance of developing partnerships with community trans health clinics. With a multidisciplinary team approach, effective care can be delivered. Further, we will discuss perioperative considerations of hormone therapy, government and insurance coverage, and the importance of using diverse resources in the care of the transgender patient. Further, we will discuss the changing vocabulary and medical-legal framework of gender affirming surgery of the face, neck, and voice.

Outcome Objectives: (1) Develop awareness of transgender care in otolaryngology by understanding key concepts within gender identity, gender dysphoria, and self-perception. (2) Appreciate health care disparities, insurance coverage challenges, and societal biases transgender patients face. (3) Learn about key community relationships that foster development of a supportive gender-affirming practice.

Walking a Tightrope: The Path to Effective Leadership for Women

Minka L. Schofield, MD, MPH (moderator);
Oneida A. Arosarena, MD; Carrie L. Francis, MD;
Cecelia E. Schmalbach, MD, MSc

Session Description: The gender landscape is changing as it relates to women being represented in medicine. Greater than 50% of medical school students are female, but the distribution of women leaders fails to follow a similar trajectory. Women are outnumbered by men in leadership roles, but there is a trend toward increasing diversity within organizations to enhance organizational efficiency, increase revenue and promote innovation. Educational differences do not explain the paucity of women in leadership roles since women tend to achieve advanced degrees to the same extent or more than men. Glass-ceiling effects, work–life balance concerns, and lack of development programs targeting

women have been identified as factors contributing to this disparity. Another factor is the perception of women as effective leaders, which can contribute to their advancement and the ability of followers to be guided by them. Furthermore, systems of oppression in our society intersect to unfairly influence the perception of women as leaders. Similar to other surgical specialties, women in otolaryngology–head and neck surgery are underrepresented in departmental and senior leadership positions. It is crucial for our members to understand these differences to better support the advancement of women into leadership roles and enhance diversity within institutions and professional organizations.

Outcome Objectives: (1) Contrast the leadership traits and styles of men and women and the intersectionality of these differences with other societal factors. (2) Discuss the role of implicit gender bias on the perception of women as effective leaders. (3) Discuss best practices for women to be viewed as effective leaders and to support women as leaders.

Why Diversity, Inclusion, and Racism Matter for Otolaryngologists in 2021

Rodney J. Taylor, MD, MSPH (moderator);
William McDade, MD, PhD; David J. Brown, MD;
Carrie L. Francis, MD

Session Description: The year 2020 illuminated many racial and social inequities in the United States. We as otolaryngologists and the patients we serve are significantly affected by these same racial and social dynamics. This panel of experts will discuss why race, diversity, and inclusion are important topics for otolaryngologists in 2021. Specifically, the panel will explore (1) how both otolaryngology residency programs and private practice otolaryngologists across the country can respond and have already responded to be more inclusive, open, and anti-racist; (2) how racism affects outcomes for common otolaryngology conditions; and (3) what challenges are faced by physicians of color and how to be strong allies for our colleagues of color.

Outcome Objectives: (1) Explain what it means to be racist and anti-racist and describe why workforce diversity matters for otolaryngologists. (2) Recognize health care inequities faced by patients of color and discuss best practices to address these obstacles. (3) Implement anti-racist policies at your home workplace and become a strong advocate for your colleagues of color.

Rhinology/Allergy

Allergy: It's Not Just The Nose!

Christopher D. Brook, MD (moderator);
J. Pieter Noordzij, MD; Maria C. Veling, MD;
Peter C. Weber, MD, MBA

Session Description: This miniseminar will provide up-to-date, evidence-based information regarding the effect of allergy on the ear, oral cavity, paranasal sinuses, pharynx, and larynx. The role of allergy in diseases such as eustachian tube dysfunction, chronic otitis media, Ménière's disease, obstructive sleep

apnea, chronic cough, laryngitis, sinusitis, and oral allergy syndrome will be discussed by experts in each individual field. The pathophysiology, clinical features, and treatment options will be reviewed. The learner will leave the course with a more comprehensive understanding of the impact and manifestations of allergic disease throughout the head and neck.

Outcome Objectives: (1) Describe the role of allergic disease in the pathophysiology of the sinuses, ears, oral cavity, obstructive sleep apnea, pharynx, and larynx. (2) Describe the role of allergy testing in head and neck diseases other than allergic rhinitis. (3) Describe the role of allergy treatment in the management of diseases of the head and neck other than allergic rhinitis.

Aspirin-Exacerbated Respiratory Disease: State-of-the-Art Multidisciplinary Management in 2021

Waleed M. Abuzeid, MD (moderator); Zara M. Patel, MD;
Joshua M. Levy, MD, MPH; Elina Jerschow

Session Description: Aspirin-exacerbated respiratory disease (AERD) is a syndrome consisting of chronic rhinosinusitis with nasal polyposis, respiratory reactions to nonsteroidal anti-inflammatory drugs, and eosinophilic asthma. AERD affects approximately 0.9% of the general population in the United States. The prevalence of AERD is much higher among certain groups including asthmatics (10%–20%), patients with nasal polyposis (10%), and in asthmatics with polyposis (40%). Despite an increased recognition of this disease entity, there continues to be an average delay of 10 years between onset of symptoms and the formal diagnosis of AERD. Once diagnosed, the adequate management of symptoms in AERD patients continues to be a challenge. Despite the introduction of several new medical treatment options such as immunomodulating biologics and surgical options including extended endoscopic sinus surgery, the respective roles of medical and surgical treatment options in the management of AERD has yet to be fully established. This miniseminar will engage attendees in an evidence-based discussion incorporating real cases. Attendees will learn about the efficient diagnosis of AERD, including the importance of timing of the diagnostic aspirin challenge and the need for coordination of the management plan with allergy providers. Attendees will achieve insight into the role of endoscopic sinus surgery, including extended sinusotomies, nasalization, and resection of involved structures, all of which will be debated. The role of aspirin therapy in the era of biologics and the nuances of these treatment approaches will be discussed. Attendees will also learn about adjunctive treatments such as dietary modification. Attendees will gain an understanding of the optimal timing of medical and surgical interventions. The multidisciplinary panel consists of academic specialists in allergy/immunology and rhinology with considerable expertise in AERD.

Outcome Objectives: (1) Understand how to efficiently identify potential cases of AERD and confirm the diagnosis through history, physical examination, and objective testing. (2) Review the evidence underlying the role of aspirin therapy, immunomodulating biologics, and adjunctive treatments in the management of

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AERD. (3) Discuss the role of primary and revision endoscopic sinus surgery in controlling AERD and appreciate where surgery fits in the context of advanced medical therapies.

Avoiding Complications in Endoscopic Sinus Surgery

David A. Gudis, MD (moderator); Kibwei A. McKinney, MD; Benjamin S. Bleier, MD; Zach Soler, MD, MSc

Session Description: Primary and revision endoscopic sinus surgery is performed frequently by otolaryngologists with a high rate of success, but complications can be devastating. This panel discusses preoperative and intraoperative considerations and recommendations to minimize the risk of surgical complications. The format is a unique combination of the panelists' own tips and tricks in addition to a review of the current evidence and knowledge base, equipping the practitioner with several essential tools with which to stay safe and avoid complications in endoscopic sinus surgery. The panel offers a critical understanding of preoperative computed tomography (CT) review, essential intraoperative fixed anatomic landmarks, image-guided navigation, perioperative pain management, antibiotics and steroids, surgical hemostasis, and the best practice immediate management of dreaded surgical complications when they do occur.

Outcome Objectives: (1) Understand how to review a sinus CT scan for high-risk anatomy and recognize critical intraoperative landmarks. (2) Implement intraoperative techniques to maximize surgical hemostasis. (3) Develop familiarity with the best practice immediate management of intraoperative complications.

Balloon Sinus Dilation: Indications, Technique, and Evidence

Waleed M. Abuzeid, MD (moderator); Spencer C. Payne, MD; Satish Govindaraj, MD; Michael Setzen, MD

Session Description: Balloon sinus dilation involves the use of catheter-based devices to dilate sinus ostia with the goal of improving the ventilation and drainage of diseased sinuses in the treatment of a variety of inflammatory sinus disease pathologies. Although increasingly popular, this technique is debated with regard to its efficacy in an expanding body of literature. Furthermore, there is increasing concern regarding the potential overuse of this technology. Consequently, the American Academy of Otolaryngology–Head and Neck Surgery Foundation published *Clinical Consensus Statement: Balloon Dilation of the Sinuses* in 2018 to ensure patient safety and proper utilization. This miniseminar will engage attendees in an evidence-based discussion regarding the indications, contraindications, and outcomes for balloon sinus dilation in the operating room and office setting. Attendees will enhance their understanding of the primary findings, conclusions, and limitations of the scientific literature as it relates to balloon sinus dilation and as viewed from the perspectives of the panel members. Attendees will gain insight into

the controversy surrounding potential overuse and abuse of balloon sinus dilation. They will also gain practical knowledge pertaining to the successful use of balloon sinus dilation, as well as possible complications directly related to the use of this technology. The panelists are experts in advanced rhinology from both academic and private practice environments and all have significant experience, and varied views, on balloon sinus dilation.

Outcome Objectives: (1) Understand the indications, contraindications, techniques, and outcomes for balloon sinus dilation. (2) Discuss the primary findings, conclusions, and limitations of the scientific literature related to balloon sinus dilation. (3) Review the evidence underlying claims of overuse of this technology and the factors that may influence physician utilization.

Biologics for Nasal Polyps: Why, Who, and When

Devyani Lal, MD (moderator); Matthew A. Rank, MD; Stella E. Lee, MD; Joseph K. Han, MD

Session Description: The recent approval of dupilumab for severe cases of chronic rhinosinusitis with nasal polyposis (CRSwNP) provides clinicians with a novel therapeutic tool. Current experience with dupilumab shows that the agent can be very effective in some but not all patients. It is also unclear how long patients may require maintenance on dupilumab and what long-term adverse effects and total costs might be. Many patients with recurrent nasal polyposis have severe biologically recalcitrant disease, whereas in others, inadequate surgery may contribute to early recurrence of nasal polyps. Given these considerations, diligence must be exercised in selecting patients for biologic therapy vs standard of care (surgery and conventional maintenance medical therapy). While patients with severe biological recalcitrance may be optimally served by the use of a biologic, other patients may be well or better served by standard of care utilizing meticulous revision surgery and postoperative maintenance medical therapy. Thoughtful interpretation of postoperative sinus computed tomography and lower airway and immunologic testing is crucial to determine the most appropriate therapeutic intervention. Biologically recalcitrant CRSwNP patients often have coexistent asthma, aspirin-exacerbated respiratory disease, eosinophilic granulomatosis with polyangiitis, and other immunological abnormalities. Multidisciplinary management of these patients with an allergist-immunologist is optimal. This panel of seasoned experts in otolaryngology and allergy immunology will discuss optimal use of biological therapy for CRSwNP. Using illustrative case presentations, we will outline how to identify which patients are best suited for potential biological therapy. In addition, we will also discuss practical steps and considerations in administering dupilumab. While dupilumab is currently the only approved biologic for CRS, trial results for other biologics in CRSwNP have been published. Each biologic targets a distinct mechanism in CRS pathogenesis, and we will highlight salient trial results as well.

Outcome Objectives: (1) Evaluate candidacy of CRSwNP patients for biologic therapy vs standard of care. (2) Explain potential adverse effects of dupilumab, omalizumab, and other biologics in the pipeline for potential approval for CRSwNP. (3) Implement plans for administration of biologic therapy in office-based practices.

Chronic Cough: Addressing Multifactorial Sources

Angela M. Donaldson, MD (moderator); Joseph K. Han, MD; Elina Toskala, MD, MBA, PhD; Johnathan Bock, MD

Session Description: Chronic cough can be a debilitating condition with a significant impact on quality of life. It is temporally defined as symptoms present for greater than 8 weeks in adults and 4 weeks in children. Its prevalence is approximately 11% in the United States, and one-fifth of these patients also have a diagnosis of chronic rhinosinusitis. For otolaryngologist, it can be one of the most daunting diagnoses to treat. There are no standardized guidelines for the workup of chronic cough, and decision making on a treatment regimen is complicated by the fact that many of these patients have multiple causes of cough, including asthma, gastroesophageal reflux, obesity, chronic bronchitis, chronic obstructive pulmonary disease, heart failure, and medication side effects. Determining which of these disease processes are contributing to the cough is a challenge to most otolaryngologists. In this multidisciplinary panel, we will use interactive case presentations to discuss the workup, treatment algorithms, and various medical therapies to address these difficult patients. This presentation will discuss practical tips to use when deciding to proceed with surgery vs medical therapy in the setting of chronic rhinosinusitis or abnormal imaging studies. This panel will focus on more complex patient presentations with 1 or more causes of cough. Our panelists will describe how they implemented a cough clinic into their practice and tips for patient selection. Lastly, the experts will discuss new medication interventions, such as gefapixant, that may change the way we treat chronic cough.

Outcome Objectives: (1) List workup exams, imaging, and labs for different phenotypes of cough. (2) Identify ways new therapies may be implemented in the treatment of chronic cough. (3) Apply treatment algorithms used by specialty experts to help manage complex multifactorial chronic cough.

Controversies in the Contemporary Management of Nasal and Sinus Disease

Joseph K. Han, MD (moderator); Rakesh K. Chandra, MD; Eric H. Holbrook, MD; Pete S. Batra, MD

Session Description: The past decade has hallmarked considerable evolution in the management of nasal and sinus disease. This has emerged from a proliferation in technology, mounting clinical experience, clinical and translational evidence, and a better understanding of the physiological basis of

many nasal and sinus disorders. Simultaneously, socioeconomic pressures have affected practice patterns. The cumulative effect of these forces has led to many novel and alternative therapeutic pathways in the management of various sinonasal conditions. Consequently, this has also led to many controversies regarding what constitutes best practice with regard to patient satisfaction, objective outcomes, and economic value. The panel is composed of an experienced and diverse group of fellowship-trained rhinologists who will examine these controversies, largely utilizing a case-based format in which each given case will highlight 1 or more particular points of controversy. Potential topics to be explored include (1) in-office surgery vs an alternate care site vs a hospital operating room, (2) balloon sinuplasty vs conventional functional endoscopic sinus surgery, (3) what constitutes maximum medical therapy, (4) the role of surgery for headaches, (5) the value of nasal or sinus surgery in sleep apnea, (6) pain management in sinonasal surgery, and (7) use of biologics in chronic rhinosinusitis. The discussion will include a mixture of evidence-based recommendations, expert opinion, and current practice guidelines. We will also address how these cases may have been handled in the past and how the current environment has shaped practice.

Outcome Objectives: (1) Identify areas of variation in practice patterns in the management of nasal and sinus disease. (2) Explore how the proliferation of treatment options has led to controversies in medical decision making. (3) Apply evidence, expert opinion, and current treatment guidelines to promote best subjective and objective outcomes.

Evidence-Based Rhinology for the General Otolaryngologist

Michael G. Stewart, MD, MPH (moderator); Abtin Tabaei, MD; Stacey Gray, MD

Session Description: Advances in pathophysiology and treatment have allowed for greater refinement in the medical and surgical management of chronic rhinosinusitis (CRS). Given the rapidly evolving and dynamic nature of the literature, the otolaryngologist needs to be up to date on the latest evidence and clinical guidelines. This course will provide a framework for interpreting and applying evidence-based medicine (EBM) and evidence-based guidelines. The panelists will summarize current EBM recommendations and the underlying research for fundamental aspects of medical and surgical treatment of CRS. This evidence-based approach will help the clinician understand the current guidelines and recommendations and also allow them to interpret new evidence as it is released. We will use a case-based approach to pose management questions from actual cases and then address the literature supporting management decisions.

Outcome Objectives: (1) Demonstrate a detailed understanding of evidence-based treatment for CRS. (2) Understand and apply evidence-based guidelines to the clinical care of a patient with CRS. (3) Interpret the clinical implications

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and limitations of evidence-based medicine guidelines in CRS.

Gussak Memorial: Avoiding Bad Results in Sinus Surgery

Martin J. Citardi, MD (moderator); Yvonne Chan, MD; Scott M. Graham, MD

Session Description: This panel presentation will explore the causes of poor outcomes after endoscopic sinus surgery by addressing the theory and technique of functional endoscopic sinus surgery. The discussion will focus on the surgical management of the middle turbinate, maxillary ostium, frontal recess, and the sphenoid recess. Postoperative management will be emphasized. Recognition and management of complications will be reviewed. Case presentations will serve to highlight the relevant principles. New technology, including steroid-releasing implants, as well as innovative devices, will be presented as solutions for complex surgical problems. In addition, the selection of surgical tactics will be discussed in the setting of presumed disease mechanisms of chronic rhinosinusitis. Throughout the session, the emphasis will be on practical solutions. The expert panelists will include formal didactic presentations as well as discussions and will share their personal experiences in treating patients with complex rhinosinusitis. Throughout the session, lessons that can be applied immediately in the care of these patients will be highlighted. Specific cases will serve to illustrate the relevant concepts and techniques. Audience participation will be encouraged.

Outcome Objectives: (1) Discuss potentially catastrophic complications of endoscopic sinus surgery, with an emphasis on pattern recognition that may mitigate these complications. (2) Emphasize comprehensive perioperative strategies (including intraoperative optimization and postoperative medical management) to achieve optimal surgical outcomes. (3) Review specific surgical techniques for endoscopic sinus surgery of specific sinus subsites (frontal sinus, ethmoid, maxillary sinus, and middle turbinate).

Harnessing Opportunities of Office-Based Treatment of Rhinitis and Sinusitis

Amber Luong, MD, PhD (moderator); Martin J. Citardi, MD; R. Peter Manes, MD

Session Description: Through case presentations, the panel will discuss novel office-based treatment options for common sinonasal complaints such as nasal obstruction, eustachian tube dysfunction, and postnasal drainage. Over the past 3 years, new office devices have facilitated the introduction of new office treatments for common conditions with limited solutions. The advent of new Current Procedural Terminology codes opens up payment mechanisms that should increase patient access to these treatments. Practicing ear, nose, and throat surgeons can now offer cryotherapy or radiofrequency for postnasal drainage, radiofrequency remodeling for nasal obstruction, steroid-eluting devices for recurrent nasal polyps, balloon dilation for eustachian tube dysfunction, and nasal

implants for nasal congestion. In this program, the panel will discuss new treatments and review the mechanism of action and data on their efficacy through case presentations. The presentation will also delve into reimbursement options and business practice implications with these office-based treatments. Finally, appropriate coding associated with these treatment options will also be discussed.

Outcome Objectives: (1) Understand novel office-based treatment options for nasal valve collapse, postnasal drainage, and eustachian tube dysfunction. (2) Interpret efficacy data on these novel technologies. (3) Assess billing and reimbursement options for these novel technologies.

Innovations in Office-Based Therapy of the Rhinology Patient

Kibwei A. McKinney, MD (moderator); Martin J. Citardi, MD; Pete S. Batra, MD; R. Peter Manes, MD

Session Description: Since the advent of balloon sinus dilation, there has been a proliferation of office-based techniques utilized in the treatment of diseases that affect the nose and paranasal sinuses. For these technological advances to be successful, they must be appropriately applied based on disease- and patient-specific factors. This first part of this session will focus on the selection of patients and the preauthorization process that is required to ensure reimbursement. This will include a discussion of how to counsel patients in preparation for the planned procedure. The session will then address the various anesthetic methods used in the awake patient to ensure patient comfort, including the administration of systemic and topical agents. Technical advances in nasal obstruction, including subcutaneous stenting and radiofrequency ablation of the nasal valve, will then be reviewed. This will consist of technical descriptions of these procedures and a discussion of the expected outcomes and potential complications. Nonresorbing steroid-eluting implants have recently gained favor in the long-term management of chronic rhinosinusitis with nasal polyps. The session will conclude with a review of the data that support the use of these adjuvant therapies and address the maintenance issues that may arise while they are in place.

Outcome Objectives: (1) Master the preauthorization process for office-based procedures, including balloon sinus dilation, nasal obstruction techniques, drug-eluting stent placement, and vidian nerve cryoablation. (2) Implement a local anesthetic protocol that may be used to facilitate the successful execution of office-based procedures in the awake patient. (3) Gain mastery of novel techniques used to treat nasal obstruction in the awake patient while minimizing patient discomfort and understand the role of drug eluting stents in the care of chronic rhinosinusitis with nasal polyps.

In-Office Rhinologic Procedures

David Brodner, MD (moderator); Christie A. Barnes, MD; Patricia A. Loftus, MD; Seth M. Brown, MD, MPH

Session Description: The procedural management of rhinology patients is quickly evolving to incorporate minimally

invasive in-office technology. Over the past few years, several medical devices have been introduced as new options for the management of vasomotor rhinitis, nasal valve collapse, and eustachian tube dysfunction. The advent of this new technology is accompanied by opportunities to determine best practices in patient selection, procedure technique, office setup, and overcoming reimbursement challenges. This panel will analyze published data and draw upon personal experience to clarify patient selection and outcomes, offer tips and pearls to refine anesthetic and surgical technique, give guidance on office equipment requirements and staff training, compare various device options, and discuss coding and reimbursement issues.

Outcome Objectives: (1) Demonstrate understanding of patient selection and procedural technique for in-office treatment of vasomotor rhinitis, nasal valve collapse, and eustachian tube dysfunction. (2) Understand office flow, equipment requirements, and reimbursement issues. (3) Provide knowledge for attendees to implement their own in-office minimally invasive practice.

Invasive Fungal Sinusitis: Up-to-Date Treatment Strategies

Patricia A. Loftus, MD (moderator); Lauren Roland, MD; Matthew S. Russell, MD; Justin H. Turner, MD

Session Description: Invasive fungal sinusitis is a highly morbid disease and a true otolaryngologic emergency. Guidelines for management of these complex patients are currently lacking. In this presentation, we will review the current data regarding treatment options and outcomes for both acute and chronic invasive fungal sinusitis. We will examine symptomatology, pathology, and computed tomography and magnetic resonance imaging findings, the latter which can oftentimes guide surgical planning very precisely. We will cover indications for transfer to a tertiary medical center and options for long-term follow-up of these at-risk patients. Lastly, we will discuss future research needs to improve our understanding of this disease process and help guide patient management and improve patient outcomes. Every otolaryngologist will encounter this disease process in their careers at some point. Early diagnosis and a basic understanding of treatment options are absolutely vital to ensure best possible patient outcomes.

Outcome Objectives: (1) Demonstrate an understanding of the current literature regarding invasive fungal sinusitis and review medical and surgical treatment algorithms, with an emphasis on early diagnosis and treatment. (2) Interpret symptomatology, pathology, and imaging findings consistent with an invasive fungal sinusitis diagnosis. (3) Discuss future research needs to improve understanding and treatment of invasive fungal sinusitis.

The Multidisciplinary Approach to Hereditary Hemorrhagic Telangiectasia (HHT)

Troy D. Woodard, MD (moderator); Joseph Parambil, MD; Charles Martin, MD

Session Description: Hereditary hemorrhagic telangiectasia (HHT) is an autosomal-dominant vascular disorder that affects approximately 1 in 5000 individuals. It is characterized by dysplasia of both large vessels that include arteriovenous malformations and of small vessels that include telangiectasias. Debilitating epistaxis is the most common symptom of HHT, but the disease often affects multiple organs and requires a multisystem and multidisciplinary approach to successfully manage these patients. The purpose of this panel is to provide an overview of the multidisciplinary approach used to diagnose, evaluate, and treat patients with HHT. We will utilize the expertise of a nationally known otolaryngologist, pulmonologist, and interventional radiologist to discuss novel pharmacologic and surgical treatment options available for HHT-related epistaxis and multiorgan disease in a case-based format. Lastly, this panel will also demonstrate the importance of the team approach while treating patients with multiorgan disease and discuss how multidisciplinary care results in significant better outcomes.

Outcome Objectives: (1) Discuss novel medical and surgical approaches to the management of epistaxis in HHT. (2) Highlight a multidisciplinary approach to diagnose and manage HHT and use genetic testing to identify mutations that predispose patients to have overlapping features of juvenile polyposis syndrome. (3) Emphasize the importance of surveillance for silent internal organ involvement that can be treated prophylactically prior to any clinical manifestations.

Strategic Management of Nasal Polyposis Using FESS, Biologics, and Biomarkers

Christine B. Franzese, MD (moderator); Cecelia Damask, DO; Stella E. Lee, MD; Sarah K. Wise, MD, MSCR

Session Description: Chronic sinusitis with nasal polyposis is becoming more widely recognized as a type 2 inflammatory disease, but the best treatment strategies for personalized patient treatment and which biomarkers to use to predict treatment success are still being investigated. For some patients, a complete functional endoscopic sinus surgery (FESS) followed by medical therapy is successful at controlling disease recurrence. For others, this is not the case, and numerous additional surgeries to control the burden of disease are sometimes required. There is the potential to use available biomarkers and patient profile characteristics to direct therapy to minimize the need for further additional surgery and corticosteroid use. In addition, with more than 1 US Federal Drug Administration-approved biologic for nasal polyps available and additional phase 3 trials combining biologic use with surgery, otolaryngologists face not only the clinical dilemma of whether a biologic agent is necessary but also which one to use and when to initiate the agent—before considering additional surgery, after performing surgery, or concurrently. This panel uses updated patient cases with biomarkers, images, and videos, as well as currently available evidence and guidelines, to discuss different therapeutic approaches to treatment and ways to potentially answer these questions: Who will do well with just

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surgery and medicated rinses? If a biologic is needed, which one is best to use, and when should it be initiated?

Outcome Objectives: (1) Describe the utilization of biologic therapies for chronic rhinosinusitis with nasal polyposis (CRSwNP) alone, pre-FESS, and post-FESS. (2) Discuss the available biomarkers, patient profiles/characteristics, and their practical clinical application in decision making for treatment of CRSsNP and biologic agent selection. (3) Discuss a guided, personalized treatment approach to CRSwNP using FESS, medical therapy, and biologics.

Therapeutic Innovations in Rhinosinusitis: From Bench Research to Clinical Practice

Jivianne T. Lee, MD (moderator); Joseph K. Han, MD; Andrew Lane, MD; Troy Woodward, MD

Session Description: Effective management of chronic rhinosinusitis (CRS) continues to remain a challenge. Despite appropriate therapy, a significant proportion of CRS patients develop recurrent disease with substantial impact on their quality of life. However, recent years have witnessed major advances in laboratory research that have greatly expanded our understanding of the pathophysiology of CRS. Such insights have led to the development of novel therapeutic options for recalcitrant disease. The purpose of this panel presentation is to discuss new, cutting-edge basic science research in rhinology and delineate how these findings have translated into innovative treatments for both chronic rhinitis and sinusitis. Current work aimed at defining CRS endotypes will be reviewed and their relationship to emerging systemic biologics addressed. The varied mechanisms of action, immunomodulatory capabilities, and clinical efficacy of these burgeoning agents will be elucidated in the context of CRS endotypes. The role of epithelial innate immunity and its clinical implications in CRS will also be assessed. Novel surgical approaches for recalcitrant CRS that have arisen from irrigation distribution studies will be delineated. The indications and techniques involved with such revision surgical salvage procedures will be described in conjunction with video presentations. Finally, new technologies will be presented along with the current evidence for their use in chronic rhinitis and sinusitis, including radiofrequency and cryoablation therapy. This session will be conducted by academic rhinologists using an interactive case-based format with audience polling.

Outcome Objectives: (1) Discuss the scientific basis underlying novel medical therapies for CRS, including systemic biologics and emerging immunomodulators. (2) Describe new surgical approaches and recent technologic innovations for management of recalcitrant CRS. (3) Understand the relevant evidence, outcomes, and indications for each therapeutic modality in patients with CRS.

Treating Patients With Cystic Fibrosis: Best Practices, Strategies, Updates 2021

Amanda L. Stapleton, MD (moderator); Brent A. Senior, MD; Stella E. Lee, MD; Adam J. Kimple, MD, PhD

Session Description: Sixty percent of pediatric and adult patients with cystic fibrosis (CF) report chronic rhinosinusitis (CRS) symptoms when questioned and endoscopic and radiographic evidence of sinonasal inflammation is nearly universal. Frontal headaches, anosmia, obstruction, discharge, and congestion are all common to the CF population. This panel of pediatric and adult rhinology experts will discuss the evaluation, medical management, imaging indications, surgical options, and long-term care of the pediatric and adult cystic fibrosis patient. The introduction of new cystic fibrosis transmembrane receptor corrector/modulator medical therapy will also be reviewed and cases discussed.

Outcome Objectives: (1) Evaluate and treat the CF patient and understand how CF transmembrane receptor corrector/modulators work. (2) Determine how to incorporate surgical intervention into CF care and follow best practice for imaging. (3) Learn culture-directed techniques to manage long-term sinus colonization/biofilm formation and establish a guideline for in-office debridement of CF patients.

Understanding the Rise in Frontal Sinus Surgery: Opportunity and Responsibility

Zara M. Patel, MD (moderator); Stacey Gray, MD; Pete S. Batra, MD; Marc Dubin, MD

Session Description: The amount of frontal sinus surgery that otolaryngologists perform on a yearly average has sharply risen since the introduction of balloon sinuplasty. There are many potential reasons for this rise, and some otolaryngologists have called into question whether the increased numbers reflect increased need vs increased reimbursement. What is clear is that frank and open discussion is needed with regard to these questions, and we as a specialty have to grapple with the question of whether self-regulation or regulation by third-party payers will eventually determine our practice.

Outcome Objectives: (1) Understand how coding and reimbursement for frontal sinusotomy has changed in recent years. (2) Consider and reflect on whether the rise in frontal sinus coding is based on increased need for frontal surgery or based on other factors. (3) Understand the evidence-based indications for frontal sinusotomy, whether performed by cold instrumentation or balloon sinuplasty.

What the Heck Is That? Challenging Nasal Endoscopy Findings

Angela M. Donaldson, MD (moderator); Eric W. Wang, MD; Roy R. Casiano, MD; Jivianne T. Lee, MD

Session Description: Understanding the initial approach for the care of patients with a sinonasal masses is essential for every otolaryngologist. A heightened level of suspicion is necessary when patients present with unilateral epistaxis, congestion, or ear fullness, as these symptoms are highly concerning for a mass. However, sometimes your nasal endoscopy does not correlate to clinical presentation leading to the question,

“What the heck is that and what do I do next?” This session features videos and stills of rare sinonasal conditions. Interactive case presentations will be presented, and a panel of rhinology experts will discuss differential diagnosis, imaging, and treatment options. The decision to perform in-office vs intraoperative biopsy can be difficult. The panelists will discuss what they would do and how they make those decisions for each vignette. The panel will also address physical exam and imaging findings that help decipher an inverting papilloma from an inflammatory polyp. Lastly, determining the presence of a nasal flare from an autoimmune vasculitis disease can be challenging; this panel of academic rhinologists will use evidence-based data and endoscopic findings to discuss indications for biopsy. Pathologies covered during the session range from inflammatory lesions to sinonasal malignancies and skull base lesions.

Outcome Objectives: (1) Apply knowledge from cases presented to help determine need for biopsy, imaging, and treatment options. (2) Demonstrate knowledge of differential diagnoses for various nasal masses. (3) Identify strategies to decipher the etiology of common nasal polyps, such as inflammatory polyps and inverting papilloma.

Sleep Medicine

Pediatric DISE Controversies: Highlights of the AAO-HNSF Consensus Statement

Cristina M. Baldassari, MD (moderator);
Derek J. Lam, MD, MPH; James M. Ruda, MD;
Claire M. Lawlor, MD

Session Description: Drug-induced sleep endoscopy (DISE) was initially introduced in Europe in the early 2000s to evaluate sites of upper airway obstruction in adult patients with obstructive sleep apnea (OSA). DISE is now commonly performed as part of the evaluation for adults being considered for sleep surgery. There is a widely used standardized scoring system, and data are also emerging regarding improved outcomes in adult patients who have undergone DISE-directed sleep surgery. Only in more recent years has DISE been performed with increasing frequency in children with OSA. High-quality, prospective studies on pediatric DISE are lacking. Thus, there are significant variations in practice among providers performing this procedure. For example, the optimal sedation protocol for children undergoing DISE is still debated. To provide guidance for providers performing pediatric DISE and with the ultimate goal of quality improvement, the American Academy of Otolaryngology–Head and Neck Surgery Foundation convened a group of pediatric OSA expert panelists to develop a clinical consensus statement on this topic. This panel discussion will highlight the main findings of the recently published consensus statement. Panelists, who include leadership from the consensus statement, will use a case-based approach to address the numerous controversies surrounding pediatric DISE,

including the lack of a widely accepted scoring system and variations in DISE technique. We will also discuss consensus statements related to indications for pediatric DISE, including the role of this procedure in children who have yet to undergo adenotonsillectomy. A brief review of the most recent, pertinent DISE literature will be presented along with expert commentary. The panelists will offer practical suggestions on how to incorporate consensus statement recommendations into practices.

Outcome Objectives: (1) Recognize the controversies in pediatric DISE. (2) Familiarized attendees with recently published clinical consensus statements on pediatric DISE. (3) Improve the quality of care for children undergoing pediatric DISE.

Snoring 2021

Ofer Jacobowitz, MD, PhD (moderator);
Robson Capasso, MD; M. Boyd Gillespie, MD;
Michael Friedman, MD

Session Description: Snoring is of major importance to our patients and their families but is challenging to treat. The expert panelists will discuss the approach to the patient with snoring and treatment experience using medical and procedural modalities. To begin, snoring is easily recognized but is not easily defined and assessed. Current technologies and clinical approaches will be reviewed, including use of apps that may improve pre- and postoperative assessment. After review of assessment, we will discuss the overall approach to treatment of the snoring patient. The nose is a key route of breathing in sleep, and obstruction may be a factor in snoring. When should the nose be treated, and what is the expected outcome? Does one always begin with treatment of the nose? What is the current office-based options for the nasal airway? With the palate being the focal point of snoring, many procedures are available for stiffening and modification. The panelists will discuss their current approach and preferred techniques—such as surgical, thermal, chemical, and suture- or implant-based techniques. For the patients who defer procedures, the otolaryngologist should be familiar with the merits and dubious claims of various over-the-counter remedies. Mandibular advancement devices are well established for snoring treatment and fit well into the treatment options. Positioning devices are also part of the comprehensive approach, and options will be discussed. The evidence or lack of will also be discussed for stimulatory treatments, sprays, pills, and expiratory pressure treatments. Snoring can be treated effectively in the hands of the otolaryngologist. Attendees are encouraged to learn more and share their experiences with colleagues.

Outcome Objectives: (1) Explain how to assess the snoring patient for treatment. (2) Compare various palatal and nasal procedures for snoring. (3) Recognize when to utilize alternative treatments for snoring, such as oral appliances and positioning aids.

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Update on Scientific Trials and Reviews in Sleep Surgery 2021

Phillip S. LoSavio, MD (moderator); Megan L. Durr, MD; Derek J. Lam, MD, MPH; Jeffrey J. Stanley, MD

Session Description: This panel is the fourth annual edition sponsored by the American Academy of Otolaryngology–Head and Neck Surgery General Otolaryngology and Sleep Education Committee. Panelists will review the medical evidence in sleep surgery from the past year. Sleep surgery is a rapidly expanding field in otolaryngology as evident by the exponential increase in publications over the past decade. In the last year alone, there were more than 1000 publications in a PubMed search of “sleep apnea surgery,” with more than 7000 in the past decade. It can be challenging for any clinician to absorb this volume of information and focus on the most clinically relevant literature. This program is intended to provide a comprehensive review of the most impactful and significant articles published this past year in the field of adult and pediatric sleep surgery, focusing on high-evidence trials and systematic reviews. The panel will review articles organized around regional therapies, including palate surgery, tonsillectomy, hypopharyngeal procedures, and pediatric therapies. There will also be a review of evidence-based postoperative care as well as diagnostic techniques such as drug-induced sleep endoscopy. The discussion will be centered on new evidence published over the past year while providing a brief overview of key sentinel articles from the past 5 years when applicable.

Outcome Objectives: (1) Examine the most recent evidence available regarding surgical treatments for obstructive sleep apnea (OSA) with a focus on new evidence published this past year. (2) Incorporate current scientific evidence in the perioperative management of OSA. (3) Compare the advantages of contemporary surgical sleep therapies, especially as they relate to upper airway stimulation and palate surgery in both adult and pediatric populations.

What I Should Have Known When I Started XII Surgery

Martin L. Hopp, MD, PhD (moderator); Maurits Boon, MD; Stacey L. Ishman, MD, MPH; Mark A. D’Agostino, MD

Session Description: Several diverse, experienced XII implant surgeons will share experiences that made them change techniques, explain issues, and discuss improvements they made in their preoperative, operative, and postoperative management of pediatric and adult obstructive sleep apnea patients undergoing XII implant evaluation and treatment.

Outcome Objectives: (1) Implement improved surgical techniques when doing XII implant surgery in children and adult patients. (2) Implement improved preoperative decision making when doing XII implant surgery in children and adult patients. (3) Implement improved postoperative management techniques when doing XII implant surgery in children and adult patients.



ORAL PRESENTATIONS



This icon indicates abstracts deemed “Best of Orals” by the Annual Meeting Program Committee. The 12 selected abstracts demonstrate outstanding scientific merit of the research and were deemed scientifically sound and novel by the committee.

Business of Medicine/Practice Management

Are In-Person Postoperative Parotidectomy Follow-ups a Thing of the Past?

Luis A. Antezana (Presenter); Katherine Z. Xie; Sarah R. Yeakel, MHA, MBA; Eric J. Moore, MD

Introduction: COVID-19 accelerated the need for virtual visits within health care, and otolaryngology was no exception. We examined whether otolaryngologists are able to perform postoperative care through a virtual visit platform, specifically for patients who underwent parotidectomy.

Method: A retrospective case review under institutional review board exemption of patients who underwent parotidectomy and postoperative video visits between September 2019 and December 2020 was conducted. A chart review of all video visits was sorted for “established” patients (ie, previously seen by the department presenting for surveillance, surgery follow-up, or new concern) and narrowed to postoperative parotidectomy follow-up patients. Days between surgery and postoperative follow-up, treatment plan, and postvisit outcomes were reviewed. Treatment plan was designated as follows: yes, a definitive treatment plan was made; no, a provider required additional in-person visits; and, not applicable, no concerns existed. Outcomes measures included whether an in-person follow-up was recommended and if a follow-up occurred.

Results: There were 447 head and neck virtual visits found, 302 established visits, and 194 new video visits. There were 96 postoperative parotidectomy patients. Demographics were 28 male and 68 female, with an average age of 54 years. The first video visit occurred, on average, 48 days postop. Of the patients, 8.3% (n = 8) presented with minor complications (eg, eye dryness, seroma, first bite pain) and required a treatment plan. The virtual visit was sufficient for prescribing a plan for 100% of those visits. For the other 91.7% of patients (n = 88), no treatment plan was required, and 26% were instructed to follow up (n = 25), 23 of whom were routine for surveillance and 2 for procedural follow-up. All other patients were instructed to follow up as needed. We noted 11 clinic and 2 surgery (hematoma evacuation, seroma aspiration) follow-ups at the time of review.

Conclusion: The results demonstrate the ability to make definitive decisions about a parotidectomy patient’s postoperative care through a virtual visit platform. This study supports the feasibility of transitioning in-person parotidectomy postop visits to virtual.

Cost Accounting in the OR: Time-Driven Activity-Based Costing and Tracheostomy

Pratyusha Yalamanchi, MD, MBA (Presenter); Kelly Michele Malloy, MD; Keith Casper; Larry Marentette

Introduction: Reducing costs while delivering efficient care is increasingly urgent in the current health care environment. Traditional hospital accounting relies on proxy use of hospital charges and fails to provide accurate assessment of surgical care costs. The objective of this study is to describe the application of time-driven activity-based costing (TDABC) to the case study of surgical tracheostomy to identify cost drivers and unused capacity.

Method: Retrospective cohort analysis of otolaryngology surgical tracheostomy procedures from 2018-2019 at a tertiary academic center (n = 97) was performed using TDABC microcosting methodology to measure cost across the operative case, using the quantity of time and the cost per unit of each resource to characterize resource utilization. Specifically, a process map was created for the operative case that outlines all resources, including personnel, durable and disposable equipment, and overhead such as facility space and management. The unit cost of each resource was then multiplied by the amount of time used in the operating room (OR) case to determine the total cost of care.

Results: The mean total cost of surgical tracheostomy by TDABC methodology was \$3593 (SD \$170.90). Labor, as defined by all personnel involved in the case based on OR case logs, was the primary cost driver at a total of \$1,397 per se (38.9% of total cost). Overhead, defined as fixed facility and administrative expenses per minute of OR time, consisted of 33.1% of total cost or \$1,190. Remaining costs included OR instruments (total \$572, cost contribution 15.9%), supplies (total \$306, cost contribution 8.5%), and depreciation (total \$128, cost contribution 3.5%). Overall, labor and fixed costs such as overhead contributed 72% of total cost in surgical tracheostomy.

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Conclusion: Time-driven activity-based costing demonstrates precise per minute, per case calculation of operative costs. For traditionally brief procedures such as tracheostomy, optimization of labor through unused personnel capacity identification and staffing rearrangement can lead to increased efficiency and potential cost savings.

Cost-Utility Analysis of Bilateral Cochlear Implantation in Adults in Poland

Piotr H. Skarzynski, MD, PhD, MSc (Presenter);
Katarzyna Ciesla; Artur Lorens; Joanna Wojcik;
Henryk Skarzynski

Introduction: Hearing loss has a wide range of causes and affects all age groups. For patients with bilateral severe to profound hearing loss, bilateral cochlear implantation (CI)—either simultaneous or sequential—is the only treatment option that can successfully restore binaural hearing and bilateral CI, also improves speech understanding in suboptimal acoustic conditions. The aim of the study was to develop a Markov model and apply it for the evaluation of 3 different treatment scenarios for adult patients with severe to profound bilateral sensorineural hearing loss.

Method: A clinical group of 22 adult patients, aged from 59.13 ± 8.9 years with severe to profound sensorineural hearing loss were included in the study. The study comprised 2 arms: patients in group 1 received the second cochlear implant 1 to 3 months after the first implant, while patients in group 2 got the second cochlear implant approximately 1 year after the first implant. All participants were first asked to complete a AQoL-8D questionnaire. For the cost-effectiveness analyses, a Markov model analyzed as microsimulation was developed to compare the different treatment options.

Results: The analyses show that bilateral cochlear implantation strategies are cost-effective compared with the “no treatment” alternative when having a 10-year model time horizon. When all 3 model scenarios are compared, the bilateral simultaneous cochlear implantation strategy (scenario 3) compared with the “no treatment” option is even more cost-effective than scenarios 1 and 2, compared with the “no treatment” alternative.

Conclusion: The model results summarize that bilateral (sequential and simultaneous) cochlear implantation that is represented in the model scenarios is a cost-effective strategy for Polish adult patients with bilateral severe to profound sensorineural hearing loss.

Impact of COVID-19 Pandemic on Otolaryngology Clinical and Surgical Volume

Annie E. Arrighi-Allisan (Presenter); Katherine L. Garvey;
David K. Lerner, MD; Joshua Rosenberg, MD;
Satish Govindaraj, MD; Alfred-Marc Illoreta, MD

Introduction: The COVID-19 pandemic has upended regular otolaryngology practices in myriad ways. However, there remains a relative dearth of data quantifying the impact of this pandemic on the clinical and surgical volume of otolaryngology practices at large, urban, multicenter hospital systems.

Method: The monthly totals of relative value units (RVUs), surgical cases, patient visits, and paid time off (PTO) in departments of otolaryngology were gathered from January to October of 2019 and 2020. Monthly and yearly values were compared using Wilcoxon signed-rank test.

Results: RVU totals of 323,791 and 239,735 were performed from January to October of 2019 and 2020, respectively ($P = .018$). While overall surgical volume decreased significantly from 2019 to 2020 (6027 cases in 2019 vs 4181 in 2020, $P = .008$), this was largely due to a decrease in ambulatory cases (5148 vs 3383, $P = .006$), as inpatient surgical volume did not change markedly (879 vs 798, $P = .323$). Follow-up visits remained relatively constant (58,163 vs 47,802, $P = .222$), but significantly fewer new patients were seen (36,172 vs 24,545, $P = .006$). Increased prevalence of telemedicine visits compensated for the decrease in new patient visits in 2020 (6535 in 2020 vs 0 in 2019), yielding an overall insignificant change in total visit volume (94,335 vs 78,882, $P = .192$). Personal PTO precipitously declined in 2020 compared with 2019 (683 vs 192, $P = .003$), as did academic PTO, although to a lesser extent (233 vs 24 days, $P = .01$).

Conclusion: Overall, RVUs decreased by 26% from 2019 to 2020, which is largely attributable to significantly fewer ambulatory surgeries and new patient visits during the COVID-19 pandemic. Increased utilization of telemedicine is a potentially lasting adaptation that has enabled providers to maintain patient care at a time when clinical volume is limited.

Malpractice Claims Among Otolaryngologists and the Association of Scholarly Activity



Kasra N. Ziai, MD (Presenter); Shivam D. Patel;
Megan Crenshaw; Robert A. Saadi, MD;
Jessyka G. Lighthall, MD

Introduction: Surgeons are at high risk for potential medical malpractice claims throughout their careers. This study aims to characterize the association between scholarly activity, academic rank, practice setting, and malpractice claims among otolaryngologists over the past decade.

Method: A Boolean search was performed and data were extracted from the 2 legal databases, WestLaw and LexisNexis. The records were obtained from January 2010 to January 2020. Each malpractice claim was reviewed for the case year, surgeon’s specialty, defendant institution type, the reason for the lawsuit, requested malpractice claim, paid malpractice claim, verdict, defendant’s academic rank, the total number of publications, and h-index.

Results: A total of 102 malpractice cases were identified. The most common procedure that led to malpractice claims was endoscopic sinus surgery ($n = 16$). Improper performance ($n = 48$) was the most common underlying reason for litigation. There was no statistically significant difference for the litigation outcome between faculty at academic institutions vs community/private (95% CI, -0.062 to 0.279 ; $P = .210$). There was also no significant correlation between the mean number of publications at the time of litigation and the litigation outcome (95% CI,

–31.62 to 9.71; $P = .296$). There was a statistically significant relationship between academic rank and the litigation outcome (95% CI, 1.85 to 2.5; $P = .049$), and defendants with higher academic rank were more likely to have a favorable outcome.

Conclusion: Our analysis showed a significant relationship between academic rank and litigation outcome but no significant correlation between h-index, number of publications, or practice setting with litigation outcome was found.

Otolaryngologist Performance in the Merit-Based Incentive Payment System, 2017-2018

Neil S. Kondamuri (Presenter); Lauren E. Miller, MD, MBA;
Roy Xiao; Vinay K. Rathi, MD, MBA

Introduction: In 2017 the Centers for Medicare and Medicaid Services (CMS) launched the Medicare Merit-Based Incentive Payment System (MIPS), which is the largest mandatory value-based payment program in health care history. CMS intended for 2017 to serve as a transition period with lower participation and performance thresholds and 2018 to be the first full program year. We examined MIPS participation and performance by otolaryngologists in both years.

Method: Using publicly available CMS Physician Compare databases, we conducted a retrospective cross-sectional analysis of otolaryngologist participation and performance in MIPS between January 1, 2017, and December 31, 2018. We used descriptive statistics to characterize participation and performance stratified by program year (2017/2018) and otolaryngologist reporting affiliation (individual/group/alternative payment model [APM]). We used chi-squared testing to examine differences in the receipt of positive payment adjustments between reporting affiliations ($\alpha = .05$). All analyses were performed in the pandas 3.0 open-source library in Python 3.

Results: In 2018 CMS required 6093 otolaryngologists to participate in MIPS. The majority ($n = 5583$; 91.6%) received positive payment adjustments. Otolaryngologists reporting as individuals in 2018 ($n = 1076/1584$; 67.9%) were less likely ($P < .001$) to earn positive payment adjustments than those participating as groups ($n = 2802/2804$; 99.9%) or through APMs ($n = 1705/1705$; 100.0%). Among otolaryngologists who participated in MIPS in both 2017 and 2018 ($n = 4814$; 79.0%), the median change in overall performance score was +3.0 points (interquartile range 0.0–13.5). Otolaryngologists who transitioned from reporting as individuals to groups ($n = 283$; 6.3%) or APMs ($n = 137$; 3.1%) achieved the greatest improvements in performance scores (groups: +14.4 median change in MIPS score; APMs: +23.4).

Conclusion: Most otolaryngologists improved scores and earned positive payment adjustments in MIPS in 2018; however, performance varied within the field.

Paycheck Protection Program Distribution to Otolaryngology Practices During COVID-19

Amy Zhu (Presenter); Manish Patel; Brandon R. Perez;
Richard Chiu; Robert T. Cristel, MD; Jeffrey Yu, MD

Introduction: The COVID-19 pandemic has been a financially challenging time for health care organizations with some ear, nose, and throat (ENT) clinics reporting about a 50% drop in completed scheduled ENT visits during the first wave compared with 2019. In this study, we assessed the economic impact of COVID-19 on otolaryngology practices by identifying businesses that received Paycheck Protection Program (PPP) funding from the Small Business Administration (SBA).

Method: In December 2020 a cross-sectional study was conducted using publicly available data published on PPP loans greater than \$0.15M by the SBA. Otolaryngology clinics benefiting from this funding were filtered using the following terms: “otolaryngology,” “otolaryngologist,” “sinus,” “head and neck,” “throat,” “ENT,” and “facial plastic.” The study criteria identified 481 clinics that met inclusion criteria following manual confirmation and duplicate removal. Loan amount, business type, geographic region, owner race, owner gender, and the number of jobs per business were recorded for each clinic. Chi-square analysis was performed to determine the significance ($P < .05$) of each characteristic.

Results: There were significant differences in loan distribution based on business type ($P < .001$) and jobs reported ($P < .001$). Higher proportions of Subchapter S corporations (60.00%) received smaller loans of \$0.15 to \$0.35M than limited liability companies (39.13%) and corporations (51.69%), which generally employ more people. Similarly, 100% of loans ranging from \$0.15 to \$0.35M went to micro and small practices, whereas 33% of medium-sized practices received loans greater than \$1M. All businesses employing greater than 250 people ($n = 5$) received loans of \$2M+.

Conclusion: This study suggests PPP funding was distributed equitably to applicant ENT clinics with larger clinics receiving larger loans.

A Simple Checkbox Improves Gender Representation at AAO-HNSF Annual Meetings

Lekha Yesantharao (Presenter); Jamie R. Litvack;
Sujana S. Chandrasekhar; Deepa Galaiya, MD

Introduction: Women are routinely underrepresented at medical conferences. At the Board of Directors Meeting in September 2017, the American Academy of Otolaryngology added 2 checkboxes querying each panel organizer if diversity of gender/race was considered in the selection of presenters, beginning with the 2018 Annual Meeting (AM). This study seeks to examine how the checkbox affected gender diversity of panel presenters at the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) AM.

Method: This was a cross-sectional investigation comparing female panel presenters between 2017 and 2020, before and after the addition of the checkboxes inquiring about diversity. The AM Official Program Abstracts were used to obtain data on presenter names and specialty area for each panel. The total percentage of female presenters, as well as percentages

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of female presenters stratified by specialty area, were compared between 2017 and 2020 to quantify any change in female participation following the addition of the checkbox.

Results: There was a significant increase in the proportion of female panel presenters from 26.4% (total n = 576) in 2017 to 33.9% (total n = 469) in 2020 ($P = .008$). There was a corresponding increase in the proportion of female presenters in most specialty areas: business (30% increase), comprehensive otolaryngology (21%), endocrine surgery (67%), head and neck surgery (52%), otology/neurotology (38%), pediatrics (83%), rhinology (29%), and sleep medicine (31%). In addition, the number of panels with no female representation decreased from 34% in 2017 to 25% in 2020.

Conclusion: This study demonstrates that the addition of a checkbox reminding panel organizers to consider diversity was positively correlated with the proportion of female presenters. Representation matters, and when women and minority physicians see people who look like themselves in leadership positions, they are more comfortable aspiring to such heights in their own careers. Thus, the simple checkbox strategy, along with other tactics such as diversifying panel coordinators, can be implemented by local, regional, national, and international medical conferences to help close the gender gap.

Trends in Spending and Utilization for Drugs Prescribed by Otolaryngologists

Shivani A. Shah (Presenter); Lauren E. Miller, MD, MBA; Vinay K. Rathi, MD, MBA

Introduction: The significant and rising cost of prescription drugs is a pressing concern for patients and payers. Little is known about spending on drugs prescribed by otolaryngologists.

Method: Using publicly available Medicare Part D Prescriber Public Use data, we conducted a retrospective cross-sectional analysis of 34 small-molecule drugs commonly prescribed by otolaryngologists (defined as 2017 Medicare Part D spending \geq \$500,000) to Medicare beneficiaries. Drugs were characterized by type (brand name vs generic). Primary outcomes for each drug included total annual spending and total annual number of days supplied. The secondary outcome was the mean drug price per day.

Results: Between 2013 and 2017, total spending on drugs prescribed by otolaryngologists to Medicare beneficiaries decreased by \$32.1 million (\$131.7 to \$99.5 million; relative decrease 24.4%; compound annual growth rate [GR] -5.4%), while total utilization increased by 24.9 million days supplied (74.6 to 99.5 million; relative increase 33.3%; GR 5.9%). For brand-name drugs, there was a decrease in spending (\$71.1 million to \$26.7 million; relative decrease -62.4% ; GR -17.8%) and utilization (11.2 million to 3.1 million days supplied; relative decrease -72.5% ; GR -22.8%). In contrast, generic drugs demonstrated increased spending (\$60.6 million to \$72.8 million; relative increase 20.2%; GR 3.7%) and utilization (63.5 million to 96.4 million days supplied; relative increase 51.9%; GR 8.7%). The mean price per day increased for all (n = 6 of 6; 100.0%) drugs without available generics.

Conclusion: Spending on drugs prescribed by otolaryngologists to Medicare Part D beneficiaries declined between 2013 and 2017 due to a transition from brand name drugs to lower-cost generic equivalents.

Using Machine Learning to Predict Case-Time Duration in Otolaryngology

Lauren E. Miller, MD, MBA (Presenter); William Goedicke; Matthew Crowson, MD; Aalok Agarwala; Matthew Naunheim

Introduction: Operating room optimization including accurate case duration estimates is essential for delivering efficient and cost-effective care. Given the ability of machine learning (ML) methods to leverage complex and heterogeneous preexisting data to predict case duration estimates, we hypothesize that ML can improve projected case lengths over existing non-ML techniques.

Method: De-identified patient information from otolaryngology surgical cases at 1 academic institution were retrospectively reviewed from 2016 to 2020. Variables collected included all patient, surgeon, procedure, and facility data known preoperatively to capture all realistic contributors. Available case data were divided into a training data set and a testing data set. Several ML algorithms were evaluated based on greatest performance of predicted case duration when compared with actual case duration. Performance of all models was compared by the average root mean squared error and mean absolute error.

Results: A total of 44,697 otolaryngology surgical cases were evaluated. The average case duration time was 97.5 ± 89.5 minutes. The most common procedure performed was myringotomy with tube placement (n = 5960), and most cases were general otolaryngology (n = 13,705) cases. The most influential predictors included procedure performed, surgeon, type of case by subspecialty, and day-of-surgery case status. The best-performing ML models were *tbost* and *XGBoost*, which reduced our operative time mean absolute predictive error by 22 minutes and 8 minutes, respectively. Using the best-performing model and financial estimates, this reduction in error could yield \$600,000 in annual operational savings.

Conclusion: ML algorithms to predict operating room case time duration in otolaryngology have the potential to improve operational efficiency and result in significant cost savings.

Comprehensive Otolaryngology

Accurate Measurement of Neck Flexion Angle During Otolaryngologic Surgery

Zhen Hu (Presenter); Hanqing Duan; Christopher R. Razavi; Francis X. Creighton, MD; Russell H. Taylor, PhD; Deepa Galaiya, MD

Introduction: There is increasing evidence showing that a surgeon's posture while operating can contribute to chronic pain. The purpose of the study is to accurately measure the surgeon's neck flexion angle while performing otolaryngologic surgery,

comparing the risks of traditional “heads down” surgery to that of “heads up” endoscopic surgery.

Method: In this study, 2 inertial measurement units (IMUs) are used, one banded to the forehead and the other attached to the back. The neck flexion angle is indicated by the pitch angle between the 2 IMUs. To confirm the accuracy, the IMU’s pitch angle was calibrated against electromagnetic trackers. Two surgical scenarios were simulated. We compared traditional thyroid surgery with endoscopic ear surgery.

Results: The neck flexion angle for traditional thyroid surgery is mainly at 60° to 90°, with the mean at 74.93°. The standard deviation is 25.16°. The total time recorded for the traditional case was 38.19 seconds. The total amount of time the surgeon spent at greater than 50°, the threshold angle for harmful trapezius pressure, was 32.34 seconds, or 84.7% of the time. For the endoscopic case, the neck flexion angle remains primarily at 25° to 35° with the mean at 32.11°. The standard deviation is 6.68°. The maximum angle is 48.25°, and the harmful 50° threshold was never achieved.

Conclusion: Previous studies have shown that trapezius muscle fatigue is highest when the neck flexion angle is greater than 50°. Our results show that traditional open surgery, such as thyroid surgery, is done with a neck flexion angle greater than 50° for the majority of the time. In contrast, the neck flexion angle remains near 30° for the endoscopic case. This study argues in favor of the development of “heads up” techniques for surgery, including the use of endoscopes or exoscopes when possible.

Adult Tonsillectomy: An Evaluation of Indications and Complications

Shivam D. Patel (Presenter); Ghazal Staity; Linda Engle; Junjia Zhu, PhD; Guy Slonimsky, MD

Introduction: Contrary to the abundant literature on the indications and complications associated with pediatric tonsillectomies, the literature regarding adult tonsillectomies is scarce. The aim of this study was to evaluate the current adult tonsillectomy indications, along with factors associated with postoperative complications.

Method: A retrospective cohort study was conducted by reviewing medical records from 2004 to 2020. Demographic, social, and clinical data were collected. Indications for surgery were categorized as infectious etiology, biopsy, obstructive sleep apnea (OSA), and tonsillar stones. Data regarding postoperative hemorrhage, emergency department (ED) visits, and readmissions were collected. Bivariate association methods and multivariable logistic regression models were used to evaluate factors associated with postoperative complications.

Results: The study included 574 adults (mean age 32 years, 69.9% female vs 30.1% male) who underwent tonsillectomy. The most common indication was infections (62.2%), followed by biopsy (26.5%), tonsillar stones (6.8%), and OSA (4.5%). The highest frequency of postoperative bleeds (17.9%) occurred in the tonsillar stones cohort; however, on multivariate analysis, the indication for surgery was not a significant

predictor. Male gender and age were independent predictors of postoperative bleeding, such that with every 1-year increase in age, the odds of having a bleed decreases (odds ratio [OR] = 0.97; 95% CI, 0.95–0.99). Younger age was a significant predictor of postoperative ED visits (OR = 0.96; 95% CI, 0.92–0.99). Mantel–Haenszel chi-square test revealed a significant linear trend of an increasing proportion of tonsillectomies performed for tonsillar stones compared with other indications for 2011 to 2019.

Conclusion: Infectious etiology was the most common indication for tonsillectomy. Indication for surgery was not found to be a significant predictor of postoperative bleeding; however, males had higher odds of postoperative bleeding. The proportion of tonsillectomies performed for tonsillar stones was steadily increasing from 2011 to 2019.

Are CT Scans Necessary for the Diagnosis of Peritonsillar Abscess?

Andy Wang (Presenter); Michael J. Eliason, MD; Michael D. Seidman, MD

Introduction: Computed tomography (CT) scans are routinely used in the diagnosis of peritonsillar abscesses (PTA), adding more than \$150 million to the diagnosis each year. We propose that the use of CT scan in the diagnosis of PTA is often unwarranted. In addition to costs, one needs to consider radiation exposure and whether CT scans accurately differentiate phlegmon vs abscess. This study compared CT findings with clinical examination to elucidate their accuracy and utility in the management of PTA.

Method: A retrospective chart review was performed of patients who presented with throat pain (ICD-9: 462, 463, 475, and 784.1) to 1 of 8 AdventHealth Orlando emergency departments from January through April of 2013. Patients with clinical diagnosis of PTA were reviewed. The accuracy of CT scans was determined by comparing the read to the outcome of a procedural intervention for abscess drainage. Likewise, those diagnosed via clinical exam only and who underwent procedural intervention were assessed for clinical accuracy.

Results: A total of 6280 patients met inclusion for review, and 116 of these were clinically diagnosed with PTA. Some 99 (85.3%) underwent CT scan and 27 (23.3%) had procedural intervention. Patients were managed medically without procedure 76.7% of the time (89 patients). Procedural intervention confirmed the presence of a PTA and accuracy of a positive radiology read in 69.6% of the patients. This represents a CT scan false-positive rate of 30.4%. Procedural intervention in those without a diagnostic CT confirmed PTA in all patients, representing a true-positive rate of 100%.

Conclusion: This study confirms a high incidence of CT scans used for the diagnosis of PTA but demonstrates a high false-positive rate as compared with the procedural intervention by an otolaryngologist. Many reading radiologists have a difficult time delineating phlegmon from abscess. Clinical exam alone is appropriate care for these patients.

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Are Goiters More Common in Certain Racial and Ethnic Groups?

Lily Young, MS (Presenter); Thomas J. Ow, MD, MS;
Juan Lin, PhD; Vikas Mehta, MD, MPH

Introduction: While the relationship between race/ethnicity and thyroid cancer has been extensively studied, there is little information about the relationship with benign thyroid disease, especially with respect to thyroid growth. We aim to determine if there is a significant correlation between race/ethnicity and total thyroid volume.

Method: We performed a retrospective cohort study of benign thyroid disease patients ($n = 457$) from June 2008 to May 2020. Exclusion criteria were age <18 years, incidental finding of thyroid cancer >1.0 cm, or history of previous thyroid surgery. The primary outcome was total thyroid volume (cm^3/mL) calculated from ultrasound measurements. The secondary outcome was the maximum dimension (cm) of the largest thyroid nodule. Demographic (race, ethnicity, sex, age), historical (family history and radiation exposure), and thyroid-specific data (thyroid-stimulating hormone, fT_4 , Bethesda score, and thyroid medications) were recorded. We performed t -tests on the primary and secondary outcomes alongside the covariates and multivariate linear regression to assess which variables were independently associated with total thyroid volume and maximum nodule dimension.

Results: Black patients ($n = 176$) had a mean thyroid volume of 142.7 ± 131.1 and a mean maximum nodule dimension of 4.3 ± 1.9 , while White patients ($n = 34$) had a mean thyroid volume of 74.7 ± 128.0 and a mean maximum nodule size of 3.0 ± 1.5 . In the multivariate model, Black patients were independently correlated with total thyroid volume ($P = .0008$; β estimate = $.501$; 95% CI, 0.209, 0.794) and maximum nodule dimension ($P = .05$; β estimate = $.642$; 95% CI, 0.006, 1.278).

Conclusion: Our data demonstrated that Black patients had significantly larger total thyroid volumes and nodules compared with White patients. Total thyroid volume was not associated with measures of socioeconomic status such as insurance type or estimated income, which suggests that access may not fully explain the differences seen. Although these findings illustrate an important relationship between race and thyroid volume, more research is required to determine the etiology of this discrepancy.

Characterization of Electronic Cigarette Users in the Otolaryngology Clinic

Peter M. Debbaneh, MD (Presenter); Sanidhya Dhir;
Alexander Rivero, MD

Introduction: Despite prevalent use, electronic nicotine delivery systems (ENDS), also called “electronic cigarettes,” have unknown clinical effects. Most research surrounding ENDS and upper airway inflammation has been conducted in vitro or in animal model studies, with few clinical studies analyzing the association between ENDS use and upper respiratory tract disease.

Method: In this retrospective cohort study of patients in a multilocation health maintenance organization system based in Northern California, patient records of ENDS users who visited the otolaryngology clinic between January 1, 2018, and December 31, 2019, were reviewed for diagnoses and classified as either inflammatory or noninflammatory.

Results: A total of 89 patients had 104 diagnoses. Some 47.2% of ENDS users had at least 1 inflammatory diagnosis, the most common of which were chronic otitis media (6.9%) and allergic rhinitis (5.9%). ENDS use was increased in White, male patients between the ages of 18 and 35 years, which is similar to previous reports. While the rate of inflammatory disease was significantly higher in male patients (60% v 25%, $P < .005$), no significant difference was seen based on age or race.

Conclusion: Previous studies have shown an association between ENDS use and allergic rhinitis, and the current study suggests there may be an overall inflammatory response to ENDS use. The identification and description of patients with ENDS use will help clinicians better risk stratify otolaryngologic diagnoses associated with this novel health behavior.

COVID-19 Tracheostomy Outcomes

Nicole L. Molin, MD (Presenter); Keith Myers;
Ahmed Soliman, MD; Cecelia E. Schmalbach, MD, MSc



Introduction: The objectives of this study were to assess the overall mortality in ventilated COVID-19 patients with and without tracheostomy (trach) and to determine if trach decreased time of intubation and length of stay (LOS) in ventilated COVID-19 patients.

Method: In this prospective cohort study, patients were included if they were older than 18 years, diagnosed with COVID-19, and required invasive positive pressure ventilation (IPPV). Patients were divided in 2 groups: IPPV with trach and IPPV with intubation only. Outcome variables included mortality, LOS, intensive care unit (ICU) stay, and IPPV duration. Data were analyzed and compared between cohorts.

Results: Of the 258 patients included, 46 (17.8%) underwent trach placement (trach cohort) and 212 (82.2%) required IPPV but did not undergo trach placement (nontrach cohort); 34.5% were female and 65.5% were male; and the average age was 62 ± 14 years. The average LOS was 15 ± 11.5 and 36 ± 13 days for the nontrach and trach cohorts, respectively ($P = .05$).

Conclusion: While trach placement in COVID-19 patients did not shorten LOS, days on IPPV, or ICU stay, trach patients experienced a significantly lower number of deaths compared with those who did not undergo tracheostomy. One goal for tracheostomy is improved pulmonary toilet with associated shortened IPPV requirements. Our study did not identify this advantage among the COVID-19 population. Lastly, this study demonstrates that need for tracheostomy in the COVID-19 setting is not a poor prognostic factor as trach patients experienced a significantly higher survival rate compared with their nontrach counterparts.

COVID-19 Tracheostomy Patients in England: Observational Study Using Administrative Data

Annakan V. Navaratnam, MBBS, FRCS (Presenter);
William K. Gray

Introduction: Strategies for tracheostomy use in COVID-19 patients have varied between hospitals and changed over time as the pandemic progressed. The objective of our study was to determine the outcomes of patients undergoing tracheostomy for COVID-19 in England using administrative data.

Method: This was a retrospective observational study using the Hospital Episode Statistics (a mandatory administrative data set for National Health Service hospitals). Patients aged ≥ 18 years who had a diagnosis of COVID-19 during a hospital stay in England that was completed between March 1, 2020, and September 30, 2020, were included. Primary outcomes analyzed were having a tracheostomy inserted, in-hospital mortality, and length of stay. Multilevel logistic regression was used to model the relationship between tracheostomy insertion and in-hospital mortality with covariates including age, sex, deprivation, ethnicity, frailty, comorbidities, and date of discharge (alive or following death). Linear regression model was used to explore the association with length of stay and tracheostomy.

Results: There were 117,438 patients who had a diagnosis of COVID-19 during this time period. Of the 11,606 (9.9%) patients admitted to critical care, initial analysis has identified 921 (7.9%) with a tracheostomy. Predictors of having a tracheostomy inserted included age 40 to 69 years and Asian and Black ethnicity. In the critical care population, patients with a tracheostomy had a higher in-hospital mortality rate and longer lengths of stay. Tracheostomy rates increased during the first 5 months of the pandemic (March to July 2020), and there was significant regional variation in the tracheostomy use.

Conclusion: There was increased use of tracheostomy in England as more was learned about the disease, although there was still variation between centers in how it was used. In analyzing all patients who had hospital admissions for COVID-19 in England, we have been able to identify the factors that influenced patients having tracheostomies and the clinical indicators that were predictive of mortality.

Effect of Applicant Screening Methods on Racial/Ethnic Diversity in Otolaryngology

Christina Dorismond, MPH (Presenter); Zainab Farzal, MD, MPH; Rupali Shah, MD; Charles Ebert, MD, MPH; Robert Buckmire, MD

Introduction: Methods for screening applicants for the otolaryngology–head and neck surgery (OHNS) residency match, such as United States Medical Licensing Examination Step 1 scores, are commonly used due to the high number of applications residency programs receive. As the Step 1 exam becomes pass/fail, programs may begin to implement new screening methods in its stead. The aim of this study is to

assess the impact of screening methods, such as Step 2 Clinical Knowledge (CK) scores and Alpha Omega Alpha (AOA) membership status, on the racial and ethnic diversity of the OHNS applicant pool.

Method: In this retrospective cohort study, residency applications submitted to our institution's OHNS residency program for the 2014–2015 and 2019–2020 application cycles were reviewed. Applicants' race/ethnicity, Step 2 CK scores, and AOA membership status were extracted. Race/ethnicity was categorized as underrepresented minorities (URM) vs non-URMs. URM was defined as Black/African American, Hispanic/Latino, Native American/Alaskan Native, and Hawaiian/Pacific Islander. Screening methods included Step 2 CK scores below the mean and 1 standard deviation (SD) below the mean, as well as non-AOA membership.

Results: Of the 2177 applicants included, 10.3% ($n = 225$) were URMs and 86.1% ($n = 1875$) reported Step 2 CK scores on their applications (mean 253, SD 12.9). A Step 2 CK score cutoff of 240 led to a 26.8% decrease in the representation of URM applicants vs a 12.3% decrease in non-URM applicants ($P < .001$), while a cutoff score of 253 led to a 61.1% decrease in URM representation vs a 40.7% decrease in non-URMs ($P < .001$). A similar disparity was found when AOA was used as a screening method (URM: -72.1% , non-URM: -56.0% , $P < .001$).

Conclusion: Otolaryngology has lagged behind other surgical subspecialties in terms of racial and ethnic diversity, a deficit that our national organizations have endeavored to eliminate. Our analyses show that using screening methods such as Step 2 CK scores and AOA membership negatively impacts the racial and ethnic diversity of the applicant pool. These data further support using a holistic evaluation method for the review of OHNS candidates.

Effectiveness and Safety of BDET With a Seeker-Based Device

Robert T. Strandring, MD (Presenter); Ellen O'Malley; Joshua Greene; Joseph Russell; Edward D. McCoul, MD, MPH

Introduction: We collected real-world data on the safety and effectiveness of balloon dilation of the Eustachian tube using a seeker-based device in patients with persistent/chronic Eustachian tube dysfunction.

Method: This study was a multicenter, prospective, single-arm registry conducted from June 2018 through August 2020 throughout 10 US centers including tertiary care and private practices. Patients aged 18 years and older with eustachian tube dysfunction who underwent balloon dilation of the eustachian tube were studied. The primary endpoints included mean change from baseline in the 7-item Eustachian Tube Dysfunction Questionnaire (ETDQ-7) and the rate of serious related adverse events. Secondary endpoints include changes in middle ear assessments, surgical intervention rate, and changes in Sino-Nasal Outcome Test (SNOT-22) and Work and Activity Impairment (WPAI) questionnaires.

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Results: A total of 169 participants were treated with balloon dilation of the Eustachian tube, with 166 and 154 participants completing the 6-week and 6-month follow-ups, respectively. Repeated-measures analysis of the change in ETDQ-7 scores indicated statistically significant improvement (-2.1 ; 95% CI, -2.40 , -1.84 ; $P < .0001$) at 6-month follow-up. The minimum clinically important difference of improvement was achieved by 85% of participants at 6 months. Four nonserious adverse events were reported. Middle ear functional assessments were improved in most participants with abnormal baseline findings. There were no statistically significant differences in the change from baseline ETDQ-7 scores between participants who had concurrent procedures and those who did not. Work/activity impairment demonstrated significant improvement.

Conclusion: Real-world evidence supports the clinical studies demonstrating that balloon dilation of the Eustachian tube with a seeker-based device is a safe and effective procedure.

Evaluation of Otolaryngology Caseload Trends From 2005 to 2019

Alexandra Welschmeyer (Presenter); Kathleen Coerd; Jason Crossley; Sonya Malekzadeh, MD

Introduction: Subspecialty caseloads logged by otolaryngology over the past 15 years are currently unknown. This study examines the trends at the national level.

Method: Otolaryngology case log data were collected from the Accreditation Council for Graduate Medical Education (ACGME) from 2005 to 2019. Data were categorized according to the following surgical subspecialties: pediatrics, rhinology/skull base, head and neck, facial plastics, otology, and laryngology. Linear regression analyses were performed for each procedure within each subspecialty, total subspecialty means, and total caseload means across all years.

Results: Overall surgical volume significantly increased between 2005 and 2019 ($P < .0001$); however, there was a significant decline in pediatrics procedures ($R^2 = 0.80$, $P < .0001$). Rhinology/skull base procedures increased the most drastically ($R^2 = 0.96$, $P < .0001$).

Conclusion: While total mean case logs have steadily increased between 2005 and 2019, pediatric cases have declined substantially due to fewer tympanostomy tube insertions and adenotonsillectomies. Rhinology/skull base procedures have increased most significantly secondary to an increase in endoscopic sinus surgeries. Despite changes in case volume among specialties, the annual increase in case load suggests that otolaryngology is meeting the demands of their graduate medical training.

Graduating Otolaryngology Residents' Specialty Area Practice Preferences

Robert H. Miller, MD, MBA (Presenter); Richard K. Gurgel, MD, MSCI; Hilary McCrary, MD, MPH

Introduction: We aim to understand residents focus area preferences. Improve workforce predictions; and improve educational needs. These data have only recently been

analyzed and represent significant new insights into the future of the specialty.

Methods: An anonymous 1-page survey instrument was completed by examinees at the conclusion of their American Board of Otolaryngology–Head and Neck Surgery oral examination from 2011 to 2019. Trends over time for specialty areas were evaluated using correlation and chi-square tests.

Results: Of the 2243 respondents, 22% will include general otolaryngology alone or in combination with another specialty area in their “ideal” practice. There was a statistically significant decline in interest in general and pediatric otolaryngology over the 8-year study period time ($r = -0.81$; $P = .01$ and $r = -0.75$; $P = .03$, respectively). Other selected specialties included rhinology (15%), head and neck (13%), and pediatric otolaryngology (11%). Excluding general otolaryngology, 45% would prefer to practice just 1 specialty area. Women entered academic practice more commonly than men did (43% vs 35%) and chose pediatric otolaryngology as one of their specialty areas more than men did (32% vs 22%; $P < .05$), whereas more men (41%) selected rhinology compared with women (29%) and head and neck (36% vs 26%; $P < .05$).

Conclusion: Although most otolaryngologists focus their practices on 1 or a few specialty areas, most workforce studies assume all otolaryngologists practice the full spectrum of the specialty, which can lead to faulty supply predictions. There is a trend for a more specialized practice with a decline in interest in general otolaryngology, which may affect access to comprehensive otolaryngology. These data will be of value in future workforce and education planning.

Impact of Saline Irrigations in Non-hospitalized Patients With COVID-19

Kyle S. Kimura, MD (Presenter); Michael H. Freeman; Justin H. Turner, MD, PhD

Introduction: Response to the COVID-19 pandemic has primarily focused on pharmacologic interventions, including antivirals, convalescent sera, and vaccinations, with each critical in the fight against COVID-19. Given previous studies demonstrating varying efficacy of saline irrigations on other viral diseases, we conducted a randomized controlled trial to evaluate the effect of nasal irrigations on upper respiratory symptoms and viral load in patients with COVID-19.

Method: This was a randomized control trial conducted from May 2020 to December 2020. Patients with a positive reverse transcriptase polymerase chain reaction SARS-CoV-2 test were enrolled within 24 hours of testing and given swabs, viral preservation media, and a symptom diary incorporating a modified version of the validated Wisconsin Upper Respiratory Symptom–21 Survey. Patients were randomized to 1 of 3 treatment arms: (1) twice-daily irrigations with hypertonic saline, (2) twice-daily irrigation with hypertonic saline with 1% surfactant, and (3) a non-intervention group. Participants performed scheduled mid-turbinate swabs and recorded daily temperatures and symptom scores over the 21-day study duration.

Results: The full set of results is to be discussed at the conference. Interim analysis demonstrated a trend toward earlier

symptom resolution in the intervention groups compared with the control group ($P = .16$), although this was not seen when all study participants' data were completed. At completion of the study and following full viral load analysis, there was no statistically significant effect on viral load between the groups.

Conclusion: Our hypothesis, that saline irrigations would decrease viral load and improve symptoms in patients with COVID-19, was ultimately not supported by this study. There was no significant difference between the intervention groups and the control group when analyzing viral load and symptomatology. Although essentially a negative study, this is the most comprehensive study evaluating efficacy of saline irrigations in COVID-19 and implies that saline irrigations are unlikely to significantly affect patients in the setting of COVID-19.

Impact of Smoking on Postoperative Complications Following Tonsillectomy in Adults

Ariel Omiunu (Presenter); Giovanna Mele;
Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: Smoking has been associated with an increased risk of postoperative complications across a variety of surgical specialties. We aim to examine the relationship between smoking and postoperative complications in adult patients undergoing tonsillectomy.

Method: The National Surgical Quality Improvement Program was used to identify adult patients who underwent tonsillectomy with or without adenoidectomy between 2005 and 2015. Patients were divided into smoker and nonsmoker cohorts. Univariable and multivariable analyses were performed to assess the association between smoking status and risk of adverse outcomes.

Results: A total of 23,959 patients met inclusion criteria, of whom 4468 (18.6%) were smokers and 19,491 (81.4%) were nonsmokers. Smokers were more likely to be older (31.6 vs 30.8 years, $P < .001$), male (41.8%, $P < .001$), and obese (38.7%, $P < .001$) when compared with nonsmokers. Smokers were more likely to have hypertension ($P < .001$), dyspnea ($P < .001$), and chronic obstructive pulmonary disease ($P < .001$). On univariate analysis, smoking was associated with a higher incidence of total complications (2.2% vs 1.5%, $P < .001$), deep surgical site infections (0.1% vs 0.0%, $P = .02$), bleeding (0.3% vs 0.1%, $P < .001$), and sepsis (0.4% vs 0.1%, $P < .001$). Multivariable logistic regression analysis found that smoking was an independent predictor of postoperative bleeding (odds ratio [OR] = 4.55; 95% CI, 1.86–11.11; $P < .001$), unplanned admission (OR = 1.25; 95% CI, 1.00–1.55; $P = .045$), and readmission (OR=1.26; 95% CI, 1.02–1.56; $P = .03$).

Conclusion: In adult patients undergoing tonsillectomy, smoking was found to be significantly associated with a higher incidence of unfavorable surgical outcomes, including postoperative bleeding, unplanned admission, and readmission.

Implementation of a Standardized Perioperative Pain Management Protocol in Otolaryngology

Michael Chang, MD (Presenter); Lauren Lalakea;
Kimberly Shepard; Mih Saste; Amanda Munoz; Misha Amoils

Introduction: Opiates are commonly overprescribed postoperatively for otolaryngologic surgeries. We implemented and evaluated the efficacy of a standardized multimodal perioperative pain management protocol in reducing opiate prescriptions in an otolaryngology practice.

Method: We retrospectively studied adults undergoing otolaryngologic surgery at a county hospital from 2018 to 2019, comparing patient cohorts before and after implementation of a standardized pain protocol in 2019. The protocol included preoperative patient education and a postoperative multimodal pain regimen stratified by pain levels mild, intermediate, and high. We compared opiate use before and after protocol implementation. Patients were surveyed regarding pain levels and opiate use.

Results: We studied 210 patients (105 preprotocol and 105 postprotocol). Overall, the mean total morphine milligram equivalents (MME) prescribed decreased from 132.5 ± 117.8 to 53.6 ± 63.9 ($P < .05$) following protocol implementation. The mean MME prescribed significantly decreased ($P < .05$) for each procedure pain tier: mild (107.4 to 40.5), intermediate (112.8 to 48.1), and high (240.4 to 105.0). The mean MME prescribed significantly decreased ($P < .05$) for each procedure type: endocrine (105.6 to 44.4), facial plastics (225.0 to 50.0), general (160.9 to 105.7), head and neck oncology (138.6 to 77.1), laryngology (53.8 to 12.5), otology (77.5 to 42.9), rhinology (142.2 to 44.4), and trauma (288.0 to 24.5). Postprotocol patients reported a mean 1-week postoperative pain score of 3.4, used opiates for a mean of 3.1 days, and used only 31% of their prescribed opiates. Four postprotocol patients requested opiate refills, compared with 3 preprotocol.

Conclusion: Preoperative counseling and standardization of a multimodal perioperative pain regimen for otolaryngology procedures can effectively lower the amount of opiate prescriptions while adequately controlling pain levels.

Increased Otolaryngology Workforce Correlated With Decreased Burden of ENT-Diseases Globally

Gaelen B. Stanford-Moore, MD, MPhil (Presenter);
Ankit Raj, MBBS; Gabrielle Hill, MPH;
Irazoque Pacifique, MD; Blake Alkire, MD, MPH;
Mahmood Bhutta, MBBS, DPhil, FRCS

Introduction: Workforce density is recommended by the Lancet Commission on Global Surgery as a core indicator of access to surgery. We quantified the global otolaryngology-head and neck surgery (OHNS) workforce and compared this to the estimated burden of diseases of the head and neck.

Method: We derived workforce estimates from a systematic literature review and unpublished data from a 2019 World Health Organization (WHO) survey. We compared per-country workforce density to population health outcomes of 4 index pathologies: lip and oral cavity cancer, laryngeal cancer, chronic otitis media, and hearing loss, using figures derived from the Global Burden of Disease data set. We performed multivariable regression of the number of ear, nose, and throat (ENT) surgeons per capita to mortality or morbidity from each

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pathology. Data were pooled by WHO region and by country income level.

Results: We obtained data on ENT surgical workforce for 138 countries. Every 10% increase in ENT surgeons worldwide was associated with a 0.18% decrease in morbidity from hearing loss ($P = .007$), measured as the years lost to disability (YLD) to prevalence ratio; a 0.10% decrease in morbidity from chronic otitis media ($P = .057$), measured as YLD to incidence ratio; and a 0.27% decrease in disease-specific mortality of lip and oral cavity cancer ($P = .035$), measured as mortality to incidence ratio. There was no relationship found for laryngeal cancer. Relationships were immune to important covariates, including gross domestic product per capita. In addition, there was a correlation between increasing ENT workforce and decreasing ENT burden of disease, which also clustered by country income level.

Conclusion: This is the first study to correlate and quantify global burden of ENT-related diseases to ENT workforce and suggests specialist human resources are an important component of national health planning in tackling such disorders.

Lips Don't Lie? Utility of Labial Biopsy in Managing Sjögren's

Joseph S. Lee, MD (Presenter); Jasmine Thai, MD; Minka Schofield, MD, MPH

Introduction: Patients with sicca symptoms are often referred to otolaryngologists for labial salivary gland biopsies (LSGB) to help diagnose Sjögren's syndrome (SS). This study investigates the utility of LSGB in the management of patients with SS and potential predictive factors that correlate with positive or negative biopsy results.

Method: Retrospective chart review of adults (18–89 years) who received LSGB by an otolaryngologist in an outpatient setting between 2010 and 2020 for the diagnosis of SS was performed. LSGB results, serology, demographics, and changes in medical treatment based on biopsy results were obtained. Chi-square test was used to identify statistically significant variables that correlate with biopsy results.

Results: A total of 55 patients underwent LSGB for the diagnosis of SS between 2010 and 2020. Sixteen (29.1%) biopsies were positive, 33 (60%) negative, and 6 (10.9%) indeterminate. Polyarthralgia was present in 15 (93.7%) patients with positive biopsies, compared with 12 (36.4%) in those with negative biopsies ($P < .001$). Neuropathy was present in 8 (50%) patients with positive biopsies, compared with 7 (21.2%) in those with negative biopsies ($P = .04$). Hydroxychloroquine was started in 7 (43.75%) patients with positive biopsies, 4 (66.6%) patients with indeterminate biopsies, and 3 (9.1%) patients with negative biopsies.

Conclusion: As LSGB is being performed more frequently at our institution, providers should reconsider its role in the management of suspected SS with isolated sicca symptoms. In these cases, biopsies are likely negative, and medical management remains unchanged. Nearly all patients with positive biopsies presented with systemic symptoms, the most common being polyarthralgia followed by neuropathy. A positive

biopsy changed treatment only when significant systemic symptoms were present. Management was not changed for sicca symptoms alone regardless of biopsy results. Patients with indeterminate biopsies were often started on hydroxychloroquine for arthralgia, regardless of serology. Positivity of SSA, SSB, or other autoimmune serologic markers did not correlate with biopsy results.

Multi-institutional Study of Resident Intraoperative Experiences for Key Indicator Procedures

Jenny X. Chen (Presenter); Elliott D. Kozin, MD; Stacey Gray, MD

Introduction: In the era of work-hour restrictions, there is growing concern that otolaryngology residents may not achieve meaningful surgical autonomy during training to ensure competency. Beyond case minimum requirements for 14 key indicator procedures (KIPs) outlined by the Accreditation Council for Graduate Medical Education, surgical experiences across programs are not well characterized.

Method: Data were gathered prospectively from 5 academic centers from December 2019 to December 2020 using the smartphone application “System for Improving and Measuring Procedural Learning” (SIMPL). After each surgery, residents and faculty were asked to rate trainee autonomy on a 4-level Zwisch scale and performance on a 5-level modified Dreyfus scale.

Results: A total of 2984 evaluations were logged by 92 residents and 78 attendings. Attending ratings of autonomy and performance increased with training level ($P < .001$). Self-assessments of autonomy and performance were lower than paired attending assessments ($P < .001$). Among attending evaluations of KIPs performed by senior residents (PGY4 or 5), 55% of cases were performed with meaningful autonomy (“passive help” or “supervision only”). Similarly, 55% of cases were rated “practice ready” performance or better. Senior residents had meaningful autonomy for $\geq 50\%$ of cases for most KIPs with the exception of flaps and grafts (40%), pediatric/adult airway (39%), and ossicular chain surgery (33%). Similarly, senior residents received “practice ready” or better performance ratings for $\geq 50\%$ of cases across all KIPs other than ossicular chain surgery (33%).

Conclusion: In this multicenter study, surgical autonomy and performance varied across otolaryngology KIPs. The development of nationwide benchmarks will help programs and residents set educational goals.

Otolaryngology Consultations for COVID-19: Determining Occupational Exposure and Inpatient Interventions

Brady J. Anderson (Presenter); Lucy X. Liu; Kevin Chow; Kunal R. Shetty, MD, MA; Jumah G. Ahmad, MD; Amber Luong, MD, PhD

Introduction: The novel coronavirus SARS-CoV-2 has ravaged the United States and transformed the way medical care

is delivered. As specialists in upper airway anatomy, otolaryngology (ENT) services may be called upon to manage various head-and-neck complaints for patients with COVID-19. While ear, nose, and throat (ENT) consults may benefit critically ill patients, they also expose physicians to the transmission of COVID-19. We sought to identify the reasons for ENT intervention and examine trends in testing through the pandemic.

Method: Records for all ENT consults from May 1 to September 29, 2020, were retrospectively reviewed. Demographic information, admission diagnoses, length of stay, COVID status, and ENT interventions were recorded. Univariate analysis was performed.

Results: Of 1343 distinct consults, 965 (72%) were tested for COVID-19, with 62 (4.6%) positive. In May 200 (70%) of 287 consults were tested with 2 (0.7%) positive, while in September, 251 (78.5%) of 320 consults were tested with 22 (6.9%) positive. The most common ENT consultation for COVID-positive patients was nasal and oropharyngeal bleeding ($n = 19$, 30.6%), followed by facial trauma ($n = 15$, 24.2%). Other reasons included respiratory distress, tracheostomy, and foreign body (retained COVID swab). Of 96 interventions for patients with COVID-19, 49 (51%) were for management of bleeding, 24 (25%) were for upper airway evaluation (UAE), and 8 (8.3%) were for tracheostomy or trach management.

Conclusion: Although patients with COVID-19 necessitated various otolaryngologic interventions, management of bleeding was the most common complaint, which may be associated with therapeutic anticoagulation as well as coagulopathy from the disease process. Bleeding control was followed by UAE and trach management, 2 aerosol-generating procedures that may increase the risk of COVID transmission. The proportion of consults tested and confirmed positive for COVID-19 at our institution increased from May to September, possibly assisting otolaryngologists to take appropriate preventive precautions.

Patient Reported Outcomes From Elective Surgery Delays due to COVID-19

Katherine R. Keefe, MD (Presenter); Brandon Hiatt; Jackson King; Brennan Blight; Jeremy Meier

Introduction: Constraints used by the COVID-19 pandemic shifted clinical equipoise for a period of time by creating situations where surgery was temporarily not a choice. In this study, we conducted patient interviews to understand how limited access during the pandemic affected patient outcomes and decision making.

Method: Within the 24-hospital Intermountain health care system, we examined patients scheduled for 1 of the 5 most common elective otolaryngology procedures: adenotonsillectomy, tympanostomy tube placement, septorhinoplasty and turbinate reduction, endoscopic sinus surgery, and thyroidec-tomy between March 14, 2020, and May 31, 2020, whose operation was postponed but not rescheduled as of September 15, 2020. We then conducted semistructured interviews with these patients or caregivers to assess patient experience and

consequences of surgical delays. Interview transcripts were then analyzed for key themes.

Results: From March 14, 2020, to May 31, 2020, otolaryngology procedure volume decreased by 74.3% compared with 2019 (3823 vs 967), and volumes for all of 2020 were 28.6% lower than 2019 (17,260 vs 12,327). Of the 808 patients with a scheduled operation that was postponed early in the pandemic, 288 patients (35%) had not yet rescheduled their planned procedure. We contacted 40 of these patients. Of those patients, 8 underwent their planned procedure with the original surgeon. In the remaining 32 patients, 27.5% (11) reported their condition improved or resolved completely and no longer required surgery. However, 27.5% (11) reported their health was negatively affected by delays. Patients also cited pandemic-related concerns (22.5%), financial concerns (15%), and other changes in life circumstances (15%) as keeping them from rescheduling their operation.

Conclusion: We have identified instances of patient-reported harm from untreated surgical problems related to postponed surgery during the pandemic. However, we also found patients who improved without undergoing their planned procedures, which may inform opportunities of improved preoperative shared decision making.

Residency Applicant Interviews Fail to Predict Ultimate Otolaryngology Performance

Jennifer Y. Lee, MD (Presenter); Jennifer Alyono; Erika Shimahara; Yifei Ma; C. Kwang Sung; Anna Messner

Introduction: The otolaryngology/head and neck surgery (OHNS) residency application process aims to identify those applicants who are most likely to become competent and successful otolaryngologists. It is unclear which application and interview features are most likely to correlate with residency graduate performance.

Method: Survey study of OHNS residency program directors (PDs) for 125 matched applicants who interviewed at Stanford from 2012 to 2015. Each PD ranked the graduated residents into the top, middle, or bottom third of all trainees who previously completed the program in 7 areas including overall performance, communication skills, technical skills, medical decision making, empathy, and ability to be a team player. Results were analyzed using a cumulative logit model.

Results: A total of 125 matched applicants representing 45 medical schools were included. Of the surveys, 100 of 125 (80%) were completed by the PDs. Four surveys for trainees who left residency were excluded. PDs rated 48.2% of applicants in the top one-third of all trainees. Medical decision making had the highest correlation with overall performance, with a partial correlation coefficient of 0.74. Older applicant age reduced the odds of receiving a higher overall performance score (odds ratio 0.67 [CI, 0.59-0.76]; $P < .001$). Gender, number of publications, United States Medical Licensing Examination Step 1 score, rank on traditional (non-standardized) or standardized multiple mini interviews (MMI),

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attendance at a top 25 medical school, and having additional degrees were not predictive of overall performance.

Conclusion: Although ideally the residency application process would identify those residents most likely to become competent OHNS physicians, this study found no application features other than younger applicant age that correlated with a better PD evaluation postgraduation. Neither the traditional interview nor the MMI interview process correlated with graduate performance.

Side Effects of Electronic Cigarettes in Otolaryngology: Scoping Review

Ameen Amanian, MD (Presenter); Jobanjit Phulka; Amanda Hu, MD, FRCSC

Introduction: Electronic cigarettes (e-cigarettes) are nicotine-delivery systems with increasing popularity; however, their effects on the upper aerodigestive tract are largely unknown. The objective of this study was to examine the unintended otolaryngology-related side effects associated with any level of e-cigarette use.

Method: The Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Reviews (PRIMA-ScR) protocol was used to conduct a scoping review of MEDLINE, EMBASE, CINAHL, WEB OF SCIENCE, and CENTRAL databases (PROSPERO: CRD 42020177790). The search strategy contained MeSH terms developed with a librarian. English studies from inception through May 1, 2020, with a sample size >5 were included. In vitro, animal, and studies on the lower respiratory tract were excluded. The main outcome was defined as otolaryngology-related side effects following e-cigarette use. Oxford Centre for Evidence-Based Medicine Levels of Evidence was used to determine the quality of the studies. Study selection was independently performed by 2 authors; discrepancies were resolved by the senior author.

Results: From the 1788 articles that were initially identified, 32 studies were included. The most common unintended side effect associated with e-cigarette use was throat irritation (n = 16), cough (n = 16), mouth irritation (n = 11), and oral mucosal lesions (n = 8). Two studies investigated the pediatric population. Two studies reported on negative voice outcomes with e-cigarette use. A large proportion of participants also reported conventional tobacco use in addition to e-cigarette. Quality of the literature was level 2 to 4. Given the significant heterogeneity in the studies, a meta-analysis could not be performed.

Conclusion: e-Cigarettes are gaining increasing popularity within the adult and youth population. The most commonly reported side effects were throat and mouth irritation, followed by cough. The long-term impact of e-cigarette on the upper aerodigestive tract is not known given the recent emergence of this technology. Future studies are warranted to determine the safety profile of e-cigarette.

Symptoms and Blood Character in COVID-19

Mohammed A. Goma, MD (Presenter); Omnia Abdel Aal; Ahmed Abdel Rahman; Tawfik El Kholi; Khalf Hamid

Introduction: People with COVID-19 have had a wide range of symptoms, ranging from mild symptoms to severe illness. Symptoms may appear 2 to 14 days after exposure to the virus. COVID-19 is accompanied by specific changes in the circulating blood cells that are analyzed by a full blood count. The objective of this study is to evaluate symptoms and ratios between different blood cell in patients with COVID-19.

Method: The study was done between June 2020 and December 2020 in the outpatient clinic of Minia University Hospital (tertiary hospital). A total of 33 patients with COVID-19 and 33 controls were selected randomly from patients attending the otolaryngology (ORL) outpatient clinic. Both groups were matched in age and gender. Both groups were subjected to ORL and systematic examination; a blood sample was taken from each subject for complete blood count and C-reactive protein testing. We evaluated the white blood cell/red blood cells ratio, neutrophils/lymphocyte ratio, platelets/lymphocytes ratio, and lymphocyte/monocyte ratio. Computed tomography (CT) of the chest was also performed in all patients to assess chest condition.

Results: Our data showed that anosmia was present in 55% of cases, burning sensation of the nose in 63.6%, nasal obstruction in 9%, fever in 57.6%, cough in 55.5%, burning of the throat in 45.5%, diarrhea in 9%, general fatigue in 75.8%, dyspnea in 51.6%, and elevated C-reactive protein in 66.7%. With regard to blood ratios, there was a negative correlation between study and control groups in all studied ratios. In all cases of anosmia and with other COVID-19 symptoms (excluding cases with cough), CT findings revealed inflammation of the lung (ground-glass appearance).

Conclusion: COVID-19 infection results in otorhinolaryngological symptoms in variable numbers of patients and burning sensation of the nose is the most frequent symptom. Blood ratios were negatively correlated with the control group. CT chest is needed in cases without cough to avoid severe chest symptoms.

Telemedicine in the Management of Postoperative Tonsillectomy and Adenoidectomy Care

Ryan M. Hendricker, MD, MBA (Presenter); Marc Katz, PA-C; Gillian Murdock; Mac Johnson; Willard C. Harrill, MD

Introduction: In an era of health care discussion of enhancing value-driven care using clinical pathways, telemedicine provides an opportunity that allows the patient and surgeon to use a postoperative virtual visit platform for routine postoperative tonsil care. We examine our practice experience with the utilization of a postoperative telemedicine clinical pathway in the surgical management of uncomplicated tonsil disease and discuss the implications for the application of telemedicine in otolaryngology.

Method: This is a retrospective chart review of a 7-physician private practice experience using a telemedicine clinical pathway for the management of routine postoperative tonsillectomy care during the 12-month period analyzed. Institutional review

board wavier was obtained through Wake Forest Baptist Health. Our electronic medical record was queried for all patients undergoing Current Procedural Terminology (CPT) 42820, 42821, 42825, and 42826 during that time frame. Selection of the postoperative pathway of either in-office or virtual through telemedicine was chosen by the surgeon. A total of 639 patients were identified from the CPT query. Independent variables analyzed include the following: age, body mass index, insurance provider, and total roundtrip distance to the closest office location. Outcome measures include use and utility of the telephone protocol, documentation of adequate clinical progress, any interventions pursued, overall postoperative complication rate, postoperative bleed rate, and factors that promoted or detracted from the use of technology in this patient population.

Results: There appears to be no difference in bleeding or complication rates in patients managed with postoperative in-person visits vs those utilizing a telemedicine protocol. There also appears to be substantial cost and time savings to patients enrolled in the telemedicine clinical pathway.

Conclusion: The use of a simple telemedicine protocol for the routine management of postoperative tonsillectomy care in a private practice model appears to be a viable, safe, and value-driven model of care.

Tolerance of Nasal and Oral Povidone-Iodine Antisepsis Amid COVID-19 Pandemic

Samantha Frank, MD (Presenter); Bishoy Ibrahim; Ruby Feng; Avinash Bidra, DDS, MS; Belachew Tessema, MD; Todd Falcone, MD

Introduction: Because of the high risk to the otolaryngology and dental communities during the COVID-19 pandemic, protocols involving topical antisepsis of the nasal and oral cavities were developed for use. Studies have demonstrated efficacy of low-dose povidone-iodine (PVP-I) to inactivate SARS-CoV-2 in 15 seconds as well as safety for use in the nasal and oral cavities. We evaluated patient tolerability of this solution when used in the outpatient office setting prior to nasal and oral procedures.

Method: A prospective study was conducted. Data were collected between October 2020 and January 2021. Via cotton pledgets, 0.5% PVP-I was applied to the nasal cavities of patients undergoing transnasal procedures in the otolaryngology office. Dental patients rinsed with 0.5% PVP-I prior to prosthodontic exam. A survey was administered regarding tolerability of the solution, including nasal irritation, oral irritation, sneezing, coughing, changes in taste, changes in smell, and agreeability to use the solution again on a scale of 0 to 3. The initial survey was administered on the day of visit and the follow-up survey 7 to 32 days later. In total, 56 patients were recruited. Follow-up data were collected from 19 patients. Prevalence of symptoms was calculated.

Results: On the date of the visit, 59% of patients reported 1 of the symptoms. Most of these symptoms were mild, with 1 nasal patient reporting a moderate amount of nasal irritation

and 1 oral patient reporting a moderate taste disturbance; 16% of patients noted a symptom on follow-up survey conducted a mean of 13 days later. Initially, 88% of patients reported that they would definitely or probably agree to future use of the solution. On follow-up survey; 95% of patients reported that they would definitely or probably agree to future use of the solution.

Conclusion: Most patients tolerate commercial low-dose nasal and oral PVP-I solutions well with mainly mild symptoms reported. Few symptoms were noted on follow-up. Importantly, a large majority of patients would agree to repeat application of the solution, suggesting that diluted PVP-I has potential for large-scale routine use in otolaryngology and dental settings.

Tracheostomy Outcomes in COVID-19 Patients at a New York City Hospital

Rahul K. Sharma (Presenter); Maheer R. Grewal; Sallie M. Long, MD; Brendon DiDonna, PA-C; Joshua Sturm, MD, PhD; Scott H. Troob, MD

Introduction: Tracheostomies have been performed in patients with prolonged intubation due to COVID-19, but the optimal timing, patient selection, and long-term outcomes largely remain unknown.

Method: A prospectively collected database of patients with COVID-19 undergoing open tracheostomy at a major medical center in New York City between March 2020 and April 2020 was reviewed. Primary endpoints were weaning from the ventilator and sedation and time to decannulation. Secondary endpoints included both immediate and long-term complication rates as well as intensive care unit and hospital discharge.

Results: In total, 61 patients underwent tracheostomy. There were 38 men (62.3%) and 28 women (37.7%) with an average age of 62 years (SD 13.7; range 23–91 years). Patients were intubated for a median time of 26 days prior to tracheostomy (interquartile range [IQR] 23–30 days). The median time to weaning from ventilatory support after tracheostomy was 18 days (IQR 10–27 days). Of those sedated at the time of tracheostomy, the median time to discontinuation of sedation was 5 days (IQR 3–9 days). Of patients who survived, 35 patients (60.3%) were decannulated. Of those decannulated (n = 33) before discharge, the median time to decannulation was 36 days following tracheostomy (IQR 27–48 days). Time from ventilator liberation to decannulation was 14 days (IQR 7–18 days). Fourteen patients (23.0%) had minor bleeding managed with packing. Two patients (3.3%) had bleeding requiring neck exploration. The all-use mortality rate was 9.4%. No patients died of procedural uses. No attending surgeons contracted COVID-19.

Conclusion: Open tracheostomies were successfully and safely performed at our institution in the peak of the COVID-19 pandemic. Most patients were successfully weaned from the ventilator and sedation. Approximately 60% of patients were decannulated prior to hospital discharge.

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Trans Orbital Neuroendoscopic Surgery: Surgical Nuances for Beginners

Yash Mittal, MBBS (Presenter); Pradeep Pradhan; Pradipta Parida; Vinusree K; Aswathi KV; Chappity Preetam, MS, DNB, MNAMS

Introduction: The pathologies in the orbit requiring surgical intervention have traditionally been accessed externally or through transnasal endoscopic approaches for extraconal lesions. A relatively newer technique, trans orbital neuroendoscopic surgery (TONES), allows access to the orbital as well as intracranial pathologies.

Method: We present our case series of 5 patients treated with TONES for superomedial and inferomedial quadrant lesions in a tertiary care setting over the past 3 years. The age range was 2.8 to 63 years. The etiologies were orbital optic nerve meningocele (n = 1), optic nerve hamartoma (n = 1), rhabdomyosarcoma of orbit (n = 1), orbital lymphoid hyperplasia (n = 1), and intraconal dermoid cyst (n = 1). The clinical findings, treatment, and postintervention follow-up data were analyzed.

Results: All 5 patients had successful outcomes. Using a “H”-shaped periorbital incision helped in elevating the periorbital flaps and made repair of the defect with fascia easier. The posterior to anterior approach was helpful in identifying the vital structures. The superomedial compartment was technically demanding and needed extensive dissection with identification of 3 muscles (inferior rectus, medial rectus, and superior oblique). In the patient with optic nerve meningocele, fenestration of the meningocele was performed with preservation of residual vision. Partial debulking of lymphoid tissue was done in the case of benign lymphoid hyperplasia, and the patient was initiated on high-dose steroids. The patient was kept on compulsory 5-year follow-up. Postoperatively, 1 patient developed enophthalmos with temporary diplopia. Ecchymosis was noted in a pediatric case operated for intraorbital pleomorphic variant of rhabdomyosarcoma.

Conclusion: Our experience indicates that orbital pathologies can be managed effectively with TONES with minimal complications. Use of neuronavigation is essential to avoid complications. Adequate experience and skill are required for using this technique.

Utility of Point-of-Care COVID-19 Testing in an Outpatient Otolaryngology Clinic

Meera Ganesh (Presenter); Meron Brawley, MD; Ashoke Khanwalkar, MD; John Mynka; David Conley, MD; Bruce Tan, MD

Introduction: We aimed to evaluate the utility of point-of-care COVID-19 testing for identifying infected patients in an otolaryngology practice, given the potential for overlap in presenting symptoms.

Method: Retrospective review of 947 patients who tested using the Abbott ID Now point-of-care SARS-CoV-2 nucleic acid test (NAT) in an otolaryngology clinic from July to November 2020 was performed. Tests were characterized by provider-specified indication (symptomatic, preprocedural, and universal),

subspecialty, provider type, and contemporaneous regional COVID positivity rates. Positive tests were further classified as true positives (TP) and false positives (FP) based on repeat polymerase chain reaction testing when available, and intergroup positivity rates were compared using the Fisher exact test. The likelihood of a FP result within 48 hours of a TP result was also evaluated to assess for batch contamination.

Results: We performed 947 SARS-CoV-2 NATs, yielding 9 TPs (0.95%) and 5 FPs (0.53%) results. Of these, 158 (5 TP, 2 FP) were for symptomatic patients, 303 (2 TP, 1 FP) were for preprocedural, and 486 (2 TP, 2 FP) for universal testing indications. The TP rates were significantly different by testing indication, with higher rates among symptomatic patients ($P = .012$; symptomatic vs universal odds ratio [OR] = 7.877; 95% CI, 1.274–83.694; symptomatic vs preprocedural OR = 4.900; 95% CI, 0.791–52.001). TP rates were also significantly different by subspecialty ($P = .011$), with significant intersubspecialty differences driven by higher rates in laryngology. TP rates were significantly higher among PA encounters than those with physicians ($P = .0005$; OR = 13.1442; 95% CI, 2.7697–67.7222). TP rates were not significantly different during periods of local outbreak, defined using an Illinois Department of Public Health threshold of 12% test positivity rate ($P = .660$). FP rates were not significantly higher if performed within a 48-hour window of a TP test ($P = .192$).

Conclusion: Point-of-care COVID-19 NAT in an outpatient otolaryngology clinic identified a low (<1%) rate of TP with most cases being clinically suspected. Laryngology patients and patients acutely seeing a PA may have higher positivity rates.

Vestibular Function in Patients With Persistent Postural-Perceptual Dizziness

Mineko Oka (Presenter); Chisato Fujimoto; Kentaro Ichijo; Tatsuya Yamasoba

Introduction: Persistent postural-perceptual dizziness (PPPD) is a recently defined syndrome that presents long-lasting sense of dizziness. PPPD is precipitated by preceding conditions that use balance disorder. To gain a better understanding of this novel syndrome, we have evaluated the vestibular function in patients with PPPD and investigated the association between the vestibular function and the preceding conditions.

Method: A total of 31 patients (7 males and 24 females) diagnosed with PPPD from 2017 to 2020 at our institution were enrolled in the study. Vestibular functions were evaluated by the caloric test and cervical- and ocular-vestibular evoked myogenic potential (cVEMP and oVEMP). Patients were categorized into the vestibular and nonvestibular disease group, according to the type of preceding condition that cause balance disorder. The frequency of abnormal findings was compared between the 2 groups for the caloric test, cVEMP, and oVEMP, respectively.

Results: Regarding the type of preceding condition, 18 patients had vestibular disease and 13 patients had nonvestibular disease. The diagnoses of vestibular disease in the 18 patients were benign paroxysmal positional vertigo (n = 5),

vestibular neuritis (n = 4), and others (n = 9). Patients with preceding vestibular diseases presented a higher rate of abnormal findings in the caloric test results compared with those with nonvestibular diseases (61.1% and 7.7%, respectively, $P < .01$). Although an increased rate of abnormal findings was observed with cVEMP and oVEMP for the vestibular disease group compared with the nonvestibular disease group, the differences were insignificant.

Conclusion: PPPD patients with preceding vestibular diseases presented a significantly higher rate of abnormal findings in the caloric test. Although disequilibrium used by PPPD cannot be fully explained by preceding condition that use balance disorders, our findings indicate the involvement of protracted vestibular dysfunction as a result of preceding vestibular disease.

Endocrine Surgery

Association of Insurance Status With Survival in Papillary Thyroid Carcinoma

Yeshwant Chillakuru Chillakuru (Presenter); Timothy Shim; Christina Darwish; Daniel Benito; Collin F. Mulhy; Ashkan Monfared

Introduction: This study was designed to determine whether insurance status affects treatment access and overall survival in patients with late-stage papillary thyroid cancer (PTC).

Method: Data on demographics, insurance status, treatment access, and survival for patients with stage III and IV PTC in the National Cancer Database from 2004 to 2015 were examined. Multivariate Cox regression was used to examine overall survival, and multivariate logistic and linear regressions were used to analyze the association of insurance status with treatment access and time to treatment.

Results: Of the 30,270 patients with late-stage PTC, 89.1% had private insurance, 7.1% had Medicaid, and 3.8% were uninsured. When controlling for stage and demographic factors, private insurance was associated with increased overall survival (adjusted hazard ratio [aHR], 0.68; $P < .001$) compared with uninsured patients, whereas Medicaid was associated with worse overall survival (aHR, 1.61; $P < .001$). Patients with private insurance were more likely to receive multimodal therapy compared with surgery alone (odds ratio, 1.22, $P < .001$). Private insurance and Medicaid patients received surgery 45.1% ($P < .001$) and 43.6% ($P = .032$) sooner, respectively, than uninsured patients. Private insurance patients received radioisotope 17.1% and thyroid-stimulating hormone suppression therapy 29.7% sooner than uninsured patients ($P < .001$).

Conclusion: This study demonstrates reduced access to treatment and worse overall survival among both Medicaid and uninsured patients with advanced PTC compared with private insurance. In fact, patients with Medicaid demonstrated a decreased overall survival compared with uninsured patients. Medicaid, despite providing insurance to the low-income

population, may not adequately reduce health care inequity in patients with late-stage PTC.

Clinical Characteristics Among Primary Hyperparathyroidism Patients by Biochemical Profile

David K. Lerner, MD (Presenter); Ameya Jategaonkar; Christine Barron; Kimia Ziadkhanpour; Samuel Trosman; Eric Genden

Introduction: Primary hyperparathyroidism is a common endocrine disorder characterized by hypercalcemia with elevated or inappropriately normal parathyroid hormones (PTH) levels. The implications of an inappropriately normal PTH are not clear.

Method: A retrospective review of all parathyroidectomy patients performed by a single surgeon at a tertiary academic medical center from November 2007 to November 2016 was performed. Patients were divided into those with elevated or normal PTH levels. Comparisons were made between groups using unpaired t tests for continuous variables and Fisher exact test for categorical variables. Postoperative surgical success was defined as normalization in serum calcium within 3 months postoperatively.

Results: Of the patients, 179 with hypercalcemia and elevated PTH (group 1) were identified compared with 76 with hypercalcemia and a normal PTH (group 2). There was no difference in age, gender, preoperative creatinine clearance, kidney stones, or constitutional complaints. Preoperative PTH in group 1 was 252.0 compared with 66.2 in group 2 ($P = .026$). There was no significant difference in postoperative surgical success between group 1 and group 2 (95.3% vs 95.2%, $P = .88$). Among patients with postoperative surgical success, the average intraoperative PTH decrease was significantly greater in group 1 than in group 2 (82% vs 60%, $P = .001$).

Conclusion: Our analysis did not find any preoperative clinical differences between group 1 and group 2. Surgical success was associated with significantly smaller intraoperative PTH decreases among patients with normal preoperative PTH levels, suggesting that surgical success in this population may be associated with a less dramatic PTH drop. Traditional criteria for intraoperative PTH monitoring may be overly stringent in this population.

Cost Comparison Between Open Lobectomy and RFA for Thyroid Nodules

Jonas R. Miller, MD (Presenter); Ved Tanavde; Ani Saraswathula; Christopher R. Razavi; Jonathon Russell

Introduction: There is an increasing array of treatment options for addressing clinically significant thyroid nodules. More recently, radiofrequency ablation of thyroid nodules (RFA) has been noted to decrease symptoms and improve cosmesis. While effective, the cost compared with alternatives has not been well elucidated. This study compares the

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cost-effectiveness of open thyroid lobectomy vs RFA for treatment of thyroid nodules.

Method: This study involved a retrospective chart review from April 2016 to January 2020. We analyzed 53 open lobectomies from September 2016 to March 2019 and 16 RFA procedures between April 2016 to January 2020. For open lobectomies, we queried Current Procedural Terminology (CPT) code 60220, which is used for “total thyroid lobectomy, unilateral.” For radiofrequency ablation procedures, we queried CPT code 60699. We focused on the variable direct cost (VDC) of each procedure. For these data, the cost of the RFA electrode was not available, and so a range of costs was added to the available data, ranging from \$1500 to \$2500 per wand.

Results: Cost-effectiveness varied depending on the cost of the electrode. In comparison with open lobectomy, the VDC to perform RFA was \$597 (19%) cheaper when the electrode cost was assumed to be \$1500. However, RFA became more costly by \$403 (13%) once estimated wand costs reached \$2500. Statistical significance was achieved for both of these differences. The median total VDC for the open lobectomies, 53 in total, was \$3179. The median VDC for RFA + \$1500 estimated wand cost was \$2582, and \$3582 with RFA + \$2500 estimated cost.

Conclusion: Based on the total number of thyroid nodules treated with thyroid lobectomy in the United States per year, assuming a portion could be treated with RFA, there are potential cost savings between \$10 million and \$30 million each year. If cost per RFA wand can be brought down to less than \$1500 and done in an outpatient clinic with minimal need for repeat procedures, over time, there would be considerable cumulative cost savings, especially in high-volume thyroid practices.

Gender and Outcomes in Patients With Thyroid Cancer Undergoing Thyroidectomy

Joseph Celidonio (Presenter); Ariel Omiunu; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD



Introduction: Preoperative risk stratification plays a pivotal role in patient outcome. Our goal is to evaluate the impact of gender in patients with thyroid cancer undergoing thyroidectomy.

Method: The 2005–2018 American College of Surgeons National Surgical Quality Improvement Project database was used to identify patients with thyroid cancer who underwent thyroidectomy. Analyzed outcomes included length of stay (LOS), readmission, reoperation, and postoperative complications.

Results: A total of 34,286 patients were included, with 25,792 (75.2%) females and 8494 (24.8%) males. Baseline demographics were significantly different among the 2 cohorts: males were older (53.8 ± 14.9 years vs 49.0 ± 14.9 years, $P < .001$), with a higher body mass index average and American Society of Anesthesiologists classification ($P < .001$). Males had higher incidences of comorbid conditions, including smoking ($P = .003$), chronic obstructive pulmonary disease, diabetes mellitus, obesity, hypertension, and bleeding disorders (all $P < .001$). Males also showed higher incidences of postoperative complications, including surgical and medical complications; increased operative time; prolonged LOS;

and reoperation ($P < .001$). On multivariable analysis, males demonstrated increased risk of overall complications (odds ratio [OR] = 1.36; 95% CI, 1.11–1.66; $P = .004$), surgical complications (OR = 1.72; 95% CI, 1.26–2.37; $P < .001$), superficial surgical site infection (SSI) (OR = 1.70; 95% CI, 1.05–2.75; $P = .031$), deep SSI (OR = 2.34; 1.11–4.93; $P = .026$), reoperation (OR = 1.65; 95% CI, 1.29–2.13; $P < .001$), and prolonged LOS (OR = 1.36; 95% CI, 1.22–1.52; $P < .001$).

Conclusion: This study revealed that male gender is an independent predictor of unfavorable postoperative outcomes following thyroidectomy for thyroid cancer, including superficial SSI, deep SSI, reoperation, and prolonged LOS.

Parathyroidectomy During Pregnancy: A Demographics-Based Study

Radhika Malhotra (Presenter); Sudeepti Vedula; Christina H. Fang, MD; Jean Anderson Eloy, MD; Soly Baredes, MD

Introduction: Hyperparathyroidism is often diagnosed in women of childbearing age. Untreated hyperparathyroidism in pregnancy can lead to neonatal tetany or intrauterine fetal demise. This review examines the demographics of pregnant patients who undergo parathyroidectomy.

Method: The Nationwide Inpatient Sample was queried for pregnant patients who underwent parathyroidectomy between 2012 and 2017. The variable “neomat” was used to identify pregnant women. Patients were divided into 2 cohorts based on income status: median income less than \$51,000 per year and greater than \$51,000. Payer status was also classified as private insurance vs government-subsidized insurance. Univariate and multivariate analyses were performed to compare variables.

Results: A total of 160 pregnant women who underwent parathyroidectomy were identified. More women were of lower income status ($n = 95$, 59.4%). Patients were largely from certain populations (Black, $n = 55$ [34.4%] vs Hispanic $n = 45$ [28.1%] vs White $n = 35$ [21.9%]). Black and Hispanic women were of lower income status than their White counterparts (Black $n = 35$ [21.9%] vs Hispanic $n = 45$ [25.0%] vs White $n = 15$ [9.4%]). Most patients had Medicaid insurance (Medicaid $n = 90$ vs private insurance $n = 50$, $P < .001$). Most cases were performed in the South (46.9%) at large-bed (75.0%), urban teaching hospitals (75.0%).

Conclusion: Parathyroidectomy in pregnant patients occurs at larger, urban-teaching hospitals and disproportionately in certain populations. There also appears to be differences in income and insurance status. Further studies need to be conducted to elucidate the impact of these disparities on the outcomes of pregnant patients undergoing parathyroidectomy.

Postoperative Complications of Thyroidectomies in Pregnant vs Non-pregnant Female Patients

Sudeepti Vedula (Presenter); Radhika Malhotra; Rushi Patel; Denny Varughese; Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: Thyroidectomy can be performed for Graves' disease or thyroid cancer in pregnant women. The incidence of treatment, medical and surgical, for Graves' disease in women of childbearing age is approximately 1 in 100. The prevalence of thyroid cancer in pregnant women is 14 per 100,000, which is higher than the prevalence in the non-pregnant population (9 per 100,000 persons per year).

Method: The National Surgical Quality Improvement Program was queried for all females who underwent thyroidectomy between 2005 and 2016. Patients were divided into 2 cohorts: non-pregnant (n = 105,204) and pregnant (n = 114). Univariate analysis was conducted to compare demographics, comorbidities, reoperation rates, readmission rates, and complications. Independent *t* tests were conducted to evaluate age, length of anesthesia time, total hospital stay, total operation time, and body mass index. Multivariate logistic regression was used to assess significance of complication rates while controlling for significant comorbidities.

Results: Pregnant females were more likely to undergo inpatient procedures (61.4% vs 40.6%, $P < .001$). Comorbidities that were significant among the 2 cohorts were diabetes mellitus, smoking, and use of hypertension medications. Pregnant patients had higher rates of systemic sepsis (2.7% vs 0.3%, $P < .001$) and emergency procedures (2.6% vs 0.2%, $P < .001$). The rates of complications in between both groups were insignificant. However, there was a significant increase in anesthesia duration and operation time in pregnant patients.

Conclusion: Pregnant patients undergoing thyroidectomy are not at an increased risk for complications. The increase in anesthesia duration and operation time is likely due to added precautions of the patient being pregnant but does not appear to add significant measured risks.

Repeat FNA Biopsy in Indeterminate Thyroid Nodules

Michael Papazian (Presenter); Jared Dublin; Thaira Oweity, MD; Kupal Patel, MD; Tamar C. Brandler, MD, MS; Babak Givi, MD

Introduction: Indeterminate fine-needle aspiration (FNA) cytology is reported in 20% to 30% of thyroid nodules. Recommended management for indeterminate (Bethesda III/IV) nodules (ITNs) includes repeat FNA, molecular testing, or lobectomy. We investigated the impact of repeat FNA in combination with molecular testing on the management of ITNs.

Method: We reviewed FNA samples from subjects with Bethesda III or IV diagnoses from 2014 to 2018 and selected those who underwent a repeat FNA of the same thyroid nodule. Patient demographics, Bethesda classifications, molecular analyses by ThyroSeq, treatment detail, nodule characteristics, and surgical pathology, when available, were recorded.

Results: A total of 94 patients with initial cytologic diagnosis of ITN and repeat FNA were identified. The median interval between FNAs was 13.5 months, and the most common reason (32, 34%) was routine follow-up. Some 37 (39%) patients were categorized as ThyroSeq positive. After repeat FNA, 53

(56.3%) remained as ITN, 40 (42.5%) were reclassified as benign, and 1 (1%) was reclassified as suspicious for malignancy. Some 33 (35%) patients underwent thyroidectomy following repeat FNA. The majority of surgical cases (29/33, 88%) had indeterminate cytology on repeat FNA, whereas 3 (9%) were benign. On final surgical pathology, 23/33 (70%) were benign, and 10 (30%) were malignant (11.6% of the total population). All malignancies were low risk and displayed positive ThyroSeq results. No progression of the nodules was seen in the 61 (65%) patients who did not have surgery, including 10 (16%) who were ThyroSeq positive.

Conclusion: Repeat FNA of initially indeterminate thyroid nodules could result in definitive diagnosis in a significant portion of patients. The risk of upstaging to a malignant nodule is very low, as is the chance of a high-risk malignancy in patients with ITN. Our findings suggest that repeat FNA, in combination with molecular testing, can safely save a significant portion of patients from diagnostic lobectomy.

Risk Factors for 30-Day Complications Following Parathyroidectomy for Secondary Hyperparathyroidism

Suhas Bharadwaj, MS (Presenter); Robert Liebman; Thomas McCune; David Lieb; Lucia Diaz-Garcia; Matthew Bak

Introduction: Short-term postoperative complications including hospital readmission remain a challenge in patients who undergo parathyroidectomy for secondary hyperparathyroidism (SHPT). Our primary objective was to identify preoperative risk factors for 30-day readmission, emergency department (ED) visits, and hungry bone syndrome (HBS) for patients undergoing parathyroidectomy (PTX) for SHPT. The secondary objectives were to learn risk factors for prolonged initial admission and develop a protocol for postoperative calcium management.

Method: We performed a retrospective chart review of patients who underwent PTX for uncontrolled SHPT at a single tertiary center from 2015 to 2019. Data extracted from the electronic medical record included demographics, comorbidities, preoperative risk factors, lab values, and postoperative complications. Our primary endpoint was 30-day readmission rate, whereas secondary endpoints include HBS and ED visits within 30 days. Data were analyzed using chi-square, Wilcoxon rank sum, regression analysis, and area under the receiver-operating curve (AUROC).

Results: A total of 54 patients were identified on chart review; 29 of 54 (53.7%) were female. Some 37 of 54 (68.5%) patients underwent total PTX. Maximum preop parathyroid hormone (PTH) level was predictive of hospital readmission within 30 days ($P = .004$) and ED visits for hypocalcemia-related symptoms ($P = .001$). Maximum preop PTH was further identified as predictive of complications, including HBS using AUROC ($P > .05$, area under the curve = 0.812). A preoperative PTH cutoff value of 1960 pg/mL was identified based on the inflection point for specificity (63%) and sensitivity (87.5%) to identify a high-risk group (>1960 pg/mL) and low-risk group (<1960 pg/mL). Intravenous calcium drip

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usage and total calcium supplementation were not predictive of readmission rates or ED visits.

Conclusion: Higher preoperative PTH levels were independently predictive of 30-day readmission rates, 30-day ED visits related to hypocalcemia, and HBS following surgery. We note a PTH cutoff value of 1960 pg/mL, which identifies a high-risk group that can be used to guide calcium replacement protocols postoperatively.

Thyroid Imaging Reporting and Data Systems (TI-RADSTM) in Community Setting

Easwer Raman (Presenter); Jagdish K. Dhingra, MBBS, FRCS

Introduction: Ultrasound (US)-guided fine-needle aspiration (FNA) forms the basis of investigation of thyroid nodules. Various risk stratification criteria based on US features have been proposed to help decide which nodules to investigate by FNA. The 2 most widely used systems are the American Thyroid Association (ATA) 2015 recommendations and the 2017 TI-RADS of the American College of Radiology (ACR). We aim to analyze the adoption and performance of the TI-RADS system over a 3-year period in a community setting.

Method: All patients referred for FNA of thyroid nodule/s to a dedicated ultrasound clinic over a 3-year period between January 2018 and December 2020 were studied. Prior to performing the FNA, nodules were prospectively assigned to 1 of 5 ATA risk categories by the senior author (J.K.D.), who was blinded to the TI-RADS score. Radiology reports were retrospectively reviewed for the TI-RADS scores. The percentage of patients that had TI-RADS scores assigned was calculated for each of the 3 years. Using cytology as the gold standard, performance of the ATA risk stratification system and the ACR TI-RADS score was compared.

Results: A total of 943 nodules were studied. Adoption of the ACR TI-RADS increased from 6.72% through 21.76% to 42.91% over 3 years. A total of 216 nodules had both the ATA risk category and TI-RADSTM score data. Some 38 of 216 nodules (17.59%) yielded positive FNA results—defined as either Bethesda category 5/6 or Bethesda category 3/4 with suspicious Afirma® Gene sequencing classifier. ATA system yielded sensitivity, specificity, and negative and positive predicted values of 62.5%, 95.1%, 96.3%, and 55.6%, respectively, compared with 50.0%, 28.6%, 72.3%, and 13.1%, respectively, with the TI-RADSTM scores.

Conclusion: In our community, there has been a gradual but slow adoption of the TI-RADSTM by radiologists, with less than 50% adoption, more than 3 years after its implementation. In our experience, ATA stratification is associated with a higher degree of sensitivity and specificity compared with the TI-RADSTM system.

Thyroid Tumor Immune Microenvironment in Nodules With Indeterminate FNA

Jennifer Wherley (Presenter); Maisie Shindo; Courtney Betts; Sam Sivagnanam; Lisa Coussens; Olga Senashova

Introduction: Evaluation of thyroid nodules with indeterminate cytology is limited by current methods. We studied the tumor immune microenvironment (TiM) of thyroid cancer using a multiplex immunohistochemistry (mIHC) technique enabling assessment of leukocyte complexity and effector status. Based on previous results, we hypothesized that evaluation of the TiM using mIHC will identify immune biomarkers to improve the risk stratification of indeterminate nodules.

Method: The TiM of adult thyroidectomy specimens containing benign and malignant neoplasms classified as indeterminate on FNA were evaluated using mIHC. Tissues were interrogated with 21 markers to identify immune cell phenotype and effector status. Results are presented as cell density and percentage of the total immune cell population.

Results: Unsupervised cluster analysis revealed 3 immune signatures: 1 enriched for malignancy, 1 enriched for benign adenomas, and 1 enriched for benign and malignant Hurthle cell neoplasms. Malignant nodules had a higher density of lymphocytes compared with benign nodules ($P = .0003$). Evaluation of the myeloid and lymphoid compartments revealed a hyperinflamed immune signature in malignant samples within both compartments (lymphoid $P = .0008$, myeloid $P = .008$). Within malignant samples, the inflammatory signature was skewed toward the lymphoid compartment. Deeper analysis of Hurthle cell neoplasms revealed a higher density of lymphocytes in Hurthle cell carcinoma (HCC; $P = .0178$) due to differences in the lymphoid compartment ($P = .0159$), specifically the cytotoxic killer T-cell population (CD8, $P = .0494$). Analysis of CD8 T-cell functional subsets revealed lower expression of T-bet in HCC ($P = .0009$), denoting a lower level of activation of anti-tumor Th1 T cells in malignant samples.

Conclusion: Our study reveals immune biomarker signature differences between benign and malignant thyroid neoplasms, with results most marked in Hurthle cell neoplasms. Our results support the potential application of mIHC to risk stratification of Hurthle cell lesions in FNA samples obtained from indeterminate nodules.

Facial Plastic and Reconstructive Surgery

Endoscopic Management of Orbital Medial Wall Fractures

Giacomo Colletti, MD (Presenter); Sara Negrello; Sabina Figurelli; Alexandre Anesi; Luigi Chiarini

Introduction: Fractures of the medial wall of the orbit were generally addressed through external routes. We developed a technique to manage them through a transnasal endoscopic approach in which we reconstruct the fractured medial wall with polyethylene implants.

Method: A total of 50 consecutive patients with unilateral fractures of the medial wall of the orbit took part in the study. The technique consisted in an endoscopic approach; the first step was a radical ethmoidectomy followed by exposure of the



fracture and identification of the 4 ledges (anterior, posterior, superior, and inferior). The fractured area was replicated on a 0.8-mm polyethylene sheath. This was designed with an excess of 2 mm in the superior and inferior margin. The implant was then placed in site by sliding its superior and inferior margin under the ledges of the fracture, thus making it self-containing. Pre- and postoperative (postoperative day [POD] 7, 90, and 180) eyeball sagittal position was evaluated with a physical examination. At POD 180, a computed tomography scan was also done. POD 1, 7, 30, and 180 diplopia was evaluated. Perioperative complications were considered: bleeding, need to secondarily reposition a displaced implant, and infection. POD 1 and POD 7 were analyzed by means of patients' subjective comfort expressed as pain and discomfort.

Results: All 50 patients achieved a symmetrical position of the eye without residual enophthalmos. All computed tomography scans at 6 months postoperatively showed a good and stable reconstruction. No diplopia was detected. In 1 case, there was the need for a second operation for a medial displacement of the implant. No other complications were observed. Specifically, not a single case of implant infection was observed. Postoperative comfort was judged to be excellent, as all patients reported no pain and a very slight discomfort.

Conclusion: Managing medial wall fractures by means of an exclusive endoscopic approach may be superior to traditional techniques because of a better visualization of the superior and inferior margins of the fracture and to a significantly superior postoperative comfort.

Enhanced Recovery Following Cleft Palate/ Lip Repair: Systematic Review and Meta- Analysis

Max Shin (Presenter); Connor Wagner; Aman Prasad;
Kevin Chorath, MD; Alvaro G. Moreira, MD;
Karthik Rajasekaran, MD

Introduction: Enhanced recovery after surgery (ERAS) protocols are pathways developed by multidisciplinary teams to hasten postoperative recovery and minimize the surgical stress response. ERAS protocols and clinical care pathways have been previously studied for the perioperative management of cleft lip and/or palate surgery; however, a robust review of their efficacy and outcomes has not been performed. The primary objective is to compare hospital lengths of stay between patients in ERAS protocols to those in traditional care pathways. Secondary objectives included evaluation of complication and readmission rates.

Method: Cohort and randomized studies of ERAS protocols pertaining to cleft palate and/or lip repair were identified through a systematic review of MEDLINE, Scopus, Embase, and gray literature. Data concerning length of stay, complications, and readmission rates were recorded and analyzed by meta-analyses to compare outcomes between patients enrolled in ERAS protocols vs those in conventional care paths.

Results: Of 722 articles identified by search criteria, 5 (0.7%) studies with 425 total patients met inclusion criteria. While specific perioperative interventions across studies were heterogeneous, patients enrolled in ERAS protocols demonstrated reduced length of hospital stay (mean difference = -26 hours; 95% CI, -31.4 to -21.1) and complication rates (odds ratio [OR]: 0.39; 95% CI, 0.16-0.97). There was no difference noted for rates of readmission.

Conclusion: Patients enrolled in the ERAS protocol demonstrated decreased complications and length of stay in the hospital. These findings suggest that implementation of ERAS protocols can lead to significant patient benefits as well as potential opportunities for hospital cost containment.

Free Tissue Transfer in Reconstruction of Scalp and Cranioplasty Defects

Nicole M. Santucci, MA (Presenter); Gabriela L. Lilly;
Farshid Taghizadeh; Ryan Li, MD; Daniel Petrisor; Mark Wax

Introduction: Scalp and cranial defects can occur as a result of malignancy, trauma, or surgical intervention for intracranial tumors. Reconstruction needs to address both soft-tissue loss and possible cranial bone reconstruction. These patients often require free tissue transfer. Reconstruction of the scalp alone is well described. Free tissue transfer reconstruction of cranioplasty defects is not. This study presents our institutional experience with free flap scalp and cranioplasty reconstruction.

Method: A retrospective review was performed of patients who underwent free flap scalp/cranioplasty reconstruction from 1999 to 2020 in a tertiary care center. Data collected included patient demographics, comorbidities, surgical indication, and type and number of reconstructions. Reconstructive outcomes and perioperative complications were reviewed.

Results: A total of 87 patients underwent 110 soft-tissue transfer procedures; this included 56 combined skull/soft-tissue reconstructions and 54 soft-tissue reconstructions. The most common surgical indication was malignancy (n = 49) followed by nonhealing wounds (n = 44). The average number of reconstructions performed prior to free tissue transfer in the soft-tissue group was 1.27 + 2.24 compared with 0.83 + 1.25 in the cranioplasty group ($P = .215$). The most common donor site was latissimus dorsi (71/110) followed by radial forearm (30/110). Flap survival rate was 84.2% in the soft-tissue group vs 92.5% in the cranioplasty group ($P = .181$). Intraoperative pedicle revision was more frequent in the soft tissue (33.9%) vs cranioplasty group (24.5%), although this did not reach significance ($P = .281$). There was no difference in the rate of postoperative dehiscence or infection between the 2 groups ($P = .638$, $P = .291$).

Conclusion: Soft-tissue coverage in cranial defects pose a particular challenge. Poor vascularity of the native tissue, bio-film formation, and chronic infection can cause recurrent wound breakdown. Free tissue transfer is a viable option for cranial reconstruction in these patients with no increased complication rate with concurrent bony reconstruction.

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Higher mir-31-5p Expression Associated With Reduced 1-Year Keloid Recurrence Following Resection

Oghenefejiro Okifo, MD (Presenter); Lamont Jones, MD

Introduction: We aim to determine the therapeutic biomarker predictability of mir-31-5p in keloid disease (KD); identify the clinical relevance of mir-31-5p expression in keloid disease; and recognize how pathways associated with mir-31-5p expression are important for cell network functions such as cell death and survival. This abstract is considered late breaking because it has identified the first clinically relevant keloid specific miRNA biomarker that is associated with a significant reduction in risk of recurrence ($P = .031$) at 1 year following surgical excision. Moreover, the results identified pathways associated with mir-31-5p expression that are important for cell network functions such as cell death and survival and the cell cycle, suggesting that positive and negative expressing cells have clinically different cellular phenotypes, which will improve our understanding of keloid biology.

Methods: The study design consisted of a retrospective cohort (RC) and a prospective cohort (PC). The study was conducted from January 2015 to May 2021 at an academic research setting. The condition studied was keloid disease. The subjects studied were formalin-fixed paraffin-embedded tissue in the retrospective cohort and fresh tissue in the prospective cohort. There were no interventions. The outcome measure was keloid recurrence at 1 year following surgical resection. The independent variable was mir-31-5p cellular expression (CE). The preliminary analyses were conducted with logistic regression (LR) and ingenuity pathway analysis (IPA).

Results: Of the 58 RC treated with surgery, 42 (72%) received adjuvant triamcinolone injections, and 8 (14%) recurred at 1 year. MicroRNA-ISH for mir-31-5p was performed using a miRNAscope™ assay, and Quantitative Pathology bioimaging analysis software was used to quantify the percentage of mir-31-5p-positive cells on a tissue microarray. mir-31-5p was expressed in 48 (83%) specimens (range 40% to 98%, mean/median of 73%/74%). In the 48 positive subjects, LR demonstrated that increasing mir-31-5p CE was associated with a reduction in risk of recurrence (RRR; $P = .031$). Specifically, a 20% increase in mir-31-5p CE was associated with an 0.86 odds ratio (OR; 95% CI, 0.75–0.98), a 14% RRR at 1 year. In patients also treated with adjuvant triamcinolone, a 20% increase in mir-31-5p CE was associated with an 0.82 OR (95% CI, 0.71–0.95, $P = .015$), an 18% RRR at 1 year. LR and IPA of PC RNA-Seq data identified 5 top canonical pathways.

Conclusion: Higher levels of mir-31-5p CE correlate with RRR after keloid resection. In addition, mir-31-5p expression is associated with pathways important for cell network functions such as cell death and survival and the cell cycle. The 5 canonical pathways include: autophagy, mTOR signaling, senescence pathway, telomerase signaling, and CDK5 signaling.

Impact of Smoking on Postoperative Complications After Facial Fracture Repair

Ariel Omiunu (Presenter); Joseph Celidonio; Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: Facial fractures are frequently encountered by otolaryngologists and plastic surgeons. Our study investigates the association between smoking and outcomes in patients undergoing facial fracture repair.

Method: The National Surgical Quality Improvement Program database was queried to identify patients undergoing facial fracture repair between 2005 and 2015. Postoperative outcomes were analyzed using multivariate logistic regression controlling for age, gender, race, and comorbidities.

Results: A total of 3578 patients were identified of which 1527 patients (42.7%) were smokers. Smokers were significantly younger than nonsmokers (36.3 ± 13.4 years vs 41.3 ± 18.8 years, $P < .001$). Smoking was more common among Black patients (27.6%, $P < .001$) and patients with lower body mass index (24.9 ± 5.9 , $P < .001$). On univariate analysis, smokers were more likely to have chronic obstructive pulmonary disease (1.9% vs 0.9%, $P = .012$), a history of weight loss (0.9% vs 0.3%, $P = .043$), and sepsis (3.0% vs 1.5%, $P = .001$). Smokers were less likely to have diabetes mellitus (4.3% vs 6.2%, $P = .012$), obesity (14.9% vs 20.1%, $P < .001$), hypertension (12.3% vs 19.7%, $P < .001$), and chronic steroid use (0.2% vs 1.4%, $P < .001$). Smokers had increased incidences of surgical complications (4.3% vs 3.0%, $P = .049$) and organ/space surgical site infections (0.7% vs 0.2%, $P = .016$) but decreased rates of medical complications (0.9% vs 1.7%, $P = .044$) and pulmonary embolism (0.0% vs 0.4%, $P = .015$). Multivariate analysis did not show any significant differences among the 2 patient cohorts.

Conclusion: Our study revealed several factors were correlated with smoking in patients who undergo facial fracture repair. However, smoking was not shown to be an independent predictor of complications following facial fracture repair.

Outcomes With Conservative Management of Frontal Sinus Outflow Tract Fractures

Steven K. Dennis, MD (Presenter); Toby O. Steele; Amarbir Gill; E Bradley Strong, MD

Introduction: To reduce the risk of complications, immediate surgical treatment of frontal sinus outflow tract (FSOT) fractures has been a standard practice. With surgical and technologic advances, conservative management (ie, observation) of FSOT fractures has become more common. Unfortunately, complication rates with observation are unknown. This study evaluates these risks.

Method: All FSOT injuries between January 1, 2005, and May 1, 2019, were identified. Patient demographics, fracture patterns, surgical intervention, complications (major included cerebrospinal fluid [CSF] leak and mucocele; minor included sinusitis), and long-term sequelae were recorded. FSOT fractures were classified as either disrupted (bony violation of the FSOT with residual patent tract) or obstructed (bony obstruction

of the FSOT). Patients with follow-up imaging >90 days were included. Patients undergoing immediate surgical intervention were excluded.

Results: A total of 136 patients were identified, and 31 met criteria. Eight patients were found to have complications (26%) at a median of 14.2 months of follow-up. There were 3 major complications (2 delayed CSF leaks and 1 mucocele; 10%) and 5 minor complications (sinusitis; 16%). Delayed surgical intervention was required in 4 patients (13%), and there were no long-term sequelae. When analyzed by type of injury, FSOT obstruction accounted for all major (10%) and 3 minor complications (10%), while FSOT disruption accounted for only 2 minor complications (6%).

Conclusion: No FSOT disruption and 13% of FSOT obstruction patients ultimately required surgical intervention. There were no long-term sequelae. Observation is a viable treatment option in this patient population given reasonable assurance of long-term follow-up.

Perioperative Hypercoagulability in Free Flap Reconstructions Performed for Intracranial Tumors

Gabriela L. Lilly (Presenter); Nicole M. Santucci, MA; Rishi Seshadri; Ryan Li, MD; Daniel Petrisor; Mark Wax

Introduction: Patients with intracranial tumors have a higher risk of thromboembolic events. This risk increases at the time of surgical intervention due to sustained platelet activation and release of tissue factor. We have noted an anecdotal increase in intraoperative flap thrombosis in patients undergoing free tissue transfer for intracranial tumor resection. This study aimed to formally evaluate this risk.

Method: A retrospective review was performed of patients who underwent free flap scalp/cranioplasty reconstruction from 1999 to 2020 in a tertiary care center. Data collected included patient demographics and comorbidities, surgical indication, and intraoperative or postoperative flap thrombosis. Free flap survival was also reviewed.

Results: A total of 69 patients were included. Nineteen underwent free flap reconstruction following resection of an intracranial tumor. The remainder underwent free flap reconstruction for scalp defects associated with cutaneous malignancies or nonhealing wounds, and served as a control group. A total of 36.8% (7/19) patients in the intracranial tumor group had a flap thrombosis that required intraoperative pedicle revision compared with 28% (14/50) in the control group. This did not reach statistical significance ($P = .476$). The rate of postoperative thrombosis was higher in the control group (8%, $n = 4/50$) than the study group (0%) ($P = .204$). The flap failure rate was also higher in the control group (12%, $n = 6/50$) than the study group (5%, $n = 1/19$; $P = .083$). All patients with intraoperative flap thrombosis were placed on a heparin drop postoperatively with only 2 flap failures noted in this population.

Conclusion: There is a modest but apparent increase in intraoperative flap thrombosis in patients undergoing free flap reconstruction for intracranial tumors. This does not occur

postoperatively and does not appear to lead to an increase in flap failure, although the use of postoperative heparin infusions is a confounder. Given our small sample size, further studies are warranted to better assess this risk and discern the need for perioperative anticoagulation.

Pharyngeal Wall and Soft Palate Motion After Speech Surgery

Tania Hassanzadeh, MD (Presenter); Nicole C. Mastacouris, MS; Kathleen C. Sie, MD; Mark A. Vecchiotti, MD; Andrew R. Scott, MD

Introduction: Velopharyngeal insufficiency (VPI) is a problem of inadequate closure of the velum against the pharyngeal walls during speech, frequently occurring after cleft palate repair. A variety of surgical treatments may be used. The primary aim of this study is to assess how pharyngeal wall and soft palate motion are affected after 2 common speech surgeries.

Method: Between 2011 and 2019, 17 patients with history of VPI who had available pre- and postoperative nasopharyngoscopy recordings were identified and underwent Furlow's palatoplasty or pharyngeal flap. There was 1 patient who underwent both procedures as staged interventions and was counted twice. Recordings were deidentified and randomized with 5 randomly selected videos duplicated to determine intrarater reliability. The videos were scored by 3 experienced raters using a modified Golding-Kushner scale. Pre- and postoperative scores were compared using a paired t test. Both inter- and intrarater reliability were estimated using intraclass correlation (ICC).

Results: The mean age of subjects was 6.9 years (range, 3–22 years, 59% male). In the Furlow's palatoplasty group ($n = 9$), there was an increase in left soft palate motion postoperatively ($t[8] = 2.71$, $P = .02$), with near statistically significant increases in right soft palate motion ($t[7] = 2.09$, $P = .07$). In the pharyngeal flap group ($n = 8$), there were increases in left and right lateral pharyngeal wall motion (left: $t[7] = 3.58$, $P = .008$; right: $t[7] = 3.84$, $P = .006$) and right soft palate motion ($t[6] = 2.49$, $P = .04$). While intrarater reliability and interrater agreement were generally similar to prior studies examining the Golding-Kushner scale, a larger patient population would be needed to confirm these findings.

Conclusion: Our results provide objective evidence that Furlow's palatoplasty and pharyngeal flap surgeries affect different anatomical sites to achieve velopharyngeal closure. Knowledge of these differences may assist surgeons in selecting the optimal technique for patients with VPI based on the degree of palatal and pharyngeal wall motion observed during preoperative nasopharyngoscopy.

A Randomized Study of Self-Directed Versus Traditional Microsurgical Training

Michael Powell (Presenter); James R. Gardner, MD; Quinn Dunlap, MD; Emre Vural, MD; Jumin Sunde, MD; Mauricio Moreno, MD

Introduction: This study aims to analyze efficacy of self-directed microvascular training vs a mentor-led course.

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Method: A randomized, single-blinded cohort study was conducted at an academic, tertiary center. Sixteen participants, postgraduate years (PGYs) 1 to 6, were randomized into 2 groups stratified by training year. Group A completed a self-directed microvascular course with instructional videos and self-directed lab sessions. Group B completed a traditional mentor-led microvascular course. Both groups spent equal time in the lab. Video-recorded pre- and postcourse microsurgical skill assessments were performed to assess the efficacy of the training. Both assessments were identical and included a preassessment survey followed by completion of a microvascular anastomosis (MVA) using the chicken thigh model. The survey evaluated levels of comfort using microsurgical instrumentation and performing MVA. There were 2 microsurgeons, blinded to participant identity, that evaluated the videos and inspected the MVA. Videos were scored using an objective-structured assessment of technical skills (OSATS) and a global rating scale (GRS). The MVA was inspected under microscopy to evaluate and objectively score quality on 5 criteria.

Results: On the precourse assessment, the groups were well matched with only economy of motion on the GRS favoring group B ($P = .02$). This difference remained significant on the postassessment ($P = .02$). Both groups significantly improved in OSATS and GRS scoring ($P < .05$). On subgroup analysis, all PGY levels improved significantly in both groups. There was no significant difference in OSATS improvement between the 2 groups ($P = .36$). MVA quality did not improve, and no differences existed between groups ($P = 1$). However, time to completion significantly improved by a mean of 8 minutes 9 seconds ($P = .01$) with no difference between groups ($P = .39$).

Conclusion: Different models of microsurgical training have been previously presented and validated as effective methods for improvement in the performance of MVAs. Our findings indicate that self-directed and mentor-led training are of equal educational value to participants.

Head and Neck Surgery

Accuracy of US-FNA Cytology in Pre-Operative Major Salivary Glandular Tumors

Chien Yang Chan (Presenter); Li Jen Liao

Introduction: There are more than 30 types of salivary glandular tumors in the World Health Organization classification; therefore, it is difficult to diagnose salivary glandular tumors. Ultrasonography (US) and fine-needle aspiration (FNA) cytology are helpful for surgeons to diagnose salivary glands tumors. However, some studies report FNA cytology with a high intermediate or nondiagnostic rate. The aim for this study is to review the diagnostic accuracy for preoperative US-FNA cytology for major salivary glands tumors.

Method: We retrospectively reviewed adults who underwent parotidectomy and submandibulectomy between 2007 and 2020. The inclusion criteria include US-FNA cytology report before the operation and pathology report after the operation. We categorized the cytology report into 4 groups: benign, malignant, intermediate, and nondiagnostic. The

benign cytology report group includes favor benign lesion, no malignancy noted, and so forth. The malignant cytology report group includes favor or suspect malignant neoplasm, and so forth. The intermediate cytology report group includes atypical cells, atypia, not exclude benign or malignant neoplasm, and so forth. The nondiagnostic cytology report group includes nondiagnostic, scant cells, lymphoid cells, and unsatisfied specimens. We calculate the diagnostic accuracy accordingly.

Results: During 2007 to 2020, there were 437 patients recruited including 400 benign and 37 malignant lesions. In the benign group, the cytology reports were benign in 265, malignant in 3, intermediate in 33, and nondiagnostic in 99. The nondiagnostic rate was 24.7% (95% CI, 20.7%–28.8%). In the malignant lesion group, the cytology reports were benign in 6, malignant in 10, intermediate in 12, and nondiagnostic in 9. The overall sensitivity, specificity, positive predictive value, negative predictive value, and accuracy for US-FNA cytology were 62.5%, 98.9%, 76.9%, 97.8%, and 96.8%, respectively.

Conclusion: For major salivary glands tumors, the nondiagnostic rate of preoperative US-FNA cytology was 24.7%. US-FNA cytology had low sensitivity but high specificity for the diagnosis of major salivary glands tumors.

Adjunctive Procedures and Complications After Carotid Body Tumor Resection

Jeff Gao (Presenter); Christopher C. Tseng; Gregory L. Barinsky, PharmD; Soly Baredes, MD; Richard C. Park, MD

Introduction: Surgical excision is the standard treatment for carotid body tumors (CBTs), but the impact of concurrent procedures such as tumor embolization (TE) and carotid artery reconstruction (R) is not well characterized. The objective of this study was to investigate the association of TE and R procedures with outcomes for CBT resection.

Method: The Nationwide Inpatient Sample was queried from years 2003 to 2014 for all patients who underwent excision of a CBT. These cases were stratified into patients who underwent excision alone, those who underwent excision with TE, and those who underwent excision with R. Univariate and multivariate analyses were performed to compare demographics, comorbidities, and postoperative complication rates.

Results: A total of 1552 patients underwent CBT surgery, with 1265 (81.5%) patients undergoing excision alone, 135 (8.7%) patients undergoing excision with TE, and 149 (9.6%) patients undergoing excision with R. There were no significant differences in rates of any complications or mortality for patients receiving excision with TE as compared with excision alone. In a multivariate regression model, patients undergoing excision with R had significantly higher rates of stroke (odds ratio [OR] 6.73, $P < .001$), hematoma (OR 14.48, $P < .001$), and pulmonary complications (OR 5.97, $P < .001$) as compared with patients undergoing excision alone. Both TE (5.0 days) and R (6.3 days) patients had longer mean lengths of stay than those with excision alone (3.34 days; both $P < .001$).

Conclusion: In the surgical management of CBTs, excision with R was associated with an increased risk of stroke, hematoma, and pulmonary complications, while excision with TE

had similar complication rates to excision alone. TE may have limited benefit for the prevention of complications.

Application of Time-Driven Activity-Based Costing for Microvascular Free Flap Reconstruction

Pratyusha Yalamanchi, MD, MBA (Presenter);
Kelly Michele Malloy, MD; Keith Casper;
Larry Marentette

Introduction: Traditional hospital accounting using fixed charge-to-cost ratios fails to provide an accurate cost of complex surgical care. Time-driven activity-based costing (TDABC) is an innovative approach for measuring costs across entire episodes of care. Here we describe the application of TDABC to characterize costs of head and neck oncologic procedures involving both resection and reconstruction.

Method: Retrospective cohort analysis of head and neck oncologic procedures involving microvascular free flap reconstruction from 2016 to 2020 at a tertiary academic center (n = 753) was performed using TDABC methodology to measure cost across operative case and postoperative admission, using quantity of time and cost per unit of each resource to characterize resource utilization. Process maps were created for each encounter that outline all resources, including personnel, equipment, and overhead such as facility space and management. The unit cost of each resource is multiplied by time used to determine the total cost of care.

Results: Among n = 753 cases, the median intraoperative time was 380 minutes (interquartile range [IQR] 227–550), and the total length of stay was 7.2 days (IQR 6.2–10.2). Total operative procedure cost as determined by TDABC was \$6540 (IQR \$4828–8663), and total admission cost was \$35,362 (IQR \$28,598–47,652). This was significantly different than total admission cost as determined by traditional cost-to-charge ratio accounting (median \$47,274 [IQR \$36,118–63,778], $P < .05$). In terms of cost contribution, labor was the primary cost driver, with a mean cost of \$16,467/encounter (cost contribution 43.4%). Other cost categories (mean, cost contribution) included supplies and equipment (\$11,686, 30.8%), overhead (\$6071, 16%), depreciation (\$3163, 8.3%), and other expenses (\$524, 1.4%).

Conclusion: TDABC offers granular cost characterization of head and neck oncologic procedures involving microvascular free flap reconstruction that (1) is significantly different than traditional cost accounting and (2) offers opportunities for cost optimization through unused capacity identification and postoperative admission efficiencies.

Association of Frailty With Head and Neck Cancer Related Readmissions

Rohith S.Voora (Presenter); Alexander S. Qian;
Nikhil V. Kotha; Edmund M. Qiao; James D. Murphy;
Ryan K. Orosco

Introduction: Head and neck cancer surgical patients are a uniquely morbid population who are at high risk for unplanned

readmissions secondary to a host of reasons. In this study, we evaluate the predictive utility of the Hospital Frailty Risk Score (HFRS), an ICD-10–dependent stratification tool, and other risk factors for 30-day readmissions in a nationally representative cohort.

Method: Our retrospective cohort comprised 20,228 head and neck cancer patients undergoing major surgical procedures from the 2017 Nationwide Readmissions Database representing 116 Medical centers nationwide. The primary outcome was unplanned 30-day readmission with other outcomes of interest including hospital burden and hospitalization charges. Bivariate and multivariable logistic regression methods were employed.

Results: Unplanned readmission occurred in 11% of patients. An elevated frailty index (HFRS >5) was identified in 24% of patients. Frailty was associated with 30-day higher readmission (bivariate: 18.8% vs 8.5%, $P < .01$), and this trend held on multivariate modeling (OR 2.55 [1.83–3.57]). Frail patients spent more days in the hospital (11.9 vs 3.7, $P < .01$) and incurred more charges across both hospital stays (\$269k vs \$172k, $P < .01$). Sepsis was the primary reason for frail readmissions (14.1%), while for nonfrail patients, it was procedural complications (7.7%). There were no statistically significant associations between 30-day readmission and other covariates.

Conclusion: In this head and neck cancer surgical population, HFRS significantly predicted unplanned readmission. HFRS is a potential risk-stratification tool and should be compared to other methods and explored in other cancer populations. Beyond the challenge of identifying at-risk patients, future work should explore potential interventions aimed at mitigating readmission.

Caregiver Experience Throughout Head and Neck Cancer Survivorship: Longitudinal Study

Khalil Baddour, MD (Presenter); Mark A. Fadel, MD, JD;
Lauren D. Kudrick, MA; Aakriti Neopaney;
Robert L. Ferris, MD, PhD; Leila J. Mady, MD, PhD, MPH

Introduction: Caregiver burden (CGB) is a multidimensional concept comprising social, emotional, and financial dimensions. While head and neck cancer (HNC) and its treatment may use functional impairment necessitating extensive regiving, little has been examined regarding HNC-related CGB.

Method: Prospective longitudinal survey of treatment-naïve adults with HNC (care receivers) and their primary informal caregivers was undertaken from October 2019 to December 2020. Participants were surveyed at 3 time points: diagnosis, mid-treatment, and end of treatment (EOT). Caregivers were surveyed with the Caregiver Reaction Assessment (CRA) tool, divided into 5 subscales on a scale of 1 to 5. Higher CRA scores indicate stronger negative impact, in all subscales except for the self-esteem domain.

Results: Of 108 newly diagnosed HNC survivors, 64 (59%) were eligible for the study cohort, 42 of whom were accompanied by a primary informal caregiver who was subsequently

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enrolled. Caregivers ranged from spouses/partners (91%), daughters (7%), and parents (2%). Among 10 caregivers (24%) who completed all 3 consecutive time points, CRA scores (median [range]) by subscale at diagnosis were: disrupted schedule, 3 (2–3.6); financial problems, 3 (2–3.6); health problems, 3 (2.5–3.5); family support, 2.2 (1–3.6); and self-esteem, 4.1 (3.4–4.4). These values remained consistent throughout the survivorship trajectory. At EOT, health problems (3.6 [2.5–4]), and self-esteem subscales (3.7 [3.1–4.3]) were most negatively affected. A significant decrease in self-esteem scores from diagnosis to EOT ($P = .014$) indicates worsening self-esteem. Two caregivers cited changes in employment from diagnosis to EOT, with 1 having to quit their job completely. Some 50% reported an effect on employment status and monthly income due to the COVID-19 pandemic.

Conclusion: HNC caregivers appear to have consistently elevated CGB regarding disrupted schedules and financial and health problems throughout survivorship. At EOT, caregiver self-esteem appears to suffer significantly while negative health-related impact worsens.

Changing Trends in Oral Cavity Squamous Cell Carcinoma Subsites

Katelyn O. Stepan, MD (Presenter); Angela Mazul; Sidharth Puram, MD, PhD

Introduction: Epidemiological trends in oral cavity cancer worldwide have undergone significant changes in the past few decades. We aim to more accurately characterize the current distribution and rates of squamous cell carcinoma (SCC) across the various subsites of the oral cavity in the United States.

Method: We used the publicly available US Cancer Statistics Public Use database, which includes de-identified cancer data reported to Centers for Disease Control and Prevention's National Program of Cancer Registries (NPCR) and the National Cancer Institute's (NCI's) Surveillance, Epidemiology, and End Results (SEER). These databases capture 97% of newly diagnosed cancers. Incident cancer cases are coded using the International Classification of Disease for Oncology ICD-O-3 sites and histology codes. We restricted our analysis to squamous cell carcinoma cases of the oral cavity subsites from 2001 to 2017. We calculated trends in annual cancer incidence rates using SEER*Stat and annual percentage change and joinpoints with the National Cancer Institute's Joinpoint program.

Results: Our data suggest that most oral cavity squamous cell carcinoma cases arise from the oral tongue (47.7%) with an age-adjusted rate of 1.7 cases per 100,000. This was followed by lip (12.5%), gingival (11.8%), buccal (7.4%), retromolar trigone (4.8%), and hard palate (2.5%) involvement. The incidence of oral tongue SCC continues to rise, with an average annual percentage change of 1.8% (95% CI, 1.6–2.1; $P < .001$) overall, with a 2.3% increase among women. Cancers involving the gingiva, buccal mucosa, and hard palate were also found to be increasing in rate, albeit to a lesser degree and with substantially lower incidence. Moreover, rates of lip, floor of mouth, and retromolar trigone primaries have decreased significantly over the past 2 decades.

Conclusion: In contrast to the commonly held belief that the lip is the most frequently involved subsite among oral cavity cancers, our more recent analysis suggests oral tongue SCC comprises the large majority of cases and is increasing in incidence.

Characterization of the Metabolic Phenotype in Oropharyngeal Squamous Cell Carcinoma Tumors

Christine Settoon, MD (Presenter); Larissa Sweeny, MD; Kelsey Lacourrege, MD; Jaclyn Williams, MD

Introduction: We recognize cell-cycle regulatory proteins involved in head and neck squamous cell carcinoma tumor microenvironment; understand the role of CD147, MCT 1, and MCT 4 in head neck cancer metabolism; and identify cell-cycle regulatory proteins expressed in human papillomavirus (HPV)-positive and -negative tumors. These are translational research findings that could not be submitted prior to the original January deadline.

Methods: This is a retrospective review of patients who underwent surgical resection of oropharyngeal squamous cell carcinoma (OPSCC) tumors between 2015 and 2020 ($n = 50$). Most were male (78%, $n = 39$) and had HPV-positive tumors (62%). Immunofluorescence analysis of archived tumors assessed CD147, MCT1, and MCT4 expression levels and correlated with clinicopathologic characteristics.

Results: HPV-positive tumors had higher expression of CD147 and MCT4, while HPV-negative tumors had higher expression of MCT1. Cervical metastasis correlated with lower CD147 (2.1 vs 1.5; $P = .009$) and MCT4 expression (0.9 vs 1.4; $P = .05$). Recurrent tumors had higher CD147 (1.9 vs 1.4; $P = .04$) and MCT1 expression (1.5 vs 1.0; $P = .04$). Prior radiation therapy correlated with higher MCT4 tumor expression (1.3 vs 0.9; $P = .04$). Former tobacco users had lower MCT1 tumor expression (1.1 vs 1.8; $P = .01$). Current alcohol use correlated with lower MCT4 tumor expression (0.7 vs 1.2; $P = .03$). Patients with hypothyroidism had higher CD147 tumor expression (2.1 vs 1.6; $P = .03$). Patients with a history of stroke had higher MCT1 tumor expression (1.6 vs 1.1; $P = .03$). Patients with coronary artery disease had lower MCT4 tumor expression (0.6 vs 1.1; $P = .9$).

Conclusion: This is the first study to demonstrate a correlation with comorbid conditions, tobacco use, alcohol use, and prior radiation therapy with the cellular metabolism of OPSCC.

Comparing Sialendoscopy Patient Experiences: General Anesthesia vs Monitored Anesthesia Care

Eric Mastrodonardo (Presenter); Daniel Campbell; Matthew Stewart; Brian Swendseid, MD; David M. Cognetti, MD

Introduction: While sialendoscopy is performed by using a variety of anesthetic modalities, there is currently no literature comparing the patient experience of these procedures based on anesthetic modality. Thus, we compared the experiences of patients who received sialendoscopy under general anesthesia

(GA) with those who received monitored anesthesia care (MAC).

Method: We conducted a prospective observational study of 43 patients who underwent sialendoscopy at a single tertiary care institution between July 1, 2020, and December 19, 2020. A survey was sent to patients on postoperative day 1 to record ratings of overall satisfaction, nervousness, pain, nausea, and future preferences. The primary outcome was overall satisfaction. Secondary outcomes included pain tolerability and preference for the same anesthetic modality for a similar, future surgery.

Results: In total, 43 patients completed the postoperative survey (93% response rate), of which 26 patients received GA and 17 received MAC. Patient overall satisfaction was similar between the 2 groups (GA: “Poor/Average” = 15%, “Good/Excellent” = 85%; MAC: “Poor/Average” = 0%, “Good/Excellent” = 100%, $P = .140$). Tolerability of postoperative pain was likewise similar between the GA (85%) and MAC (94%) groups ($P = .633$). Patients who received MAC reported intraoperative pain as “none/tolerable” 65% of the time and “uncomfortable” 35% of the time. Patients who received GA would prefer the same anesthetic for a similar, future procedure more often than in the MAC group (81% vs 47%, respectively, $P = .044$).

Conclusion: Patients who undergo MAC during sialendoscopy report similar overall satisfaction and postoperative pain tolerance as those undergoing GA. However, patients who undergo GA do report higher preference rates for the same anesthetic for a similar, future surgery.

Cost-Effectiveness Analysis of Sialendoscopy for Submandibular Gland Sialolithiasis

Joseph R. Acevedo, MD, MAS (Presenter); Ashley Hsu; Daniel Kwon; Raymond Kung; Niels Kokot, MD

Introduction: Sialendoscopy of the submandibular gland has become increasingly popular for the treatment of sialolithiasis due to its low morbidity and preservation of the salivary gland. However, stone extraction is not always successful and comes at a higher cost than traditional gland excision.

Method: We designed a Markov decision model to compare the cost-effectiveness of sialendoscopy vs gland excision for the management of submandibular gland sialolithiasis. Rates of disease resolution and complications were found in peer-reviewed literature and used to simulate surgical outcomes. We considered the quality-of-life of patients using health utilities and costs were estimated using Medicare reimbursement data. Cost-effectiveness was determined by calculating an incremental cost-effectiveness ratio (ICER), which is the difference in cost over the difference in quality-adjusted life-years (QALYs) between treatments. In the United States, a willingness-to-pay ratio of \$150,000 per QALY was considered cost-effective. One-way and multivariate sensitivity analyses were used to identify drivers of our model and test the robustness of its conclusions.

Results: Sialendoscopy was cost-effective over gland excision using our best estimates for all model variables. Over 10 years, sialendoscopy yielded 9.02 QALYs at an average cost of \$8192 while gland excision produced 8.94 QALYs at an

average cost of \$6103. The ICER for sialendoscopy was \$34,817 per QALY, which is well below the willingness-to-pay threshold of \$150,000 per QALY. The model was sensitive to the probability of successful stone extraction using sialendoscopy. If the probability of success reached 58% or higher, sialendoscopy was cost-effective over gland excision. Over 10,000 model iterations using random variability showed that sialendoscopy was cost-effective 62% of the time.

Conclusion: Sialendoscopy is a cost-effective management option for sialolithiasis when the probability of successful stone removal reaches 58% or greater. This target may aid management decisions and counseling based on preoperative stone characteristics.

Effect of Income Disparity on Patients Who Undergo Laryngectomy

Emily Keenan (Presenter); Matthew Linz; Sudeepti Vedula; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: The impact of income disparities on outcomes following laryngectomy has not been previously described in the literature. This study evaluates the associations between annual income and a variety of demographic factors among patients undergoing laryngectomy.

Method: The Nationwide Inpatient Sample was queried for patients who underwent laryngectomy between 2012 and 2017. Patients were stratified into 2 groups based on median household income: less than \$51,000 vs \$51,000 or greater. Univariate and multivariate analyses were performed to compare demographics and outcomes.

Results: A total of 41,470 patients who underwent laryngectomy were identified. Most patients were 61 to 70 years old (26.0%), male (68.3%), White (67.5%), and had Medicare insurance (39.2%). Most patients underwent laryngectomy in the South (39.7%) at large-bed size (71.0%), urban teaching hospitals (88.6%). When accounting for demographic factors, including race, gender, hospital region, and teaching status, patients in the higher income cohort had a shorter length of stay (10.8 days vs 12.4 days; odds ratio, 0.996; 95% CI, 0.995–0.997; $P < .001$). There was no significant difference in hospital charges between the 2 cohorts.

Conclusion: The annual income of laryngectomy patients appears to have a significant association with age, race, gender, insurance, hospital location, size, and type. Patients with higher incomes were found to have a significantly shorter length of stay without significant difference in total charges for the admission. These findings are important in understanding the driving forces behind disparities in health care.

Effect of Prior Tracheostomy on Complications After Total Laryngectomy

Sarah Sussman (Presenter); Ramez Phillips, MD; Bryan Renslo; Alyssa Givens; Adam Luginbuhl, MD

Introduction: Preoperative tracheostomy (POT) prior to primary total laryngectomy (TL) may be required in patients

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with imminent airway compromise. Debate exists on whether recent tracheotomy increases risk for postoperative complications. The objective of this study was to assess whether POT less than 14 days increases the risk of complications after TL and to determine if timing of tracheostomy creation is associated with increased risk.

Method: Retrospective review of patients who underwent primary TL for cancer at a tertiary care hospital between 2007 and 2020 was conducted. Dependent variables of interest included complications, return to operating room, and readmission within 30 days of TL. Complications included stomal infection/tracheitis, stomal dehiscence, hematoma, fistula, and free flap failure. Logistic regression and receiver-operating characteristic (ROC) analyses were used to assess the effect and timing of tracheostomy creation on complications after TL.

Results: A total of 162 patients without history of chemoradiation underwent primary TL. The rate of POT was 65% (n = 105), 97% of which remained with a tracheotomy at time of TL. The mean time from tracheotomy creation to TL was 1.1 ± 2.7 months. Some 80 patients had POT within 30 days of TL, 56 of whom within 14 days. Complications after TL occurred in 33% of patients and included fistula in 14%, infection in 14%, stomal dehiscence in 11%, hematoma in 6%, stomal stenosis in 3%, and free flap failure in 2% of patients. Rate of 30-day readmission was 11%. Rates of return to the operating room during initial admission and within 30 days were 10% and 6%, respectively. POT creation had no impact on complications, 30-day return to OR, or readmissions ($P > 0.05$). Timing of tracheostomy creation prior to TL had no impact on complications (ROC area under the curve = 0.539). Patients with complications after initial tracheostomy placement (2%) did not have an increased risk of developing complications after TL ($P = .944$).

Conclusion: Despite variation in surgeons, residents, and adjuvant therapy in our 13-year longitudinal cohort, POT does not carry increased risk of postoperative complications. TL should not be delayed in patients who have had POT.

Endoscopic Surgery Improves Survival in Nasopharyngeal Carcinoma: An NCDB Study

Andrey Finegersh, MD, PhD (Presenter); Mena Said, MD; Ryan K. Orosco, MD; Adam Deconde, MD

Introduction: The nasopharynx is anatomically constrained and tumors of the nasopharynx present unique surgical challenges. While primary surgical excision of head and neck cancers has advantages over primary radiation, the effect of surgical modality on nasopharyngeal cancers has not been established.

Method: The National Cancer Database (NCDB) was used to identify patients with nasopharyngeal cancers without distant metastasis who were treated with curative intent from 2004 to 2016. All adult patients with available staging and surgical codes were included. Demographic, clinical, and treatment variables were extracted and used for analysis. SPSS was used to generate univariate and multivariate comparisons.

Results: We identified 144 patients undergoing endoscopic (including robotic) resection excluding biopsies, 154 patients undergoing open surgical resection excluding biopsies, and 8408 patients undergoing primary radiation with or without chemotherapy (nonsurgical). Patients undergoing surgery were more likely to have lower T and N classification compared with primary nonsurgical therapy. Rate of positive surgical margin rate was high, with endoscopic resection at 41.5% and open resection at 39.1%. On multivariate Cox regression adjusting for clinical stage, age, facility type, primary site, median income, and systemic therapy, endoscopic resection was associated with significantly improved overall survival relative to nonsurgical therapy (adjusted hazard ratio [aHR] 0.67; 95% CI, 0.45–0.99; $P < .05$); however, open surgery was not associated with improved overall survival relative to nonsurgical therapy (aHR 0.76; 95% CI, 0.55–1.05; $P = .09$). In addition, increasing median income, decreasing clinical stage, private health insurance, and care at an academic facility were all associated with improved overall survival on multivariate Cox regression.

Conclusion: Our results suggest that endoscopic resection of nasopharyngeal cancers may improve overall survival. While these resections are challenging, advances in endoscopic and robotic platforms may expand surgical access in the future.

Functional Outcomes and Abbreviated Admission in Elderly Free Flap Patients

Anvesh Kompelli (Presenter); James R. Gardner, MD; Samantha Mohler; Jumin Sunde, MD; Emre Vural, MD; Mauricio Moreno, MD

Introduction: We assess elderly patients' length of stay and its effects on functional status in relation to preoperative functional status and modified frailty index after free tissue transfer (FTT).

Method: We performed a retrospective chart review of all elderly patients (≥80 years old) who underwent FTT for reconstruction following ablation of head and neck cancer from September 2013 to August 2020 at an academic, tertiary center. Ninety-day postoperative functional status, 30-day complications, and 90-day mortality were the primary endpoints of this study. Functional status was categorized as patients living independently, within assisted living, or within a skilled nursing facility (SNF). Modified frailty index was calculated for each patient. Patients were stratified by flap type (osseous vs soft-tissue component) and primary site (aerodigestive vs nonaerodigestive/cutaneous sites).

Results: A total of 44 patients, ranging in age from 80 to 95 years, met inclusion criteria. The mean length of stay for the cohort was 7.4 days. Flap failure occurred in 2 patients (4.5%). The 90-day mortality for the cohort was 15.9%. Flap type and primary site were not associated with the primary endpoints. Length of hospital admission was associated with transfer to higher level of care, flap failure, and return to the operating room ($P = .004$, $.000$, and $.000$, respectively). Modified frailty index was associated with flap failure ($P = .003$). There was a significant decline in functional status postoperatively,

compared with preoperative functional status ($P = .01$). Postoperative SNF functional status was associated with longer lengths of hospital stay ($P = .019$).

Conclusion: FTT is associated with changes in functional status in elderly patients. Age does not appear to be a driving factor in postoperative outcomes following FTT, but chronic medical comorbidities contribute to higher rates of postoperative complications, prolonged hospital stays, and functional decline.

Health-Care System Predictors of HPV-Status and Outcomes in Oropharyngeal Cancers

Rahul K. Sharma (Presenter); Raquel Lobo Querido, MD; Alexander Chern, MD; Andrew Tassler, MD

Introduction: In the past few decades, oropharyngeal cancer (OPC) has been increasing at an epidemic rate. The aim of this study is to examine social and health-system predictors of human papillomavirus (HPV)-status and disease-specific survival (DSS) in OPCs.

Method: This was a retrospective study of adults with OPC between 2010 and 2016 from the Surveillance, Epidemiology, End Results (SEER) registry. Logistic regression controlling for age, race, sex, and health care system factors were used to predict HPV-status. Kaplan-Meier and Cox regression were used to assess DSS. Health care system predictors, derived from the 2013 to 2017 American Community Survey, included county-level measures of median household, percentage without a high school education, rural/urban status, and density of radiation-oncologists/otolaryngologists/primary care physicians. Density of practitioners was calculated per 100,000 using 2017 US Department of Health and Human Services estimates.

Results: We analyzed 15,022 patients. Of the patients, 71.9% had HPV-positive OPC. HPV-positivity has significantly increased from 65.9% in 2010 to 77.2% in 2016 (p75th percentile; 0.83, 0.76–0.92, $P < .001$), and metropolitan county status (0.82, 0.75–0.89, $P < .001$) was independently associated with HPV-status. When stratified by HPV-status, higher income and being insured were positively associated with DSS in HPV-positive patients after controlling for TNM staging and age. Uninsured status, non-White race, and lower income was negatively associated with DSS in HPV-negative patients. Density of practitioners was not associated with HPV-status or DSS in either group.

Conclusion: Social and health-system factors affect HPV-status and survival of patients with oropharyngeal cancer. Awareness of risk factors, epidemiologic factors, and clinical behaviors is important to optimize care.

Intraoperative Vasopressors in Head and Neck Free Flaps: Reoperation Rates

James R. Gardner, MD (Presenter); Victoria Gau; Patrick Page; Emre Vural, MD; Jumin Sunde, MD; Mauricio Moreno, MD

Introduction: Vasoactive agent usage in free flap patients has been investigated and debated. Although much of the data

show no association between vasopressor usage and free flap failure, this study's objective was to investigate the effect of vasopressor use on the incidence of reoperation within 5 postoperative days.

Method: We performed a retrospective chart review of head and neck free flap patients (May 2014–October 2019) at an academic, tertiary care center. Patient charts were queried for demographic variables, use of continuous intraoperative vasopressor, type, duration, and infusion rate of vasopressor, reoperation within the first 5 postoperative days, and reason for reoperation.

Results: In total, 449 free flaps were performed. Some 174 patients had a continuous vasopressor used during their operation, of which 22 necessitated the use of 2 vasopressors simultaneously. A total of 23 reoperations occurred within 5 days; 8 required vasopressor usage during their initial surgery. Flap and vasopressor type had no association with reoperation ($P = .96$ and $.429$, respectively). Duration and infusion rate demonstrated no association with reoperation ($P = .978$ and $.323$ respectively). No association was seen between vasopressor use and all-use reason for reoperation ($P = .059$). Thrombosis or hematoma showed no association with vasopressor usage ($P = .083$). No increased risk of reoperation was noted for single or multiple vasopressor use ($P = .69$, $.5$, respectively).

Conclusion: Vasopressor use is not associated with reoperation in free flap patients. Duration and dosage are also not associated with reoperation. The reason for reoperation was not associated with any characteristics of vasopressor use. Though vasopressors are safe in free flap patients, their use should still be limited to cases of necessity.

Midlevel Provider-Based Survivorship Clinic Model: A 4-Year Experience

Quinn Dunlap, MD (Presenter); Jennifer Silva-Nash; Samantha Rose, APRN; Jumin Sunde, MD; Emre Vural, MD; Mauricio Moreno, MD

Introduction: We present our experience with the efficacy and safety of an advanced practice registered nurse (APRN)-based surveillance clinic for all head and neck malignancies, regardless of site/stage, beginning after 1 year of surveillance with the surgeon.

Method: All patients who underwent surveillance in an embedded APRN-based head and neck cancer survivorship clinic at an academic, tertiary care center from December 2016 to October 2020 were retrospectively reviewed for diagnosis, staging, pattern of recurrence, visit frequency, and compliance. Surgical resectability of recurrent disease was used as a surrogate for timely diagnosis.

Results: A total of 896 patients were followed by the APRN in our clinic model. The mean length of follow-up was 1 year during the study period. Mucosal primaries represented 80% of patients, with the remainder being cutaneous and salivary. The primary malignancies were predominately squamous cell carcinoma (73%). The most common primary subsites were oropharynx (29%), oral cavity (23%), hypopharynx/larynx (18%), and salivary glands (10%). T-staging at

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presentation for the primary cancer was 38% T1, 18% T2, 14% T3, and 22% T4. N-staging was 30% N0, 16% N1, 30% N2, and 5% N3. Recurrences were detected in 51 patients (5.4%). Recurrences included 22 local, 13 regional, 8 distant, and 6 second primaries. Two patients had multiple synchronous recurrences. Of the 41 patients who recurred locoregionally, 36 (88%) were deemed amenable to salvage surgical intervention, with or without adjuvant therapy.

Conclusion: APRN-based surveillance of head and neck cancer without patient selection (risk stratification) appears to be a sound model but needs further evaluation in a prospective fashion. Consistent with the literature, 88% of patients with locoregional recurrence were candidates for salvage surgery, emphasizing that recurrences are identified in a timely fashion.

NCDB: Survival Between Head and Neck Melanoma and Other Regions

Claudia I. Cabrera, MD, MS (Presenter); Shawn Li, MD; Rosalynn Conic, MD, PhD; Brian Gastman, MD

Introduction: Primary site is considered an important prognostic factor for cutaneous malignant melanoma (CMM); however, opinions vary regarding its influence on survival. This study compares overall survival between head and neck melanoma (HNM) and melanoma of other regions (MOR) and also between melanoma of the scalp and neck (MSN) and melanoma of other head regions (MOHR).

Method: Patients diagnosed with CMM are reported to the National Cancer Database (NCDB). We identified patients with HNM (MSN and MOHR included) and MOR, stages I to IV ($n = 39,965$) and their linked survival data using the NCDB. Survival was analyzed using propensity score-matching methods.

Results: After matching using propensity scores, allowing this observational study to mimic a randomized controlled trial, subjects with HNM showed a 25% increased mortality when compared with MOR (hazard ratio [HR] = 1.25, [95% CI, 1.17–1.33]; $P < .05$). Among those with HNM, hazard was not proportional over time, overall subjects with MSN in the first 3.5 years follow-up (75% of subjects) showed a 14% increased mortality when compared with MOHR (HR 1.14, [95% CI, 1.04–1.26]; $P < .05$); however, after 3.5 years, no difference in survival was noted ($P = .53$).

Conclusion: In this study, we found that patients with head and neck melanoma have a higher mortality when compared with melanoma of other regions; however, the risk of mortality of primary sites within the head and neck region varies over time. These results suggest that patients with scalp and neck melanoma are at greater risk for mortality during the first 3.5 years, and this increased risk is not evident once this threshold of 3.5 years of follow-up is reached. A lower threshold of suspicion for recurrence/metastasis may be warranted for patients with HNM so as to improve survival and prevent nonresectable disease. Further research is needed to evaluate additional patient factors or a difference in treatment approach influencing this increased risk.

Occult Metastases During Salvage Oral, Oropharyngeal Free Flaps: Oncologic Outcomes

Margaret E. Wieser (Presenter); Emily Sagalow; Alyssa Givens; Joseph M. Curry, MD; Tabitha L. Galloway, MD; Patrick T. Tassone, MD

Introduction: The incidence, location, and oncologic impact of occult nodal metastasis after elective neck dissection in the setting of salvage oral cavity or oropharyngeal resection requiring free tissue transfer reconstruction have not been well-studied.

Method: This was a retrospective cohort study of 2 tertiary cancer centers. We identified patients with recurrent, persistent, or second primary oral cavity or oropharyngeal squamous cell carcinoma with no evidence of regional metastasis and who required free tissue transfer reconstruction of primary site. Patients who underwent elective neck dissection or exploration were reviewed for the presence of occult nodal metastasis. Disease-free and overall survival were measured. Odds ratios (ORs) and hazard ratios (HRs) were used for analysis.

Results: A total of 83 patients were included: 52 with oral cavity primary tumors and 31 with oropharynx. Some 78 patients (94%) underwent elective salvage neck dissection, and the average unilateral nodal yield was 13.8 lymph nodes. Occult metastases were found in 9 (11.5%) patients, of whom 2 had subsequent regional recurrence. Neither elective neck dissection nor presence of occult metastasis was significantly associated with regional disease-free survival or overall survival. Among 10 patients with regional recurrence during follow-up, 3 occurred ipsilateral to prior neck dissection. Oropharyngeal primary tumors were associated with higher risk of occult metastasis (OR 1.38, $P < .01$) and worse overall survival (HR 2.09, $P = .01$).

Conclusion: There is a low incidence of occult metastasis in the setting of postradiated recurrent or second-primary oral cavity and oropharyngeal tumors. Elective neck dissection did not improve regional or overall survival. Occult metastasis was more likely in oropharyngeal primary tumors but did not significantly affect regional or overall survival. Elective neck dissection after radiation may be required to access vessels for free flap reconstruction but did not affect oncologic outcomes in this study.

Oncologic Outcomes Following Induction Chemotherapy for Sinonasal Squamous Cell Carcinoma

Alexander T. Murr (Presenter); Nicholas R. Lenze, MPH; Jared M. Weiss, MD; Bhishamjit S. Chera, MD; Brian D. Thorp, MD; Siddharth H. Sheth, DO, MPH

Introduction: The use of induction chemotherapy has historically been reserved for achieving organ preservation for patients with sinonasal squamous cell carcinoma (SCC). This study compares oncologic outcomes in sinonasal SCC treated with induction chemotherapy prior to surgical resection vs patients treated with primary surgical resection \pm postoperative chemoradiotherapy.

Method: Medical records of patients with biopsy-proven sinonasal SCC treated between 2000 and 2020 were reviewed for demographics, tumor characteristics, staging, treatment details, and oncologic outcomes. Patients were matched 1:1 based on age, sex, and cancer stage according to treatment received. Time-to-event analyses were conducted.

Results: In total, 26 patients with locally advanced sinonasal SCC were included and received either induction chemotherapy (n = 13) or primary surgery (n = 13). Baseline demographics, Charleston Comorbidity Index, and median follow-up time were well balanced. Weekly cetuximab, carboplatin, and paclitaxel (Kies regimen) was the most common induction regimen used. No difference in recurrence-free survival was found between the induction or primary surgery groups at 1 year (90.0% vs 80.8%; $P = .499$) or at 3 years (75.0% vs 80.8%; $P = .971$). Compared with primary surgery, patients treated with induction chemotherapy trended toward improved 1-year overall survival (OS; 100% vs 76.2%; $P = .088$) and had significantly improved 3-year OS (100% vs 48.4%; $P = .016$). Two patients receiving primary surgery presented with metastatic disease at recurrence compared with 0 in the induction group.

Conclusion: Induction chemotherapy improved OS compared with primary surgery \pm postoperative therapy. We hypothesize that differences in recurrence patterns may explain these findings.

Open Partial Horizontal Laryngectomies for T3–T4 Laryngeal Cancer: Oncological Outcomes



Pedro Henrique Esteves Gonçalves (Presenter); Izabella Costa Santo; Mariana Machado Salles; Emilson de Queiroz Freitas; Fernando Luiz Dias; Andressa Silva de Freitas

Introduction: The Open Partial Horizontal Laryngectomies Type II (OPHL-II) is an open partial surgical technique initially described for the treatment of initial tumors of the glottic region. The use of this surgical technique for selected tumors in advanced stages and its oncological results have been widely discussed in the literature. The objective of the study is to evaluate oncological and functional results in patients with laryngeal tumors T3 and T4 who underwent OPHL-II between 1995 and 2015.

Method: Retrospective cohort study, including individuals diagnosed with laryngeal cancer T3 and T4 and submitted to OPHL-II in the Head and Neck Surgery Department of the Brazilian National Cancer Institute, was performed.

Results: There was a total of 204 patients with T3 and T4a staging, 172 (84.4%) cases pathologically staged as T3 and 32 (15.6%) cases as T4a. Almost all patients (186, 91.1%) underwent OPHL-II, only 14 (6.8%) had OPHL-IIb, 4 patients had OPHL-IIIa. Of these patients, 193 were men (94.6%) with a mean age at surgery of 60.8 years. We observed that 91% of the patients were able to breathe without the aid of a tracheostomy during the follow-up. Of the patients, 90% ate exclusively orally. After 5 years of follow-up, the overall survival (OS) was 78.7%, the disease-free survival (DFS) was 85.7%, and the disease-specific survival (DSS) was 85.3%. Patients older than 70 years had worse OS ($P = .003$). The DFS was affected negatively by higher

T staging (0.048) and for patients who had 1 arytenoid removed ($P = .019$). These 2 categories of patients also had worse DSS ($P = .030$ and $P = .036$, respectively).

Conclusion: OPHL-II is a safe surgical procedure for the treatment of advanced laryngeal tumors, with good oncological and functional outcomes. Age, T staging, and arytenoid preservation affected survival.

Operative Time and Complications After Oral Cavity Free Flap Reconstruction

Noah Shaikh, MD (Presenter); William Stokes

Introduction: We evaluate the effects of operative time on mortality, venous thromboembolism (VTE), surgical site infection (SSI), myocardial infarction (MI), cerebrovascular accident (CVA), pneumonia, readmission, reoperation, and skilled facility discharge after head and neck free flap reconstruction.

Method: The American College of Surgery (ACS) National Surgical Quality Improvement Program (NSQIP) data from 2015 to 2018 were queried for postsurgical outcomes after head and neck oncologic resection with free flap reconstruction. The primary outcomes assessed were mortality, skilled facility discharge, readmission rate, reoperation rate, VTE, SSI, MI, CVA, and pneumonia. The primary predictive variable assessed was operative time. Secondary predictive variables assessed included 2-team approach, body mass index (BMI), chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), and osteocutaneous flap use. Logistic regression models were used to predict surgical outcomes. Variables in the univariate model with a P value $\leq .1$ were applied to a multivariate model.

Results: A total of 1710 patients who underwent microvascular free flap reconstruction of the oral cavity were identified. The mean operative time was 9.6 hours. In univariate models, operative time was predictive of increased rates of discharge to a skilled nursing facility, MI, VTE, rates of reoperation, and SSI. Multivariate models found that operative time was an independent predictor of SSI, reoperation, skilled facility discharge, and MI. In addition, the 2-team approach was independently associated with reoperation and pneumonia. There was a significant increase in operative time with the 2-team approach to flaps from 9.4 to 9.8 hours ($P = .01$).

Conclusion: To our knowledge, this is the largest assessment of operative time on free flap outcomes in head and neck reconstruction. We found increased operative time was an independent predictor of increased rates of MI, SSI, VTE, reoperation, and discharge to a skilled nursing facility. Interestingly, we found that the typical 2-team approach was predictive of an increased operative time.

Outcomes in Salvage Surgery for Oropharyngeal Squamous Cell Carcinoma

Eric Abello, MD (Presenter); Khodayar Goshtasbi; Michael Berger, MD; Jack Birkenbeuel; Tjason Tjoa, MD; Yarah Haidar, MD

Introduction: Primary treatment of oropharyngeal squamous cell carcinoma (OPSCC) frequently includes radiation \pm

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chemotherapy. Treatment for locoregional recurrence of OPSCC often necessitates salvage surgery. With the increasing incidence of OPSCC and the improved prognosis in OPSCC associated with human papillomavirus (HPV), we aimed to evaluate survival outcomes of salvage surgery on a national sample.

Method: The National Cancer Database was queried from the years 2004 to 2015. Patients with OPSCC who underwent radiation therapy followed by surgery at least 6 weeks after the start of radiation (defined as salvage surgery) were included. Survival outcomes were analyzed using univariate and multivariate Cox proportional hazard models to evaluate the association between several demographic or clinical factors and survival. Hazard ratio (HR) and 95% confidence intervals (CIs) were reported. In addition, Kaplan-Meier log-rank tests were used to compare survival outcomes based on insurance status, use of chemotherapy, surgical margins, and HPV status.

Results: A total of 1078 (84.1% male) patients were included, with a mean age of 57.6 ± 9.8 years and median survival of 87.8 months. On Kaplan-Meier analysis, private insurance, use of chemotherapy, and negative surgical margins were associated with improved survival. On multivariate analysis, independent predictors of mortality included lower income (hazard ratio [HR] = 1.20, $P = .045$), government insurance (HR = 1.72, $P < .001$), being uninsured (HR = 1.53, $P = .020$), positive surgical margins (HR = 1.82, $P < .001$), and ≥ 7 days of postoperative hospitalization (HR = 2.59, $P < .001$). Subgroup analysis based on HPV status ($n = 247$) demonstrated that HPV positivity ($P = .027$) contributed to improved overall survival.

Conclusion: Salvage surgery for OPSCC may continue to become more frequent given the increased incidence of OPSCC, and this study suggests survival in salvage surgery is linked to insurance status, HPV status, income level, and margin status. These results can aid in both patient selection and patient counseling when considering salvage surgery in recurrent OPSCC.

Patients With Head & Neck Cancer With COVID-19 in Brazil

Pedro Henrique Esteves Gonçalves (Presenter);
Andressa Silva de Freitas; Nathalia Peres Borges dos Santos;
Mariana Machado Salles; Fernando Luiz Dias;
Izabella Costa Santo

Introduction: With the emergence of SARS-CoV-2 infection, concern for the most vulnerable populations has become an urgency. Several studies warn of the weakness of patients with head & neck cancer (HNC). The objective is to describe the sociodemographic and clinical profile of patients with HNC with a positive diagnosis for COVID-19 who required hospitalization.

Method: In this prospective observational study, carried out from March to May 2020, we included individuals of both sexes, enrolled in the Head and Neck Surgery Department of the Brazilian National Cancer Institute and diagnosed with COVID-19 who needed hospitalization.

Results: A total of 1153 patients were attended in this period; 30 patients required hospitalization and tested positive for COVID-19. The group had a mean age of 62.4 years, with a prevalence of male patients ($n = 20$; 66.67%). There was a predominance of elderly (63.33%), self-declared White (73.32), married (53.32), with low education (56.58%), and smokers (56.67%). Most patients had advanced clinical oncological staging (III–IV; 53.33%), approximately. The larynx was the site with the highest prevalence of individuals ($n = 7$), followed by the thyroid ($n = 5$) and the oral cavity ($n = 5$). Systemic arterial hypertension and diabetes mellitus were the most prevalent comorbidities. It was observed that 60% of patients delayed the start of cancer treatment due to a positive diagnosis for COVID-19. Ten deaths had been confirmed, for a mortality rate of 33.3% in the sample.

Conclusion: The present study describes a group of patients with HNC at increased risk for hospitalization infected by COVID-19: elderly individuals, with advanced tumors, economically disadvantaged, and undergoing cancer diagnosis and treatment who were not in social isolation.

Predictive Factors of Metastasis in Minor Salivary Gland Cancer

Eduardo Wanderley Estanislau da Costa (Presenter);
Paula Fatturi Moretzsohn, MD; Julia Bette Homem de Mello;
Luis Felipe Ribeiro Pinto; Roberto Araujo Lima;
Fernando Luiz Dias

Introduction: Cervical and distant metastasis is an independent factor of poor prognosis for patients with malignant epithelial neoplasms of salivary glands. The lack of consensus related to the elective treatment of the N0 neck and the scarcity of effective systemic treatments for distant metastatic diseases make it essential.

Method: A retrospective study, including 379 patients with tumors in oral cavity or oropharynx, treated over a 20-year period (1995–2015) at the National Cancer Institute of Brazil. Clinical, pathological, and treatment data were obtained from medical records.

Results: Metastasis were observed in 68 patients (17.9%); among them, 40 patients had cervical metastasis (10.6%), 22 patients had distant metastasis (5.8%), and 6 patients had both cervical and distant metastasis (1.6%). Adenoid cystic carcinoma type tumor ($p < 4$ cm, $P < .001$; odds ratio [OR] = 7.216) and vascular invasion ($P = .001$; OR = 8.156) for cervical metastasis. The impact of cervical metastasis on 5- and 10-year overall survival (OS) was 52.6% and 38%, respectively. While the impact of distant metastases on 5- and 10-year OS was 45.2% and 15.7%, respectively. The OS of patients without cervical or distant metastasis was 85.8% at 5 years and 75.4% at 10 years.

Conclusion: For distant metastasis, the adenoid cystic carcinoma-type tumor is the most important predictive factor, and for cervical metastasis, a combination of smoking and alcohol consumption, adenocarcinoma tumor type, classification T > 4 cm, and vascular invasion. Cervical and distant metastasis negatively affected the OS.

Predictors of Survival in Parotid Adenocarcinoma: Study of 2387 Cases

Priyanka Singh (Presenter); Simran Ohri; Sudeepti Vedula; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: The goal of this study is to identify predictors of overall survival in adenocarcinoma of the parotid gland using a national database.

Method: The National Cancer Database was used to identify cases of parotid adenocarcinoma from 2012 to 2017. Relevant demographic, tumor, and survival characteristics were extracted and analyzed. Kaplan-Meier and Cox multivariate regression analyses were performed to evaluate the association between regional lymph node metastasis (defined by clinical N+), distant metastasis, margins, tumor staging, and survival.

Results: A total of 2387 cases of adenocarcinoma of the parotid gland were identified. The age at diagnosis ranged from 18 to 90 years (mean, 66 years). Most patients were male (64.3%). Most tumors were between 2 and 4 cm (48.4%) and had negative margins after surgical resection (61.6%). Metastasis was uncommon (13.3%). The 5-year overall survival rate was 59.9%. Upon multivariate regression analysis, several variables were found to be significantly associated with worse survival, including older age (hazard ratio [HR]: 1.64; 95% CI, 1.33–2.03; $P < .001$), distant metastasis (HR: 1.74; 95% CI, 1.10–2.76; $P < .018$), and pathologic lymph node involvement (HR: 1.84; 95% CI, 1.30–2.64; $P = .001$). Clinical lymph node involvement, however, was not found to be a significant predictor of survival ($P = .59$). The status of surgical margins (negative vs positive) was also not found to be a significant predictor of survival ($P = .059$).

Conclusion: Adenocarcinoma of the parotid gland is a malignancy with moderate prognosis. The presence of pathologic lymph node involvement, distant metastasis, and older age were found to be significant predictors of 5-year survival.

Predictors of Survival in Parotid Gland Carcinoma Pleomorphic Ex Adenoma

Vivienne Qie (Presenter); Devanshi Patel; Sudeepti Vedula; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: This study aims to better characterize predictors of survival of carcinoma pleomorphic ex adenoma (CPXA) of the parotid using a national database.

Method: The National Cancer Database was used to extract patients with CPXA of the parotid from 2004 to 2016. Relevant demographic, tumor, and survival characteristics were analyzed. Kaplan-Meier and Cox multivariate regression analyses were performed to compare survival predictor variables, including regional lymph node metastasis (defined by clinical N+), tumor size, metastasis, and surgical margins.

Results: A total of 1218 cases of parotid CPXA were identified. The mean age at diagnosis was 64 years (range, 18–90 years). Most patients were male (59.5%). Most tumors were between 2 and 4 cm in size (47.0%). Most cases had negative surgical margins following surgical resection

(67.7%). Clinical (cN+) and pathologic (pN+) locoregional metastases were present in 22.6% and 34.3% of cases, respectively. Distant metastases were less common (4.5%). The 5-year overall survival rate was 63.9%. Kaplan-Meier analyses found lower overall survival for cases with regional metastasis (cN+ = 40.3%; pN+ = 42.2%), distant metastasis (19.5%), and positive margins (43.7%). Upon multivariate analysis, regional metastasis (hazard ratio [HR]: 1.41; 95% CI, 1.00–1.98; $P = .05$), distant metastasis (HR: 2.26; 95% CI, 1.42–3.59; $P = .001$), and positive surgical margins (HR: 1.80; 95% CI, 1.43–2.27; $P < .001$) were found to be significant predictors of worse survival.

Conclusion: CPXA is a malignancy with moderate prognosis. The presence of regional and distant metastases and positive margins were found to be significant predictors of 5-year survival.

Preoperative Activity Status Predicts Postoperative Head and Neck Wound Complications

Kunjan B. Patel (Presenter); Gabriela DeVries; Maria Masciello; Elena Gavril; Christopher Sullivan

Introduction: Preoperative functional activity status (PFAS) is a key component of frailty, a known risk factor for postoperative complications. The association between PFAS and incidence of postoperative wound complications, however, has not been well described in head and neck (H&N) literature. The current study investigates whether PFAS as measured by metabolic equivalents (METs) affects the incidence of wound complication after H&N cancer surgery.

Method: Institutional review board-approved, retrospective review of patients from 2014 to 2020 who underwent resection of aerodigestive tract squamous cell carcinoma excluding the esophagus at a single tertiary care center was performed. A standardized MET calculation questionnaire was used. METs measure the energy cost of activities compared with the basal metabolic rate. One MET equates to energy used when sitting. Ten (10) METs corresponds to energy used with vigorous activity. Patients were divided into 3 MET groups: 7 to 10 (group 1), 5 to 6 (group 2), or 1 to 4 (group 3). Chart-documented wound complications included flap failure, dehiscence, infection, incisional breakdown, hematoma, and chyle leak. Wound complication incidences were compared to discern if patients in the low (<4) MET subgroup developed more complications than patients in the higher MET subgroup. Statistical analysis was done via Welch t test. A P value <.05 was statistically significant.

Results: Of 233 patients, 46 (19.7%) had 7 METs (group 1). Wound complications occurred in 24.4% of patients. Of these, 12.2% were in group 1, 66.6% in group 2, and 21.0% in group 3. Group 1 (METs >7) patients had a significantly lower wound complication incidence compared with group 2 or 3 ($P = .02$). The difference remained significant after adjusting for tobacco or alcohol use, preoperative albumin, and prior chemoradiation.

Conclusion: Patients with high PFAS (METs >7) had a significantly lower incidence of postoperative wound complications compared with patients with METs <7 after adjusting for

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common risk factors. Functional status, defined by METs, may predict the wound complication rate after H&N cancer surgery.

Pre-operative Risk Factors Associated With Free Flap Failure and Complications

Madelyn Stevens, MD (Presenter); Michael H. Freeman; Justin Shinn; Nicole Kloosterman; Kyle Mannion; Sarah Rohde, MD

Introduction: Microvascular free flap reconstruction is a key reconstructive option for defects of the head and neck. The present study aims to identify the incidence and preoperative risk factors associated with free flap complications and failure.

Method: Retrospective review at a single tertiary care center that included 1052 patients who underwent consecutive free flap reconstruction of the head and neck was performed. Variables collected include demographics, comorbidities, preoperative laboratory values, treatment history (prior chemoradiation), and cancer stage. Postoperative flap-related complications included early (within 1 postoperative week) flap failure, oro-/pharyngocutaneous fistula, and other surgical complications including hematoma, infection, dehiscence, and skin loss.

Results: Incidence of early free flap failure was 4.2% (n = 44). Female sex (odds ratio [OR] 2.47; 95% CI, 1.26–4.85; $P = .008$), elevated preoperative platelet count (OR 2.41; 95% CI, 1.13–5.18; $P = .02$), and presence of peripheral vascular disease (PVD; OR 3.46; 95% CI, 1.28–9.34; $P = .01$) were independently associated with the risk of early free flap failure. Flap-related complications occurred in 21.3% (n = 225) of patients. Female gender (OR 1.57; CI, 1.07–2.39; $P = .02$) and PVD (OR 2.69; CI, 1.42–5.11; $P = .003$) were also associated with nonfistulous flap complications. In addition, age (OR 0.98; CI, 0.97–0.99; $P = .03$), race (OR 0.66; CI, 0.46–0.93; $P = .02$), diabetes (OR 1.77; CI, 1.08–2.89; $P = .02$), prior chemoradiation (OR 1.46; CI, 1.00–2.12; $P = .05$), and advanced primary tumor stage (T3/T4; OR 1.56; CI, 1.08–2.25; $P = .02$) were associated with other flap complications.

Conclusion: High preoperative platelet counts, female sex, and PVD are all strong predictors of free flap failure and complications. This suggests that hypercoagulability and poor vessel quality may predispose patients for flap failure. Patients with elevated platelets or PVD warrant careful reconstructive decision making and close monitoring in the perioperative period.

Prognostic Utility of Neutrophil-Lymphocyte Ratio in Locoregionally Advanced Larynx Cancer

Rohith S. Voora (Presenter); Nikhil V. Kotha; Abhishek Kumar, MD, MAS; Tyler F. Stewart, MD; Brent S. Rose, MD; Ryan K. Orosco, MD

Introduction: Neutrophil-lymphocyte ratio (NLR) has been associated with survival outcomes in several nononcologic and oncologic disease states, but its association with larynx

cancer has yet to be elucidated. We examine the utility of NLR as a predictor of survival in patients with locoregionally advanced larynx cancer treated with curative intent within the Veterans Affairs (VA) national database.

Method: Within the VA database, we identified patients with locoregionally advanced (T3–4, N0–3, M0) laryngeal squamous cell carcinoma diagnosed between 2000 and 2017 and treated with curative intent—either primary laryngectomy with adjuvant therapy or radiation-based treatments. Cutoff values for NLR were calculated using Contal/O’Quigley’s and Cox Wald methods. The outcomes of overall survival (OS), larynx cancer-specific survival (LCS), and nonlarynx cancer survival (NCS) were evaluated using multivariable Cox and Fine–Gray models.

Results: In 1047 eligible patients, the optimal NLR cutoff was identified as 4.17: 722 patients with $NLR \leq 4.17$, 325 patients with $NLR > 4.17$. The elevated NLR cohort had a greater proportion of T4 disease (39.4% vs 28.4%, $P = .0005$), node-positive disease (52.3% vs 43.1%, $P = .01$), and surgical treatment (43.7% vs 35.2%, $P = .01$). Kaplan-Meier analysis revealed an inferior median OS for the elevated NLR cohort (21.6 months; 95% CI, 17.8–24.8 months) compared with the lower NLR cohort (37.2 months; 95% CI, 31.1–43.0 months) $p < .05$. $NLR > 4.17$ was associated with decreased OS (hazard ratio [HR] 1.31; 95% CI, 1.12–1.54; $P = .0010$) and inferior LCS (HR 1.46; 95% CI, 1.17–1.83; $P = .0009$) but not with NCS (HR 0.94; 95% CI, 0.75–1.18; $P = .58$).

Conclusion: In patients with locoregionally advanced larynx cancer treated with curative intent, $NLR > 4.17$ was associated with inferior OS and LCS. The prognostic value and clinical utility of this simple biomarker offers potential as a valuable cancer-specific marker in this high-risk population and should be further studied as a clinical tool in this setting.

Protocolized Preoperative Airway Management for the Difficult H&N Airway

Sobia Khaja (Presenter); Darrell Randle

Introduction: Head and neck cancer malignancies can pose significant and unique challenges in airway management due to the resultant anatomical and functional changes of the upper aerodigestive tract. These changes not only can affect the primary surgical management of the disease but also influence subsequent surgical procedures.

Method: We developed and implemented a new institutional protocol in October 2019 to facilitate optimized clinical care of these complex patients after experiencing a potentially avoidable emergency tracheostomy and several near-miss situations. This protocol involved collaboration between multiple departments and consisted of (1) chart review of all patients with head and neck cancer scheduled to undergo procedural intervention to identify patients potentially requiring advanced clinical airway assessment, (2) airway clearance examinations performed by otolaryngology with documentation of airway management recommendations, (3) assessment by the anesthesia preoperative clinic, (4) closed-loop communication with the anesthesia operating room scheduling team with verification of the airway

management plan. A centralized difficult airway calendar was additionally created for shared use to facilitate communication between care team members.

Results: A total of 45 patients were identified as potential difficult airways from October 2019 to January 2021 after undergoing screening by the head and neck team. Each patient had a multidisciplinary airway management plan created and communicated to the team prior to surgery. None of these patients required an emergency tracheostomy or experienced unanticipated airway management complications.

Conclusion: Head and neck cancer patients present a unique challenge with regard to airway management. We have demonstrated the feasibility, acceptance, and success of a structured multidisciplinary airway management program in preventing unanticipated airway management complications.

Quality-of-Life in Recurrent and Second Primary Head and Neck Cancer

Vaibhav Ramprasad, MD (Presenter); Jinhong Li, MS; Karley Atchison, MA; Dan Zandberg; Marci Nilsen, PhD, RN; Jonas T. Johnson, MD

Introduction: With multiple modalities of treatment for head and neck squamous cell carcinoma (HNSCC) with similar cure rates, quality-of-life (QOL) measures can be used to compare modalities. We examined QOL in patients treated for primary only, second primary tumors, and recurrence of HNSCC.

Method: The study design was a retrospective cohort study conducted on patients seen in survivorship clinic between December 2016 and June 2019. QOL was measured using the University of Washington QOL (UW-QOL) questionnaire with physical and social subscale scores calculated. Scores at the most recent clinic visit were used. Regression analysis and trend tests were used to explore associations and compare QOL outcomes.

Results: A total of 662 patients, 546 patients with 1 HNSCC primary, 34 patients with discrete second primary, and 82 with recurrent HNSCC were included. On multivariate analysis, patients with 1 HNSCC primary undergoing definitive chemoradiation therapy (CRT) and surgery with postadjuvant therapy (SA) had worse QOL (CRT: UWQOL-Physical 12.17 [95% CI, -16.58, -7.77; $P < .0001$, SA, -12.11 [-16.07, -8.15], $P < .0001$, and CRT, UWQOL-Social -5.32 [95% CI, -9.44, -1.20, $P = .011$, SA: -7.28 [95% CI, -11.34, -3.23, $P = .00045$] compared with surgery only. Patients with second primary and recurrence fared worse (second primary: UWQOL-Physical -11.15 [-17.72, -4.58], $P = .00091$, recurrence: -14.42 [-18.81, -10.03], $P < .0001$) than primary HNSCC only. UWQOL-Social was worse in recurrent HNSCC at -5.94 [-10.58, -1.30, $P = .012$] compared with primary HNSCC only. Within patients with recurrence, CRT trended worse UWQOL physical scores (11.49 [-24.03, 1.06], $P = .07$) compared with surgery only.

Conclusion: Lower QOL scores are associated with patients with recurrent or synchronous second primary HNSCC diagnosis. Patients with recurrent HNSCC undergoing CRT had worse QOL than those undergoing salvage surgery. Consideration of

QOL is crucial, particularly in treating patients with recurrence and second primary. Surgical management should be favored if treatment modalities are clinically equivalent due to favorable QOL outcomes.

Role of Tumor Infiltrating Lymphocytes in Laryngeal Cancer Undergoing Bioselection

Molly Heft Neal, MD (Presenter); Paul Swiecicki; Francis Worden; Gregory Wolf; J Chad Brenner; Matthew Spector

Introduction: Bioselection to assess tumor response after 1 cycle of chemotherapy to determine candidacy for larynx preservation vs primary total laryngectomy is a treatment strategy for patients with advanced larynx squamous cell carcinoma (LSCC). Tumor infiltrating lymphocytes (TILs) are proven biomarkers in head and neck cancer but have not been evaluated as a way to select patients for treatment paradigms. This study evaluated the role of TILs in patients with advanced LSCC undergoing bioselection.

Method: Patients with advanced-stage LSCC treated with bioselection were identified, and those with available tissue samples were included ($n = 76$). Patient characteristics were collected, and immunohistochemistry for TILs was performed. Patients were stratified by CD8 status using the median TIL count as a cutoff. Kaplan-Meier survival analysis and multivariate Cox regression were performed using SPSS (v. 26).

Results: There were no significant differences in demographics between patients with low and high CD8 lymphocyte counts. When controlling for tobacco, tumor site, and stage, high CD8 TIL count was an independent predictor of improved 5-year disease-specific survival (hazard ratio 0.17; 95% CI, 0.03–0.84; $P = .03$). Similar trends were seen with overall survival; however, data were not statistically significant ($P = .16$). Although CD8 TIL counts did not predict overall response to induction therapy, subgroup analysis of patients treated with CRT revealed that CD8 TIL count was significantly associated with degree of response. Patients in the CD8 high cohort were significantly more likely to have a greater than 80% response to induction compared with those in the CD8 low group (64% vs 38%, $P = .046$). There was no significant association between CD8 TILs and laryngectomy.

Conclusion: These findings support prior data published by our group that showed that TILs predict disease-specific survival in advanced LSCC. TILs did not predict response to induction chemotherapy or laryngectomy but were significantly associated with degree of response among chemotherapy responders.

Sentinel Lymph Node Biopsy in High-Risk Cutaneous Squamous Cell Carcinoma

Marc-Antoine Poulin (Presenter); Valerie Tremblay-Abel; Emilie Perron; Francois Parent; Marie-Michele Blouin

Introduction: Nodal metastasis is an important prognostic factor for mortality in cutaneous squamous cell carcinoma (cSCC), but there is no consensual agreement on which

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patients may benefit sentinel lymph node biopsy (SLNB). This study aimed to establish the rate of positive SNLB among patients with high-risk cSCCs and help identify which high-risk features are associated with a positive SLNB.

Method: This is a retrospective chart review of 93 patients who underwent SLNB for cSCC between January 2014 and December 2019 at CHU de Quebec. Patients with prior clinical or radiological nodal metastasis were excluded. The main outcome measurements were clinical and histopathological high-risk factors and SNLB results. Patients with positive SNLB were discussed at a multidisciplinary cutaneous tumor board for adjuvant therapy.

Results: Of the 93 SLNBs performed, 83 (89%) were in the head and neck region and 5 (5.4%) had a positive SNLB. Three patients (3/5) had neck dissection and 1 (1/5) had radiation therapy, with no recurrence at the time of last follow-up. A tumor diameter greater than 2 cm, a tumor depth greater than 6 mm or below subcutaneous fat, perineural invasion of nerves with a diameter greater than 0.1 mm, moderate or poor histologic differentiation, lymphovascular invasion, and immunosuppression were associated with a positive SLNB. All tumors with a positive SLNB were classified as T2b or more according to the Brigham and Women's Hospital (BWH) tumor staging.

Conclusion: High-risk characteristics may help to identify which patients could benefit from SLNB. Our results support that SNLB should be performed for tumors with 2 or more BWH high-risk features (T2b and T3) but not for earlier stages.

Socioeconomic Factors Influencing Treatment Delay and Mortality in Laryngeal Cancer

Noah Shaikh, MD (Presenter); William Stokes

Introduction: We evaluate the effects of race, ethnicity, socioeconomic status, and distance to treating facility on treatment delays and survival outcomes in laryngeal squamous cell carcinoma (LSCC).

Method: The National Cancer Database (NCDB) from 2004 to 2017 was queried for laryngeal cancer outcomes. The primary outcomes assessed were the diagnosis to treatment interval (DTI) and overall survival. Predictive variables of a prolonged DTI were assessed using univariate and multivariate logistic regression models. The primary predictive variables assessed were race, ethnicity, sex, age, distance to treating facility, rural living, academic versus nonacademic treatment center, and insurance status. The effects of DTI on survival were then assessed using a Cox proportional hazards model. Secondary predictive variables included in the model were clinical TNM stage at presentation, race, ethnicity, distance, sex, age, insurance coverage, rural living, and treatment at an academic center.

Results: A total of 136,203 patients with laryngeal cancer were identified, of which 53,398 had a prolonged DTI. The overall distance to a treatment facility was found to be predictive of a DTI greater than 30 days. This was independent of race, age, gender, and insurance status, which were all

predictors of prolonged DTI as well. DTI greater than 30 days was found to be an independent significant predictor of mortality with a hazard ratio of 1.23 ($P < .001$). In contrast, treatment at an academic facility was not found to be a significant predictor of survival in our model.

Conclusion: To our knowledge, this study is the largest study to assess the impact of socioeconomic factors on DTI and DTI's effects on survival in patients with laryngeal cancer. DTI is significantly affected by social determinants of health, such as race, gender, insurance status, and treatment availability. Of note, prolonged DTI was a significant predictor of mortality while treatment at a high-volume center was not. Improving referral pathways or outreach may help improve survival in laryngeal cancer, especially in high-risk populations.

Solitary Fibrous Tumors of the Head and Neck

Hye Rhyn Chung (Presenter); Albert Y. Han, MD, PhD; Farres Obeidin; Ashley E. Kita, MD; Dinesh K. Chhetri, MD; Maie A. St. John, MD, PhD

Introduction: Solitary fibrous tumors (SFTs) are rare soft-tissue neoplasms with a propensity to recur. Approximately 6% of SFTs are reported in the head and neck. The aim of this study was to evaluate clinicopathological factors of head and neck SFTs and features that may predict tumor recurrence.

Method: A single-center retrospective study was conducted on pathologically confirmed cases of SFTs between 1996 and 2020. Patient demographics, clinical course, and histopathological features including diagnostic markers of STAT6 and CD34 were evaluated. Recurrence-free survival was estimated using Kaplan-Meier analysis. Multivariate analyses were performed using Cox regression analyses.

Results: A total of 52 patients were reviewed. The median patient age was 55.5 years (range, 15–89). SFTs showed a slight female predilection (55.8%). The most common subsite was orbit (55.8%, $n = 29$), but other involved areas included nasopharynx, paranasal sinuses, and scalp. The mean tumor size was 3.2 cm (range, 0.9–11.2). Strong STAT6 (100%) and CD34 (97.9%) expression was observed on immunohistochemistry. All patients were initially managed with wide local excision. Approximately 90% of patients ($n = 24$) had positive margins on pathological review. Some 40% ($n = 16$) recurred at a median of 2.5 months (range, 0–119) after surgery. On univariate analysis, tumor size greater than 4 cm and patient race were significant predictors of tumor recurrence. Hispanic race was associated with the highest rates of recurrence. However, patient age (≥ 55 years), high mitotic rate, and subsite were not associated with recurrence. On multivariate analysis, only race but not tumor size remained as a significant covariate.

Conclusion: In this largest case series of head and neck SFTs, a median time to recurrence of 2.5 months was observed. Large tumor size and patient race were associated with tumor recurrence on univariate analysis, but only patient race in multivariate analysis. Because of the short time to recurrence, imaging within 2 months after surgery may be indicated.

Stage-Specific Survival in Young Oral Tongue Squamous Cell Carcinoma Patients

Krishna Bommakanti, MD (Presenter); Arash Abiri; Albert Y. Han, MD, PhD; Khodayar Goshtasbi; Edward Kuan; Maie A. St. John, MD, PhD

Introduction: We aim to identify specific demographic factors or clinicopathologic characteristics associated with 2-year survival in young tongue cancer patients (age <45 years) in early stage (I–II) and late-stage (III–IV) groups.

Method: A retrospective review of 3262 cases of oral tongue squamous cell carcinoma (OTSCC) in individuals less than 45 years of age, between 2005 and 2014, was performed using data from the National Cancer Database. Factors affecting 2-year survival in patients with early stage (I–II) and late-stage (III–IV) disease were identified through univariate and multivariable analyses.

Results: Demographic factors and tumor characteristics were compared in 1899 patients with early stage OTSCC and 1363 patients with late-stage OTSCC. On multivariable analysis of early stage OTSCC, high tumor grade (hazard ratio [HR] = 2.08; 95% CI, 1.45, 2.99), local metastasis (HR = 2.85; 95% CI, 1.37, 5.95), and tumor size (HR = 1.04; 95% CI, 1.02–1.07) were significant predictors of mortality. In multivariable analysis of late-stage OTSCC, African American race (HR = 2.79; 95% CI, 1.40–5.56), positive surgical margins (HR = 1.77; 95% CI, 1.07–2.93), local metastasis (HR = 2.20; 95% CI, 1.03–4.72), distant metastasis (HR = 11.66; 95% CI, 2.10–64.73), depth of invasion (HR = 1.03; 95% CI, 1.01–1.05), and tumor size (HR = 1.007; 95% CI, 1.003–1.01) were associated with death within 2 years. Subset analysis of clinical N0 stage tumors revealed treatment with surgery alone to be associated with survival at or beyond 2 years on univariate analysis (HR = 0.14; 95% CI, 0.05–0.39).

Conclusion: Our results suggest that early mortality in patients with young OTSCC is associated with positive lymph nodes, high tumor grade, and large tumor size in early and late-stage OTSCC. Distant metastasis and depth of invasion were associated with early mortality in late-stage OTSCC. Our results suggest that more aggressive upfront treatment, including extirpative surgery and elective neck dissection, should be considered in early stage patients with the high-risk features described earlier.

Survival Analysis Oral Squamous Cell Carcinoma in São Paulo, Brazil

Carlos T. Chone, MD, PhD (Presenter); Isabella Grieger; Gustavo Mercuri

Introduction: Oral cavity squamous cell carcinoma (OSCC) is the leading malignancy of the oral cavity; in Brazil, in 2018, 14,700 new cancer cases were reported in the oral cavity. In the Southeast region of Brazil, it is the fourth most frequent tumor in men.

Method: The study has a retrospective observational character, with transversal and quantitative cuts. An epidemiological analysis was carried out of the database of the Fundação

Oncocentro de São Paulo concerning patients with squamous cell carcinoma of the oral cavity diagnosed between 2004 and 2014 in the State of São Paulo. Univariate and multivariate analyses were performed using Cox regression to assess general recurrence, death, and local recurrence factors. The chi-square test was used to assess the relationship between outcomes and variables, with the construction of Kaplan-Meier curves for survival. The level of significance adopted was 5%. Descriptive analysis was performed by gender, age group, clinical stage at diagnosis (early or advanced), type of treatment (surgical or nonsurgical), presence of recurrence (local and regional), and distant metastases and analysis of factors related to death, local recurrence, and death due to recurrence. We measured the overall survival and disease-specific survival over 10 years. Survival curves were constructed according to the clinical stage at diagnosis and the treatment modality.

Results: In both univariate and multivariate analysis, we observed that the advanced clinical stage is the most influential variable in the outcome; in the multivariate analysis, a hazard ratio of 4.253 was presented ($P < .0001$). The probability of death was 50.37% in 5 years and 57.62% in 10 years, with an average of 6.7 years after diagnosis and a median of 4.84 years. Patients diagnosed in the early stages and treated with surgery had the lowest chance of local recurrence, with a probability of 10.17% and 15.69% in 5 and 10 years, respectively, and an average of 10 years.

Conclusion: Surgical treatment modality confers better outcomes, with longer relapse-free survival rates for patients diagnosed in early and advanced clinical stages.

Survival Outcomes of Transoral Robotic Surgery Alone for Oropharyngeal Cancer

Chareeni Kurukulasuriya (Presenter); Simion Chiosea, MD; Robert L. Ferris, MD, PhD; Seungwon Kim, MD; Umamaheswar Duvvuri, MD, PhD

Introduction: The treatment of human papillomavirus (HPV)-positive oropharyngeal squamous cell carcinoma (OP) poses an important problem as the incidence rises in comparison with HPV-negative cases. Transoral robotic surgery (TORS) is an increasingly adopted treatment modality for the resection of OP. The recent ECOG-3311 study demonstrated excellent oncologic outcomes with reduced postoperative therapy. We sought to evaluate the outcomes of treating OP with TORS alone at our own institution.

Method: A single-center retrospective chart review was conducted on all patients who underwent TORS without adjuvant therapy for OP from January 2010 to July 2020. Patients were followed for disease recurrence, metastasis, and survival. Locoregional control (LRC), disease-specific survival (DSS), and overall survival (OS) were calculated. Kaplan-Meier survival analysis with log-rank testing was used to evaluate HPV status association with treatment outcomes.

Results: Of the 117 patients treated, 88 had HPV-positive cancers (75%) and 29 had HPV-negative (25%). All patients

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were stage T1/2 with 52 (44%) stage N0 and 65 (57%) with node-positive disease at time of surgery. Median follow-up time was 28.9 months. Seventeen patients (23%) experienced recurrence, with rates of 8% in HPV-positive and 34.5% in HPV-negative patients. Local recurrence, regional recurrence, and distant metastasis was found in 12 (10.3%), 11 (9.4%), and 4 (3.4%) of patients, respectively. Median time to locoregional recurrence was 17 months. Mean recurrence-free survival for the HPV-positive cases was 104 months (95% CI, 96–112) and 72 months (95% CI, 54–91) for the HPV-negative cases (log-rank test, $P = .003$). Overall 2-year survival in HPV-positive and HPV-negative cases was $94\% \pm 3\%$ and $78\% \pm 8\%$, respectively (log-rank test, $P = .02$). At 2 years, LRC was 83%, DSS was 98%, and OS was 88% for the TORS cohort overall.

Conclusion: Our preliminary data support the ECOG-3311 study findings to suggest TORS alone provides excellent control and chance of survival in early stage HPV-positive OP. Further analysis is needed to determine if factors such as tumor site and recurrence patterns also affect survival outcomes from treatment with TORS alone.

Thyroid Surgery Bleeding Complications Associated With Perioperative Aspirin Use

Te-Ana A. Harris, MD (Presenter); William Dehart; Georgia Borgarelli; Brian Gross

Introduction: Aspirin therapy has proven benefit as prevention against thromboembolic events, but little evidence exists to direct perioperative aspirin use in patient undergoing thyroid surgery. We conducted the largest known study to investigate the risk of bleeding complications in patients on perioperative aspirin undergoing thyroid surgery.

Method: We conducted a retrospective cohort study of patients aged 18 years and older who underwent thyroid surgery for both benign and malignant thyroid disorders between January 1, 2018, and January 1, 2020, at hospitals within the Healthcare Corporation of America (H) network in the United States. The outcome measurement was perioperative bleeding complications, such as estimated blood loss and hematoma diagnosis, in patients on aspirin as compared with those who are not on aspirin.

Results: In a sample of 11,543 patients who underwent thyroid surgery, aspirin therapy was found to be associated with increased bleeding complications ($\beta = .46$, $P < .05$, risk ratio = 1.57; CI, 1.01–2.43). The overall likelihood of experiencing a bleeding complication was low (129 of 11,543 patients). However, thyroid surgery patients on perioperative aspirin therapy had a 57% higher rate of postsurgical bleeding complications than thyroid surgery patients not on aspirin therapy. These data were acquired after controlling for demographic variables.

Conclusion: To date, this is the largest known study investigating bleeding complications in thyroid surgery associated with perioperative aspirin use. Although bleeding complications were uncommon, there remains a statistically significant association between aspirin use and thyroid surgery bleeding complications. To make more definitive treatment recommendations,

prospective, randomized control studies comparing perioperative aspirin use and bleeding complications in thyroid surgery are required.

Treatment Decision Regret in Patients With HPV Mediated Oropharyngeal Carcinoma

Andrea Ziegler, MD (Presenter); Kevin Sykes; Lisa Shnyder; Kiran Kakarala; Andres M. Bur, MD

Introduction: Patients with early human papillomavirus (HPV)-mediated oropharyngeal squamous cell carcinoma generally have 2 treatment options, primary surgical vs nonsurgical management. The goal of this study was to evaluate decision regret in patients with early HPV mediated oropharyngeal carcinoma treated with transoral robotic surgery (TORS) compared with patients treated nonsurgically.

Method: Patients voluntarily participated in an institutional head and neck cancer registry. As a part of the registry, patients were asked to complete a validated decision regret scale (scored 0–100, 0 = no regret) at follow-up visits at multiple time points after the completion of treatment (range 17–516 days). Patients also completed the validated University of Washington quality-of-life questionnaire after the completion of treatment.

Results: There were a total of 17 patients (56.7%) who underwent primary surgical management with TORS and lymph node dissection compared with 13 patients (43.3%) who were treated nonsurgically. The median stage of both groups was T2N1 with an overall median stage of 1 ($P = .37$, $P = .069$, $P = .41$, respectively). There was no significant difference in the need for gastrostomy tube ($P = .43$). The average number of modalities of treatment was 1.82 for the TORS group compared with 1.62 for the nonsurgical group ($P = .42$). TORS patients averaged a score of 16.35 on the decision regret survey, which was significantly lower than the average score of 23.71 in the nonsurgical group ($P = .018$). There was no significant difference in the overall quality of life between the 2 groups ($P = .44$).

Conclusion: Patients with early stage HPV-mediated oropharyngeal carcinoma are often faced with a choice between primary surgical and nonsurgical management. These patients generally have favorable oncologic outcomes regardless of the treatment option pursued, and both groups had low levels of regret in this study. However, our study shows that patients who undergo primary surgical management with TORS have less decision regret in the early follow-up period.

Virtual Surgical Planning for Mandibular Reconstruction: Does It Affect Outcomes?

Tyler Merrill, MD (Presenter); Olivia Speed; James R. Gardner, MD; Emre Vural, MD; Jumin Sunde, MD; Mauricio Moreno, MD

Introduction: Virtual surgical planning (VSP) uses patient-specific imaging to create an individualized surgical plan and offers potential benefits. Prior studies indicate that VSP can offer cost benefits stemming from reduced operative time and length of hospital stay. We sought to assess the impact of VSP technique for mandibular reconstruction in the context of a

validated postoperative abbreviated length of stay clinical pathway.

Method: All patients undergoing fibula free flap reconstruction for mandibular defects at an academic, tertiary care center between December 2015 and October 2020 were included in this retrospective cohort study. The study cohort was divided into 2 subgroups: VSP reconstruction vs conventional reconstruction techniques. The primary endpoints of this study were operative time, ischemia time, and length of hospital admission for each cohort.

Results: A total of 44 patients underwent VSP reconstruction, while 48 patients underwent conventional reconstruction. VSP was associated with significantly lower ischemia time (110 minutes vs 124 minutes, $P = .022$) and total operative time (6 hours 54 minutes vs 7 hours and 46 minutes, $P = .02$). Segments of bone required for reconstruction were used as a surrogate for complexity. Total operating room time was significantly increased with increasing number of segments needed in both the VSP group (Kruskal-Wallis test, $P = .002$) and the conventional group (Kruskal-Wallis test, $P = .015$). The length of hospital stay was not significantly different between groups (4.78 days vs 6.5 days, $P = .148$).

Conclusion: Shorter operative times and lengths of admission have been attributed to the use of VSP in osseous free tissue transfers. Translated into cost savings, it is argued that these reductions offset the added cost of VSP. Our study indicates that VSP utilization provided a significantly reduced operative time but had no impact on length of admission in an abbreviated admission clinical pathway following free tissue transfer.

Laryngology/Broncho-Esophagology

30-Day Postoperative Outcomes Following Transcervical Zenker's Diverticulectomy in the Elderly

Annie E. Moroco, MD (Presenter); Robert A. Saadi, MD; Vijay Patel, MD; John Gniady, MD

Introduction: Zenker's diverticulum commonly affects an older population with symptoms that compromise quality of life. The therapeutic goal for these patients is to improve functional outcome while limiting the potential for morbidity and mortality. We sought to identify the role of age and other preoperative factors on 30-day outcomes following open surgery.

Method: A retrospective analysis was performed using the American College of Surgeons National Surgical Quality Improvement Program database to identify patients undergoing open Zenker's diverticulectomy (CPT 43130) between 2006 and 2018. Outcomes analyzed include patient demographics, medical comorbidities, admission type, operative characteristics, length of admission, postoperative complications, readmission, and reoperation.

Results: A total of 614 patients were identified. The mean age at time of surgery was 71.1 years, with 13.4% of patients older than 85 years. The postoperative complication rate was

6.7%, with a mortality rate of 0.3%. Both smoking status (odds ratio, 2.94; $P = .008$) and prior congestive heart failure (odds ratio, 10.00; $P = .014$) had a significant effect on the postoperative complication rate.

Conclusion: Age was not found to be an independent risk factor associated with adverse outcomes following open cervical diverticulectomy, suggesting this procedure can be performed in patients with advanced age. Preoperative discussion regarding patient factors including social and medical history is encouraged.

Airway Fires in Otolaryngologic Surgery: A Database Review

Luke J. Pasick (Presenter); Jane Tong; Daniel Benito; Zoukaa Sargi; Mursalin M. Anis, MD, PhD

Introduction: An estimated 34% of reported operating room fires involve the airway. Despite the inherent risks in otolaryngologic surgery, education regarding prevention and management of airway fires is limited in graduate medical training.

Method: The US Food and Drug Administration's Manufacturer and User Facility Device Experience database was queried for reports of adverse events related to fires occurring during surgical procedures of the airway from January 1, 2010, to March 31, 2020.

Results: A total of 3687 reports were identified, and 49 unique reports of airway fire were included. Sustained fires were described in 16 (32.7%) reports and 33 (67.3%) described transient flares. Two fires extended beyond the airway, and 9 (18.4%) were noted to have occurred at the start of the case. Patients were ventilated using cuffless, cuffed, or laser-reinforced endotracheal tubes in 3, 6, and 7 cases, respectively. In 2 cases, a tracheostomy tube was in place. Fires occurred most commonly during tonsillectomy ($n = 22$ [44.9%]), vocal fold excision ($n = 5$ [10.2%]), and adenoidectomy ($n = 4$ [8.2%]). Initial fuel sources were identified as oxygen, an energy device, or gauze in 17 (34.7%), 27 (55.1%), and 2 (4.1%) reports, respectively. There were 16 patient injuries, most commonly thermal burn (14 [87.5%]), and 2 operator injuries. Saline washing was utilized in 7 (14.3%) cases overall. Patients were extubated immediately in 2 (12.5%) of the 16 cases of sustained fires. There were 0 mortalities reported.

Conclusion: Operating room fires during surgical procedures of the airway pose life-threatening risks to patients. Examination of airway fire cases and the creation of standardized or mandatory reporting mechanisms may help educate otolaryngologists on key prevention and management strategies.

Background-Oriented Schlieren Imaging During Jet Ventilation Models Aerosolization During COVID-19

Kate Clancy, MD (Presenter); Abdulaziz Alrefale, PhD; Bryan Schmidt, PhD; Nicole Maronian, MD; N. Scott Howard, MD, MBA

Introduction: During the COVID-19 pandemic, minimizing the surgeon's exposure to aerosol-generating procedures is

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critical, and to our knowledge, the airflow dynamics and subsequent risk to the surgical team due to a back-flow or plume during jet ventilation has not been studied. Background-oriented Schlieren (BOS) imaging detects distortions in airflow to see the invisible: a density gradient creates a refractive index change in the air, which uses small shifts to the recording of a visually textured background that are revealed using imaging-processing techniques. We aimed to use the BOS technique to illustrate the airflow patterns of jet ventilation.

Method: A manikin model of jet ventilation was created to mimic lung compliance in an open system. A laryngoscope was used to expose the model and was suspended. The Monsoon III high-frequency jet ventilation system (Vyaire, Chicago, Illinois, USA) was used in either a supraglottic (delivered via laryngoscope port) or infraglottic technique (Hunsaker Mon-Jet ventilation theter, Medtronic, Minneapolis, USA). Various delivery settings were tested including driving pressure, ventilation frequency, and use of a variety of suction types/position. Images were obtained with a high-speed camera, and BOS processing was performed. Plume size was measured with ImageJ software (National Institutes of Health, Bethesda, Maryland, USA).

Results: We successfully used BOS imaging to demonstrate variations in plume volume during supraglottic and infraglottic techniques. Low-frequency jet ventilation (12 cycles/min) and lower driving pressures had a smaller plume than high-frequency jet ventilation (120 cycles/min) or higher driving pressures with all other settings stable. There appeared to be a higher transnasal plume during supraglottic jet ventilation. Suction position significantly affected the plume size.

Conclusion: High-frequency, low-volume, infraglottic jet ventilation with dual suction appears to have a lower risk of aerosolization compared with other modes of ventilation. Higher driving pressures were correlated to plume size.

Biomarkers of Regeneration Following Injection Laryngoplasty Using Novel Material

Andrew J. Bowen, MD, MS (Presenter);
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Stephen Voss, MS; Kathleen Bartemes, PhD;
Dale C. Ekbom, MD

Introduction: The development of novel biomaterials for injection medialization laryngoplasty (IL) depends on understanding the interaction between material and the native vocal fold tissue. We analyzed harvested laryngeal tissue using nanoflow liquid chromatography electrospray ionization tandem mass spectrometry (nLC-MS/MS) following IL in a rabbit model using a novel jellyfish collagen (JC).

Method: Three biomaterials (JC, Cymetra, and Restylane) were injected into the left vocal cord of rabbits following left recurrent laryngeal nerve transection. Tissue was harvested 4 and 12 weeks after IL. Tissue from the medialized (test) and contralateral (internal control) vocal folds were analyzed using nLC-MS/MS. Proteins present in all rabbit groups, with 2 or more unique peptides and an enrichment or underexpression level ≥ 1.5 -fold in test relative to control samples were

selected for further consideration. $P < .05$ after Bonferroni correction was considered statistically significant. Results were visualized with heat maps and analyzed with Reactome software.

Results: A total of 518 proteins were identified across all groups. The top upregulated pathways within tissues in the JC group included collagen production and the citric acid cycle, while Restylane and Cymetra groups showed upregulation in glucose metabolism and the inflammatory response respectively. Vimentin, fibronectin, actin alpha beta, and type 1 collagen were abundant at 4 and 12 weeks for the JC group, suggesting a possible regeneration response within the medialized tissue. Proteins involved in inflammation were present only in Cymetra rabbits at 4 weeks.

Conclusion: At 12 weeks postinjection with a novel jellyfish collagen, the vocal fold proteome suggests a regenerative environment and minimal inflammation.

Defining Clinician Ability to Screen for Laryngeal Mass from Voice

Grace M. Wandell, MD, MS (Presenter); Anthony B. Law, MD, PhD; Emily Wilson, MS, CCC-Scalp; Albert L. Merati, MD; Mark Whipple, MD, MS; Tanya K. Meyer, MD

Introduction: A machine-learning algorithm (MLA) that analyzes voice to screen for laryngeal lesions could be helpful in primary care and remote settings. Understanding the human-level performance of this task may guide the design and evaluation of MLAs for this purpose. This study examines clinicians' ability to screen for laryngeal mass from voice by expertise level.

Method: Experts (laryngologists or speech language pathologists) and nonexperts (general medicine physicians) were recruited to complete an online survey. Clinicians were asked to listen to 5-second /i/ voice samples and estimate the probability of a laryngeal mass (laryngeal cancer, dysplasia, leukoplakia, cyst, polyp, nodules, or papilloma). Underlying pathology was defined by laryngoscopy. A between-subjects study design was used, wherein clinicians in the same expertise group evaluated different samples, except for a subset of samples seen by all clinicians to assess reliability. Diagnostic performance metrics and reliability using intraclass correlation coefficients (ICCs) were compared between groups.

Results: In total, 18 clinicians (9 experts and 9 non-experts) evaluated 311 voice samples. The experts more successfully screened for mass than nonexperts, with an area under the curve (AUC) of 0.67 (95% CI, 0.59–0.76) for experts and 0.56 (95% CI, 0.48–0.64) for nonexperts ($P = .02$). Sensitivity was similar between groups (experts: 0.78 [95% CI, 0.73–0.83]; nonexperts: 0.78 [95% CI, 0.72–0.83]). Experts demonstrated greater specificity (0.47 [95% CI, 0.33–0.62]) than nonexperts (0.25 [95% CI, 0.14–0.40]). Interrater reliability was fair among both experts (ICC 0.53) and nonexperts (ICC 0.45). Intrarater reliability was excellent among experts (ICC 0.91) and good among nonexperts (ICC 0.67).

Conclusion: Compared with general medicine physicians, voice experts are more adept at screening for laryngeal masses

from voice, and this appears to be due to a difference in specificity. MLAs with higher specificity may be helpful to screen for individuals who do not have laryngeal masses in primary care settings to avoid costly referrals.

Developing Otolaryngology Trainees' Perceptual Awareness of Neurological Voice Conditions

Torrey L. Fourrier, MD (Presenter); Kathryn Waugh; Tim Craven; Lyndsay Madden

Introduction: Auditory-perceptual characteristics of neurologic voice conditions (NVC) can mimic muscle tension dysphonia (MTD) to untrained listeners, warranting utilization of other diagnostic modalities including flexible laryngoscopy for accurate diagnosis. Perceptual voice evaluations have been relied upon more routinely during the COVID-19 pandemic. While proficiency in auditory-perceptual voice evaluation is conventionally gained through repetition/experience, our study aimed to determine if a live, lecture-based module could increase the ability of otolaryngology-head and neck surgery (ENT) residents' ability to perceptually identify NVC and MTD.

Method: This prospective cohort study was conducted at an academic medical center in 2019 to 2020 with 13 otolaryngologists. Intervention included a 60-minute live lecture discussing adductor spasmodic dysphonia (ADSD), abductor spasmodic dysphonia (ABSD), vocal tremor, and MTD with voice recordings samples for each condition. Participants were tested prelecture, immediately postlecture, and 3 months postlecture to evaluate accuracy in perceptual voice evaluation. Residency training level, English as a primary language, professional voice experience, and gender were analyzed when assessing results.

Results: Prelecture evaluations showed junior s more accurately identified ABSD than more senior s ($P = .008$) did, and females identified ADSD more frequently than males did ($P = .025$). All s identified ADSD more consistently after the education session ($P = .047$), and among those with English as their primary language, identification of ADSD was better ($P = .045$).

Conclusion: Proficient perceptual analysis of voice disorders likely requires more experience than can be gained in 1 lecture. For residents not yet proficient in perceptual analysis of NVC vs MTD, telemedicine and limited laryngoscopy examinations due to COVID-19 risks pose a new challenge.

Do Patients Regret Having In-Office Vocal Fold Injections?

Alice Liu, MD (Presenter); Yunqi Ji, PhD; Amanda Hu, MD, FRCSC



Introduction: In-office vocal fold injections (VFIs) are an effective treatment for glottic insufficiency with improved voice outcomes and high completion rates. The primary objective of this study was to assess if patients had decisional regret after VFI. Secondary objectives included determining whether any factors are associated with lower decisional regret.

Method: We performed a cross-sectional study including patients who underwent a VFI for glottic insufficiency from August 2017 to December 2019. Participants completed the validated Decision Regret Scale (DRS) via telephone. Demographic data, clinician's perceptual analysis with GRBAS (Grade, Roughness, Breathiness, Asthenia, Strain), patient's self-reported Voice Handicap Index-10, and maximum phonation time were analyzed. Descriptive statistics and univariate and multiple logistic regressions were performed.

Results: Of the 253 patients who underwent VFI, 75% who were eligible (136/182) completed the DRS (age 67.5 years [SD 13.9], 58.1% male). Some 61 (61%) reported no decisional regret, 24.3% reported mild decisional regret, and 14.7% reported moderate to strong decisional regret. Univariate analysis reported that lower VHI-10 was associated with lower DRS ($P < .03$), and greater improvements in grade ($P < .001$) and breathiness ($P < .03$) were associated with lower DRS. Multivariate logistic regression reported that a greater improvement in grade, breathiness, and roughness was associated with lower DRS ($P < .03$). Demographics had no correlation with DRS.

Conclusion: Most patients had no or mild decisional regret after VFI. Patients who self-perceived less vocal handicap after VFI had lower decisional regret. Patients' whose clinicians perceived a greater improvement in voice after VFI had lower decisional regret.

Effects of Aspiration Prevention Surgery on the Pharynx and UES

Rumi Ueha, MD, PhD (Presenter); Taku Sato, MD; Takao Goto, MD; Akihito Yamauchi, MD, PhD; Tatsuya Yamasoba, MD, PhD

Introduction: Oral intake after aspiration prevention surgery (APS) is influenced by the postoperative pharyngeal pressure and the dynamics of the upper esophageal sphincter (UES). We examined the effects of less invasive APS with UES relaxation effect (in patients who underwent laryngeal closure with cricopharyngeal myotomy [LC-CPM] and central-part laryngectomy [CPL]) on pharyngeal pressure and UES dynamics.

Method: We retrospectively assessed the high-resolution pharyngeal manometric (HRPM) data of patients who underwent APS in our institution from 2018 to 2020. Then, we compared the effects of bilateral cricopharyngeal myotomy (in combination with LC: the LC-CPM group) and total cricoidectomy (the CPL group) on both pharyngeal pressure and UES dynamics before and after surgery.

Results: A total of 15 patients (median age: 68 years, 14 men [93%]) were enrolled. Primary diseases associated with severe aspiration were neuromuscular disease in 9 patients, stroke in 3 patients, and others in 2 patients. The pharyngeal swallowing pressure did not change significantly before and after APS. UES resting pressure and UES relaxation duration were significantly decreased ($P < .001$) and prolonged ($P < .001$) after APS. Only the CPL group (7 patients: median 59 years, all men) showed an increase in velopharyngeal closure integral after APS ($P < .05$). Prolonged UES opening duration was

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recognized postoperatively in the CPL group ($P = .031$) compared with the LC-CPM group.

Conclusion: APS minimally effects pharyngeal swallowing pressure, decreases UES resting pressure, and prolongs UES relaxation duration. CPL may be more effective for postoperative UES relaxation in patients with a short UES relaxation time.

Endotracheal Tube Size Selection Trends and Correlation of Laryngeal Injury

Noel Phan (Presenter); Rohini Bahethi; Songhon Hwang; Mark S. Courey, MD; Benjamin Tweel; Diana N. Kirke

Introduction: Many factors influence the choice of endotracheal tubes (ETTs) for patients who require mechanical ventilation. In this study, we aim to determine if ETT size had an impact on number of complications among a cohort of patients intubated in the emergency department at Mount Sinai Hospital over a 2-year period.

Method: This is a retrospective chart review of all patients who underwent intubation in the emergency department at Mount Sinai Hospital from January 1, 2018, to February 1, 2020. Primary outcomes of interest included size of the ETT, bronchoscopies performed, number of days intubated, length of admission in the intensive care unit, flexible laryngoscopy examination findings, otolaryngology interventions performed, and mortality on admission.

Results: Overall during the study time, there were 386 patients intubated. The average age was 66.05 years (± 18 years). Some 51% of the patients were female ($n = 198$), while 49% were male ($n = 188$). The average body mass index for males and females was 26.13 and 27.68, respectively (± 7.88 kg/m²; $P < .18$). Of the 386 patients intubated, 223 patients (57.7%) were intubated with an 8.0 ETT followed by 136 patients (35.2%) with 7.5 ETT, while only 16 patients (4.1%) were intubated with a 7.0 ETT. The average number of days intubated was 3.25 days (± 3.57). Bronchoscopies were performed in 49 patients (13%), and 29 patients (7.51%) had a tracheostomy performed. A total of 27 patients (13%) underwent a full exam and flexible laryngoscopy. Of these, 81.1% were intubated with an 8.0, and 5 patients were noted to have had vocal fold hypomobility and/or immobility, 3 had laryngotracheal stenosis, 2 had vocal cord granulomas, and 1 patient had a vocal cord hemorrhage.

Conclusion: In terms of ETT selection, the decision of which size of ETT to use when intubating a patient is based on balancing the different risk, benefits, and needs of the patients. Despite a low incidence rate of complications, this study highlights the overall trend of choosing a larger ETT as a potential contributing factor to developing laryngeal injury and laryngotracheal stenosis during short-term intubation.

Evaluation of Idiopathic Subglottic Stenosis Patient Experience With In-Office Procedures

Hannah N. Kuhar, MD (Presenter); Brad deSilva, MD; Brandon Kim, MD; Jeffrey Straub, MD; Catherine Anderson; Laura Matrk, MD

Introduction: We aim to enhance the knowledge of the clinical experiences of patients with idiopathic subglottic stenosis (iSGS) surrounding in-office procedures through survey evaluation. We focus on patients' outcomes, clinical experiences, and quality of life following in-office bronchoscopy and steroid injection.

Method: This is a survey study through online questionnaire. An anonymous survey was used to collect responses to a series of questions administered to the largest support group for those with airway stenosis, "Living with idiopathic subglottic stenosis."

Results: The study is ongoing, with 474 individual responses (99.8% female, majority ages 41–55 years, 97.59% White, 77.6% from North America). A total of 87.5% of respondents had undergone in-office bronchoscopy, with an average tolerance of 8 of 10 (1 = intolerable, 10 = tolerable) and willingness to undergo repeat procedure in 9 of 10. Of the participants, 30.24% had undergone in-office steroid injection, with an average tolerance in 7 of 10 and willingness to undergo repeat procedure in 8 of 10. Most reported recovery time to normal activity as <24 hours. The most uncomfortable aspect of in-office steroid injections was gag reflex (18.79%); 74.5% never experienced adverse reactions, and 46.62% experienced pain after in-office steroid injection, with the majority treated with over-the-counter medication (44.29%). A total of 66.4% of patients experienced out-of-pocket expenses. Overall convenience of in-office steroid injection was rated as 8 of 10.

Conclusion: In-office procedures such as bronchoscopy and steroid injection are generally well-tolerated by patients and incur minimal recovery time, periprocedural discomfort, or adverse reactions. These in-office procedures represent effective, convenient therapeutic options for iSGS patients. Additional research is needed to understand and address periprocedural challenges to enhance care delivery, including uncomfortable components of procedures and associated expenses.

Experiences of Idiopathic Subglottic Stenosis Patients During the COVID-19 Pandemic

Hannah N. Kuhar, MD (Presenter); Brad deSilva, MD; Brandon Kim, MD; Jeffrey Straub, MD; Catherine Anderson; Laura Matrk, MD

Introduction: We aim to better understand the clinical experiences and quality of life of patients with idiopathic subglottic stenosis (iSGS) during the COVID-19 pandemic. We also seek to investigate how the COVID-19 crisis has affected iSGS patient interactions with their health care providers and access to care.

Method: This is a survey study through an online questionnaire. An anonymous survey was used to collect responses to a series of questions administered to the largest support group for those with airway stenosis, "Living with idiopathic subglottic stenosis."

Results: The study is currently ongoing, with 474 complete individual responses to date (99.8% female, majority ages 41–55 years, 97.59% White, 77.6% from North America). A total of 44.65% of respondents had asked their doctor about COVID-19. Questions included risk of contracting COVID-19 (67.13%), plan for procedures (52.78%), and how the virus

could affect breathing (47.69%). Clinic visits were affected by change in format to virtual (41.84%) and postponement (33.33%). Of the patients, 61.28% were concerned that COVID-19 may cause a life-threatening delay in therapy (50.68%) or intubation airway damage (45.27%). Respondents said that the pandemic has not affected their ability to attend the clinic (70.87%) or procedures (50.94%).

Conclusion: The COVID-19 pandemic has affected iSGS patient perspectives on their condition and interactions with the health care system. Despite increased unease surrounding disease management during the pandemic, most iSGS patients have been able to continue appointments and necessary procedures. The findings highlight the need for enhanced communication between providers and iSGS patients to address the unique challenges of iSGS management during the pandemic.

Forces During Suspension Laryngoscopy: Relationships With Hemodynamics and Anesthetic Requirements

Thomas Palladino (Presenter); Yuan Shi; Xiaotian Wu, PhD; Yvon Bryan, MD; Ryan Halter, PhD; Joseph Paydarfar, MD

Introduction: Suspension laryngoscopy (SL) is commonly performed, but little is known about forces generated during these procedures. The goal of this study was to identify correlates between patient factors and forces generated during SL as well as the effects these forces have on hemodynamic responses and anesthetic requirements.

Method: Patients undergoing SL were recruited at a tertiary care academic center from July 6, 2018, to December 22, 2020. A force array with 13 sensors along the blade and 3 sensors for the maxilla were mounted on a Lindholm laryngoscope with an additional sensor under the suspension arm. Patient anatomic features, prior treatment, anesthetic data, and perioperative data were obtained. Outcomes were forces, hemodynamic changes, and anesthetic requirements.

Results: A total of 53 patients were recruited (40 male, 13 female), and the mean age was 61.9 years. Indications were diagnostic laryngoscopy and resection of benign and malignant lesions. The mean maximum laryngeal and maxillary forces were 234N and 229N, respectively. The mean percentage change in mean arterial pressure (MAP) following the initial force stimulus was 52.0. Patients with MAP changes $\geq 52\%$ were older compared with those with MAP changes $< 52\%$ ($P = .010$). The mean MAP during the case was 95.6 mmHg. Patients with MAP ≥ 96 mmHg had higher mid-case laryngeal ($P = .019$) and maxillary forces ($P = .008$). At 5 and 10 minutes into the cases, forces were higher in patients with American Society of Anaesthesiologists scores 1 to 2 vs 3 to 4, for the larynx ($P = .012$, $P = .027$) and maxilla ($P = .041$, $P = .029$). In multiple regression analysis, only dentition predicted laryngeal forces ($P < .001$), while both dentition ($P = .013$) and airway grade ($P = .006$) predicted maxillary forces. Differences in forces and hemodynamic changes were not seen in patients with different anesthetic techniques.

Conclusion: Dentition and higher airway grades predicted forces measured in SL. Higher forces were associated with

higher MAP, and older patients had more hemodynamic instability at the start of SL. Force arrays may potentially provide real-time feedback during SL to facilitate titration of anesthetics and minimize complications.

Glottic and Subglottic Injury and Development of Pediatric Airway Stenosis

Lauren Pinzas (Presenter); Joshua R. Bedwell; Julina Ongkasuwan, MD

Introduction: Intubation in children can lead to the development of glottic and subglottic stenosis; however, it is difficult to predict which children will go on to develop airway stenosis. Direct laryngoscopy (DL) at the time of tracheostomy is standard practice at our institution and often reveals glottic or subglottic granulation tissue and/or ulceration. The purpose of this study is to determine how often children with evidence of airway injury at the time of tracheostomy go on to develop airway stenosis.

Method: This is a retrospective database review (January 2014–December 2020) of pediatric patients who underwent endotracheal intubation (ET) and subsequent tracheostomy in a tertiary care hospital and had both concurrent and follow-up DL. Clinical variables included congenital syndromes, cardiovascular disease, prematurity, number and length of intubations, ET tube size, and diagnosis of reflux. Outcomes included glottic or subglottic injury (GSI) and progression to stenosis. Multivariate analysis was performed via SPSS.

Results: Of the 202 patients (median age at surgery 207 days, interquartile range 116–805) who met study criteria, 44.6% had GSI at time of tracheostomy. Congenital cardiovascular disease had 2.03 times increased risk of developing GSI ($P = .048$). The relative risk of developing airway stenosis if GSI was identified was 2.37 (95% CI, 1.71–3.28). On univariate analysis, risk factors for developing stenosis in children with GSI include prematurity ($P = .04$), younger age at time of surgery ($P < .01$), ETT size ($P < .01$), and concurrent neonatal ($P < .01$) or congenital cardiovascular diagnosis ($P < .01$). However, none of these were significant on multivariate analysis.

Conclusion: Intubated patients with evidence of GSI are more likely to develop airway stenosis than those without GSI. Congenital heart disease was associated with twice the risk of developing GSI. Univariate analysis suggests that once injured, this injury was more likely to progress to stenosis was if the patient was premature or younger at time of surgery, had a larger ET tube, or had further comorbid neonatal or congenital cardiovascular diagnoses.

In-Office–Based Biopsies in Otorhinolaryngology: Reviewing a Year Experience

Patricia Corriols Noval (Presenter); Eugenia Carmela López Simón; Minerva Rodriguez Martin; Ramón Cobo Díaz; Belen Salvatierra Virio

Introduction: In-office procedures are a viable option for many patients, particularly those for whom risks of general

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anesthesia are high. Because of this, performing a high-resolution procedure, such as taking a biopsy in the outpatient clinic, may speed up the diagnosis by minimizing the patient's risk and reducing the time derived from surgical waiting list. The use of anticoagulation in some patients may be a limitation, owing to the risk of bleeding into the airway with the patient awake.

Method: We performed a retrospective study reviewing patients undergone in-office pharynx and larynx biopsies with local anesthesia in the ear, nose, and throat outpatient clinic during 2019. Antiaggregant or anticoagulant treatments were taking into account, and if they were retired for the biopsy. The main symptom referred, the definitive anatomopathological result, and the way the sample was obtained were also recorded.

Results: A total of 70 patients were included with an average age of 60.47 years old, with 41 males (58.57%) and 29 females (41.42%). Seven patients were taking antiaggregants, and the other 7 anticoagulant therapy; the treatment was stopped only in the latter. All samples were taken endoscopy assisted. Glottis was the most frequent area biopsied (70%), followed by supraglottic (22.85%) and hypopharynx (7.15%). In 7 patients, the sample obtained was not conclusive, so it was necessary to scheduling for larynx microsurgery. Anatomopathological exam show 33 cases of squamous carcinoma, 23 laryngeal polyps, 5 chronic inflammation, 4 dysplasia, 3 hyperplasia with hyperkeratosis, and 2 granulomas. There were no incidences related to the procedures.

Conclusion: Taking in-office biopsies may be a safe and effective procedure when a good endoscopy exposure is achieved. The risk is minimal if the lesions are small and the patient is collaborator and also if anticoagulant treatment is stopped before the biopsy. Big lesions in the glottis of anxious patients can suppose relative contraindications for the procedure.

Indications for In-Office Therapeutic Superior Laryngeal Nerve Block

Alan J. Gray, MD (Presenter)

Introduction: Superior laryngeal nerve (SLN) blocks have demonstrated efficacy in the treatment of chronic neurogenic cough. However, multiple laryngeal pathologies are believed to involve the SLN and may potentially benefit from blockade of the internal branch of the SLN. This study aims to determine the indications for in-office therapeutic SLN block.

Method: The charts for 133 patients treated with SLN block at the University of Texas San Antonio Voice Center from 2015 to 2020 were retrospectively reviewed. Data were collected and analyzed on patient demographics, pertinent diagnoses, procedural indications, and outcomes including pre- and postinjection subjective improvement, change in the Cough Severity Index (CSI), Voice Handicap Index-10 (VHI-10), and Dyspnea Index (DI).

Results: Patients had a mean (SD) age of 57 (14) years and were 76% female. Some 21 patients were lost to follow-up

after their procedure. Some 65% underwent SLN block for a primary diagnosis of chronic cough, 23% for paralaryngeal pain, 13% for symptoms of throat clearing or globus pharyngeus in the absence of cough, 5% for laryngospasm, 1.5% for postviral acute cough, and 1% each for paradoxical vocal fold motion and intractable hiccups. However, there was significant diagnosis overlap, with many patients meeting more than 1 indication. There was a high rate of muscle tension dysphonia (29%) in the cohort. Some 22% had a concomitant unilateral vocal fold mobility disorder or a known vagal nerve injury. Of the patients with the primary diagnosis of chronic cough, 70% reported subjective improvement in symptoms after undergoing SLN block. Some 50% of patients with paralaryngeal pain reported improvement as did 75% of patients with laryngospasm. Outcome data regarding pre- and posttreatment CSI, VHI-10, and DI are pending statistical analysis.

Conclusion: In-office blockade of the internal branch of the SLN using a long-acting local anesthetic and particulate steroid have potential therapeutic benefit in a variety of laryngeal disorders in addition to chronic cough.

Laryngeal Adductor Reflex Movement Latency Following Tactile Stimulation

Madeleine P. Strohl, MD (Presenter); Jolie L. Chang, MD; Christopher D. Dwyer; VyVy N. Young, MD; Clark A. Rosen, MD; Steven W. Cheung, MD

Introduction: Emerging evidence implicates sensory dysfunction as a key factor in conditions such as chronic cough, obstructive sleep apnea, and dysphagia. While the determination of sensory thresholds to tactile triggered responses is important, there is also a need to assess sensorimotor integration to advance our understanding of laryngopharyngeal functional integrity. We address this concept using calibrated aesthesiometers to measure the latency of laryngeal adductor reflex (LAR) motion onset in control subjects.

Method: A total of 21 healthy subjects (11 male, 10 female) contributed to the analyzable data set. Tactile stimuli were delivered to the aryepiglottic folds and medial pyriform sinuses using 30-mm Cheung-Bearlly monofilaments (4-0 and 5-0 nylon sutures; 8-7 dB force difference) via channeled flexible laryngoscope. The LAR onset latency, defined as the first visual detection of ipsilateral vocal fold adduction following tactile stimulation, was measured by frame-by-frame analysis of video (30 frames/second) recordings.

Results: Overall mean (SD) LAR onset latency across both subsites and stimulation forces was 176.6 (25.4) milliseconds. The stimulation duration minimum extended beyond the LAR latency in all cases. LAR latencies were indistinguishable in comparisons by laterality, stimulation force, subsite, sex, and age (35 years).

Conclusion: Aesthesiometer-triggered LAR latency appears to be invariant over an 8.7-dB force range and between the aryepiglottic fold and medial pyriform sinus subsites in asymptomatic, healthy controls. Based on these data, LAR

latency incongruencies between stimulation forces or laryngo-pharyngeal subsites may serve as pathophysiological features to dissect mechanisms of upper aerodigestive tract disorders.

Long Term Endoscopic Wedge Excision Outcomes for Idiopathic Subglottic Stenosis

Andrew J. Bowen, MD, MS (Presenter); Katherine Z. Xie; Dale C. Ekbom, MD; Semirra Bayan, MD; Jamie O'Byrne; Jan Kasperbauer, MD

Introduction: While endoscopic laser wedge excision (LWE) for treatment of idiopathic subglottic stenosis (ISS) appears to demonstrate the lowest recurrence rate among the different endoscopic modalities, there is a paucity of long-term follow-up data on this specific technique. At the conclusion of this presentation, participants will be knowledgeable on the long-term outcomes for patients who undergo LWE with ISS.

Method: This is a retrospective chart review of patients seen at our tertiary care center with a diagnosis of ISS who underwent at an LWE during their care between 2002 and 2020. Patient demographics such as age, sex, and comorbidities were collected. Procedures prior to presentation at the Mayo Clinic, along with all operative procedures performed before and after LWE at Mayo, were documented. The primary outcome variable was the rate of recurrence, defined as the need for a consecutive operative procedure after the initial LWE calculated over 2-year intervals.

Results: A total of 183 ISS patients within the study period underwent an LWE procedure at some point during their treatment. All but 3 of these patients were female, with a mean age of 52 years at the time of their first LWE procedure for ISS and a mean follow-up time of 6.5 years (range, 2 months–18.25 years). For 113 (62%) of these patients, the LWE procedure was their first surgical treatment for their ISS disease. The rate of recurrence within this specific subset of patients was 20%, 34%, and 45% at 2 years, 4 years, and 6 years respectively.

Conclusion: The prior reported recurrence rate for LWE following a multi-institutional study from the North American Airway Collaborative PR02 group was 15% over a 3-year prospective period. Our ongoing study will provide a more definitive estimate of the true recurrence rate with this modality with a significantly longer follow-up interval.

Multidisciplinary Tracheostomy Care Bundle for Prevention of Pressure Injuries

Jared A. Shenson, MD (Presenter); Ann Mitchell Ellsworth, RN, MSN, CNS, CMSRN; Aussama K. Nassar, MD, MSc; Douglas Z. Liou, MD; Jennifer Y. Lee, MD

Introduction: Tracheostomy-related pressure injuries (TRPIs) occur in up to 13% of patients postoperatively and may increase resource utilization and costs. A care bundle of procedural and educational initiatives may significantly reduce the incidence of these preventable events.

Method: A multidisciplinary collaborative approach was used to design a tracheostomy care bundle involving all specialties

performing tracheostomy at an academic medical center. Key elements included a protective dressing under the face plate, appropriate placement and timely removal of securing sutures, and optimal patient and equipment positioning. Care was standardized across otolaryngology, general surgery, radiothoracic surgery, interventional pulmonology, respiratory therapy, and nursing. Following a 1-month trial with a single service, the bundle was revised and implemented across all services. Intraoperative tip sheets and head-of-bed signage were created to reinforce best practices. Documentation of care bundle elements was incorporated into the electronic health record to support longitudinal performance measurement.

Results: In the 12 months preceding implementation, 6 of 260 (2.3%) patients undergoing tracheostomy sustained stage 2 or higher TRPIs. The incidence of stage 1 injuries was unknown. During a 1-month trial, 12 patients underwent tracheostomy with 100% adherence to all items in the care bundle. No TRPIs or other trach-related complications occurred. Results after implementation hospital-wide are being collected and will be shared at time of presentation.

Conclusion: In the first reported effort to standardize perioperative tracheostomy care across all surgical services at an academic medical center, collaborative implementation of a care bundle reduced the incidence of TRPIs without adverse effects on patient care.

New Horizons in Recurrent Respiratory Papillomatosis: VEGF and Novel Immunotherapy

Jonas R. Miller, MD (Presenter); Jordan A. Garcia; Brandon Lam; Lisa Rooper, MD; Simon Best

Introduction: Recurrent respiratory papillomatosis (RRP) is a viral infection (human papillomavirus 6 and 11) of the aerodigestive tract that, if left untreated, significantly affects quality of life, including the ability to communicate and breathe. Treatment was traditionally limited to serial ablative procedures in the operating room with the possibility of local adjuvant therapy, but new systemic therapies are showing significant promise. Therefore, the goal of this study is to provide a scientific rationale for a combined therapeutic approach using vascular endothelial growth factor (VEGF) inhibitors and novel immunotherapies.

Method: We have taken fresh specimens from 12 patients to date and performed flow cytometry on papilloma, normal adjacent tissue, and blood for each patient. We then evaluated the co-expression of VEGF and certain immune checkpoint proteins (such as CTLA-4, LAG3, TIM3, IDO1, PD-1, and PD-L1) and compared them with the expression in the patient's normal adjacent tissue and in the patient's blood. In addition, we physically mapped the immune checkpoint inhibitor expression from 61 papilloma samples constructed in tissue microarray blocks. These slides were then scored by a head and neck pathologist. Molecular coexpression was further stratified based on papilloma severity using the Derkay classification system.

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Results: Our preliminary data show increased degree of coexpression with VEGFR2 of immune checkpoint inhibitors, including PD-L1, galectin-9, and VEGFR2.

Conclusion: Our preliminary analysis shows that papilloma specimens have increased coexpression of immune checkpoint inhibitor proteins alongside VEGF. Some of these immune checkpoint inhibitors already have novel immunotherapies that are available to the public, and there is justifiable molecular rationale to offer these systemic treatments to patients affected by RRP.

Normal Values of Novel Vocal Fold Vibratory Parameters

Akihito Yamauchi, MD, PhD (Presenter);
Rumi Ueha, MD, PhD; Takao Goto, MD; Taku Sato, MD;
Tatsuya Yamasoba, MD, PhD

Introduction: Voice quality has been assessed by subjective audioperceptual rating or acoustic analysis of recorded voice sample. Through recent technological developments, attempts to assess voice quality directly from the voice source (vocal fold vibration) using high-speed digital imaging (HSDI) have started, and novel parameters that should sufficiently reflect voice quality such as open quotient (OQ), speed quotient (SQ), period-perturbation quotient (PPQ), amplitude-perturbation quotient (APQ), harmonics-to-noise ratio (HNR), and spectral tilt (H1-H2) are attracting attention. However, the normal values of these parameters are not investigated in a study with a large subject size. Correlations among these parameters are not fully investigated, either.

Method: The authors hereby calculated the above-mentioned novel parameters from HSDI data of vocally healthy subjects to establish normal values and to evaluate the intercorrelation among parameters. A total of 108 vocally healthy subjects were recruited in this study, and a sustained phonation /i/ at a comfortable pitch and loudness was recorded transorally using a high-speed camera at 4500 frames per second. From the obtained HSDI data, OQ, SQ, H1-H2, PPQ, APQ, and HNR were calculated via glottal area waveform. Obtained values were then statistically analyzed.

Results: Values of OQ (0.44 ± 0.14), SQ (1.12 ± 0.26), APQ ($0.93\% \pm 1.04\%$), and HTN (21.1 ± 5.1 dB) were generally comparative with normal values of conventional acoustic analysis reported in the literature, while PPQ ($1.39\% \pm 1.41\%$) was higher than the reported normal value ($<0.5\%$). The value of H1-H2 was first reported in this study. A strong positive correlation between H1-H2 and OQ ($r = 0.86$) and a moderate negative correlation between PPQ and HNR ($r = -0.57$) was detected.

Conclusion: Obtained normal values generally coincided with those of traditional acoustic analysis in the literature, and thus analysis was considered sufficient. A correlation study inferred similarity between H1-H2 and OQ and between PPQ and HNR and dissimilarity among others.

Recurrent Respiratory Papillomatosis Treatment at a Public vs Private Hospital

Melissa Zheng, MD (Presenter); Nikhil Arora;
Tamara N. Chambers, MD; Karla O'Dell, MD;
Michael Johns, MD

Introduction: The interaction between social determinants of health and the clinical course of recurrent respiratory papillomatosis (RRP) is poorly understood. This study compares patients treated for RRP at a tertiary care academic center (TAC) vs a public safety net hospital (PSNH) staffed by the same otolaryngology providers.

Method: A retrospective cohort study was performed of adult patients undergoing treatment for RRP at a TAC ($n = 48$) and a PSNH ($n = 14$) between July 2010 and September 2020. Demographic, disease, and treatment characteristics were compared.

Results: There was no difference between cohorts in age, gender, medical comorbidities, or history of juvenile onset. PSNH patients were more likely to be Hispanic, have public or no insurance, and reside in a zip code with lower median income compared with TAC patients. Despite living significantly closer to the hospital, PSNH patients were more likely than TAC patients to present with respiratory symptoms (50% vs 20.8%, $P = .04$) and exhibit more than 1 involved laryngeal subsite at their first surgical intervention (78.6% vs 27.1%, $P = .001$). They also had high referral rates for otolaryngologic care via the emergency department (42.9%) rather than outpatient referral (35.7%) and were more likely than TAC patients to require urgent intervention (21.4% vs 2.1%, $P = .03$). There was no difference in time interval from first clinic visit to procedure date. TAC patients exhibited a higher peak annual surgical frequency than PSNH patients did (median 3 vs 2 procedures, $P = .04$), although the total number of treatments did not differ.

Conclusion: PSNH patients present with more severe and symptomatic RRP disease compared with TAC patients. This finding may be related to sociodemographic disparities leading to poorer access to care.

Reproducibility of Laryngeal Force Sensor Measurements

Tiffany Wang, MD (Presenter); Allen Feng; Eleftheria Puka;
Vishwanatha Rao; Phillip Song

Introduction: The laryngeal force sensor (LFS) provides real-time force data during suspension microlaryngoscopy procedures. Its measurements have previously been shown to predict perioperative narcotic requirements as well as postoperative complications. The reproducibility of its measurements has not been elucidated.

Method: A consecutive series of 200 prospectively enrolled adult patients had force data collected from 2017 to 2019 during various types of suspension microlaryngoscopy procedures (excision of benign lesion, endoscopic cancer resection, and airway dilation procedures). Of these 200 patients, 10

were patients who had had 2 separate, similar procedures done, with unique LFS force metrics measured for each procedure. The unique force metrics from one procedure to the next were then compared for these 10 patients.

Results: The mean change in maximum force between procedures was 14.5 lbf (SD 11.6), the mean change in average force was 12.3 lbf (SD 11.8), the mean change in total impulse was 7.7 ton-seconds (SD 6.9), and the mean change in total suspension time was 8.99 minutes (SD 7.2).

Conclusion: LFS measurements appear to be reproducible, as demonstrated by the small changes in force metrics between 2 similar procedures performed for the same patient. A patient's past force metric recordings can thus help the surgeon use the LFS to stay within the same force metric goals for subsequent similar procedures.

SARS-CoV-2 Infection and Post-extubation Laryngeal Function

Benjamin Campbell, MD (Presenter); Kevin Motz; Michael Pitman; Kenneth Fletcher; Seth Cohen; Alexander Gelbard, MD

Introduction: In critically ill patients with SARS-CoV-2, risk factors for laryngeal complications after endotracheal intubation (ie, diabetes, obesity, prolonged intubation, hypotension, and large endotracheal tube [ETT] size) are common. Given the global impact of the virus, more information is needed regarding the long-term laryngeal effects on both breathing and voice.

Method: A retrospective review of patients receiving laryngologic care at a tertiary academic center was compiled, and patient characteristics were abstracted. Postmortem analysis of subglottic tissue in 2 patients with SARS-CoV-2 was performed using in situ hybridization of SARS-CoV-2 RNA and immunohistochemistry (IHC) for CD4 and CD8.

Results: Collectively, patients ($n = 8$) were 55.0 (SD ± 14.3) years old with a body mass index of 33.7 (SD ± 4.5). Most had type 2 diabetes mellitus (62.5%) and hypertension (50%). The average intubation duration was 15.1 days (SD ± 5). Most patients were intubated with an 8.0 ETT. The level of laryngotracheal injury occurred within the posterior glottis ($n = 6$ [75%]) and subglottis ($n = 2$ [25%]). Both subglottic specimens tested for SARS-CoV-2 infection were positive for the virus within the mucosal epithelium. IHC demonstrated CD4+ and CD8+ cells indicating an abundant adaptive immune response. At our institution, 1.5% of SARS-CoV-2 patients required intubation. By extrapolating from these data, we estimate roughly 300,000 patients required intubation nationally in 2020 for SARS-CoV-2 infection with more than 225,000 survivors at risk for laryngotracheal complications.

Conclusion: Laryngotracheal complications occur frequently after intubation for SARS-CoV-2. Earlier tracheostomy, use of smaller ETTs, and early injury identification through routine screening may limit the impact of functional laryngeal disability.

SLN Block Response Rates in 59 Neurogenic Cough Patients

Nicholas J. Talbot (Presenter); Margaret Heller; Sarah Nyirjesy, MD; Brandon Kim, MD; Brad deSilva, MD; Laura Matrkka, MD

Introduction: Chronic neurogenic cough related to hypersensitivity of the internal branch of the superior laryngeal nerve (SLN) is often treated with neuromodulating medications, which can cause considerable side effects. Our objective is to determine whether steroid and local anesthetic injection of the SLN ("SLN block") is a viable alternative for treatment.

Method: A retrospective chart review was performed on patients receiving SLN blocks from January 2015 to June 2020. Patients were asked whether the injection was beneficial, and Cough Severity Index (CSI) scores were obtained. Anticipated predictors of positive response were recorded, including tenderness to palpation over thyrohyoid membrane, unilateral cough trigger site, preceding viral infection, and medical history. Outcomes included percentage of responders, overall change in CSI score, and predictors of positive response.

Results: In total, 87 patients met inclusion criteria; 59 had complete data. Some 39 patients (67%) endorsed qualitative improvement in cough symptoms and quality of life after SLN block, and 6 of 39 (15%) required 2 treatments before improvement. Six of 15 (40%) patients who did not improve with the first injection had positive response to the second. Responders and nonresponders started at similar average CSI scores (26.73 vs 27.38, $P = .83$). Average postinjection CSI of responders was 17.53, compared with 27.17 ($P = .0049$) for nonresponders. No association was found between predictor variables and SLN block response. No significant side effects were reported.

Conclusion: SLN block is a low-risk procedure with good response rates, although our data did not demonstrate clear predictors of response. Those who responded to treatment had significantly improved CSI scores.

Smoking and Carcinoma Trends in Recurrent Respiratory Papillomatosis Patients

Taylor Freeman (Presenter); David Allen, MD; Ericka Erickson, MBA; Brandon Kim, MD; Brad deSilva, MD; Laura Matrkka, MD

Introduction: Recurrent respiratory papillomatosis (RRP) is a chronic disease of the respiratory tract caused by human papillomavirus types 6 and 11. The disease course is characteristically unpredictable, ranging from spontaneous remission to aggressive, recurrent disease. Thus, management is often challenging and requires unique approaches tailored to each individual patient. While recent literature has described risk factors for more aggressive disease, few sources have investigated the impact of smoking on RRP disease course and risk for malignant transformation.

Method: A retrospective chart review was conducted for patients evaluated for RRP at an academic tertiary care center

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between 1990 and 2020. A total of 188 patients were identified. Demographic and clinical data were collected, including smoking and alcohol history, human papillomavirus subtype, history of dysplasia and/or carcinoma, Voice Handicap Index scores, Derkey scores, surgeries (in office and operating room), and days to papilloma recurrence.

Results: Malignant degeneration in RRP occurred in 16.3% of smokers and 4.7% of nonsmokers. Smokers who developed carcinoma had significantly more debulkings during their disease course than those not developing carcinoma (6.6 vs 2.0, $P = .019$). In addition, patients who either presented with or developed carcinoma during their course had a higher pack-year smoking history (19.5 vs 12.7, $P = .003$). No difference in recurrence rate or intersurgical interval was demonstrated between smokers and nonsmokers.

Conclusion: The report demonstrates that smoking can increase the chance of malignant transformation in RRP patients and lead to a more severe clinical course, requiring additional surgical interventions.

Spirometry and Dyspnea Index: A Novel Way to Follow up Patients With Subglottic Stenosis

Eleftherios Ntouniadakis, MD (Presenter);
Mathias von Beckerath, MD; Josefin Sundh, MD

Introduction: We aim to promptly assess a relapse of subglottic stenosis with the use of spirometry and dyspnea index (DI); to monitor treatment effects after endoscopic treatment in adults with subglottic stenosis; and to compare treatment effects between adults treated for subglottic stenosis. As there is no consensus on how to follow up adult patients with subglottic stenosis functionally, our project suggests a novel way to monitor this patient group postoperatively with spirometry combined with the DI.

Methods: This was a prospective cohort study during 2016 to 2020 of patients. Patients with subglottic stenosis. Included were 52 adults who underwent endoscopic balloon dilation at a tertiary referral hospital. Forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF), peak inspiratory flow (PIF), forced inspiratory volume in 1 second (FIV1), expiratory disproportion index (EDI), DI, Voice-Handicap Index (VHI) were measured. Correlations between Cotton–Myer grading and spirometry measurements, DI, VHI were analyzed. Pearson's correlations coefficient, receiver-operating characteristic curve analysis, and t test were used.

Results: The Cotton–Myer classification correlated only weakly with PEF ($r = -0.37$, $P = .007$), PIF ($r = -0.34$, $P = .17$), and total peak flow TPF ($r = -0.38$, $P = .007$). The EDI demonstrated the best area under the curve (AUC; 0.89, $P < .001$) followed by TPF (0.88, $P < .001$), PEF (0.87, $P < .001$), and PIF (0.84, $P < .001$). The DI showed an excellent AUC (0.99, $P < .001$), while the VHI showed a fair AUC (0.72, $P < .001$). Patients treated endoscopically with balloon dilatation showed a decrease of 53% (CI, 41%–66%; $P < .001$) in the EDI and an increase of 34% in TPF (CI, 29%–40%; $P < .001$), 37% in PEF (31%–43%; $P < .001$), and 30% in PIF (24%–36%; $P < .001$).

Conclusion: The Cotton–Myer classification is insufficient for illustrating functional aspects of subglottic stenosis. EDI and PEF combined with DI are reliable measurements, both in demonstrating treatment effects and in the surveillance of the condition postoperatively.

Topical Capsaicin for the Treatment of Sensory Neuropathic Cough

Rebec Hoesli, MD (Presenter); Benjamin Wajsborg;
Robert W. Bastian, MD

Introduction: Sensory neuropathic cough (SNC) is a debilitating disorder causing a severe, chronic cough that is destructive to quality of life. While neuralgia medications are often very effective in treating this disorder, there is a small subset of patients who do not respond to a series of medication trials. Capsaicin spray was initially trialed as an additional option for these refractory cases several years ago, with anecdotal improvement for some patients. The purpose of this study is to evaluate both type and degree of capsaicin's benefit to patients with SNC, especially in those who have failed prior medications.

Method: This is a retrospective chart review of 248 patients with SNC who tried using capsaicin throat spray between December 2005 and April 2020 at a tertiary care laryngology practice. Patients were instructed to use the spray for a minimum of 2 weeks before reporting on results. They were educated on 3 types of potential benefit: (1) to reduce the global severity of their coughing, (2) to “schedule” coughing so as to gain an hour or two of calm, or (3) to abort coughing via a counterirritant effect. Outcome was measured as patient-reported percentage cough reduction.

Results: Of 248 patients, 145 (58.5%) reported benefit. Some 30 (12.1%) completed the trial but did not tolerate it well enough to evaluate benefit. In total, 54 (21.8%) reported no effect, 7 (2.8%) reported minimal effect, 10 (4.0%) reported only transient improvement, and 2 (0.8%) reported a worsened cough. Of the 145 patients with any benefit, 69.7% (101) used capsaicin as a cough reducer, 9.0% (13) as a cough scheduler, 10.3% (15) as a cough aborter, and 11.0% (16) experienced a combination of benefits. Of the 145 with benefit, 128 patients provided a numerical percentage of cough reduction. A total of 48.4% (62) reported 75% or more cough reduction, 27.3% (35) reported 50% to 74% cough reduction, 10.9% (14) reported 25% to 49% cough reduction, and 13.3% (17) reported less than 24% reduction.

Conclusion: Our study suggests that topical capsaicin spray might be considered as an alternative treatment option for persons with sensory neuropathic cough.

Transcutaneous CO₂ Changes During Apneic Oxygenation With High-Velocity Nasal Insufflation

Liuba Soldatova, MD (Presenter); Joshua Atkins, MD, PhD;
Jonathan Gavrin, MD, PhD; Natasha Mirza, MD

Introduction: High-velocity nasal insufflation (Hi-VNI) is a technique that can deliver apneic oxygenation without an endotracheal tube in the surgical field, but it does not allow for

continuous monitoring of the end-tidal CO₂ (ETCO₂). We performed continuous transcutaneous pCO₂ (tcpCO₂) monitoring during Hi-VNI cases to estimate the rate of rise in PaCO₂.

Method: After informed consent, tcpCO₂ monitor was used during 8 short microlaryngeal procedures carried out with Hi-VNI oxygenation. For comparison, tcpCO₂ was measured in 2 patients ventilated via endotracheal tube (ETT). Patient characteristics, vital signs, end-tidal ETCO₂, and tcpCO₂ were recorded.

Results: In 8 vocal cord injection cases with median apnea time of 16 minutes (M:F = 5:3, median age of 58 years, median body mass index of 26.34 kg/m², Mallampati score 1–2, American Society of Anesthesiologists class 2–3), only 1 case required intubation due to rapid rise in tcpCO₂. Median rate of ETCO₂ rise was 0.45 mm Hg/min (range [0.19; 1.67]). The median rate of tcpCO₂ rise was 1.95 mm Hg/min (range [1.42; 2.46]). The highest rates of tcpCO₂ rise corresponded with the lowest SpO₂ nadir values (81% and 74%). The rates of ETCO₂ and tcpCO₂ rise for intubated patients were lower (continuous ventilation case with the rate of ETCO₂ and tcpCO₂ change of 0.08 and 0.40 mm Hg/min; intermittent apnea case with the rate of ETCO₂ and tcpCO₂ change of 0.20 and 0.97 mm Hg/min). Maximum values of tcpCO₂ ranged between 61 and 88 mm Hg and did not correspond with the highest tcpCO₂ rate of change or the lowest SpO₂ nadir.

Conclusion: Our cases demonstrated a gradient between ETCO₂ and tcpCO₂ during apneic oxygenation with Hi-VNI, with the initial values and the rate of change in tcpCO₂ being higher than the initial values and the rate of change in ETCO₂. The highest rate of change in tcpCO₂ and the highest maximum tcpCO₂ values did not always correspond with the lowest SpO₂ nadir. Future studies will help determine if these trends can be observed in a large cohort of patients.

Viral Infectivity in COVID-19 Patients Undergoing Tracheotomy

Manish George, MBBS (Presenter); Charlotte McIntyre; Jie Zhou; Wendy Barclay; Neil Tolley

Introduction: The purpose of this study is to establish the infectivity of COVID-19 patients at the time of surgical tracheotomy.

Method: This is a prospective single-institution study across 3 hospital sites during the United Kingdom's first wave of the COVID-19 pandemic in 2020. Intubated and ventilated patients for respiratory wean tracheotomy underwent SARS-Cov-2 polymerase chain reaction (PCR) nasal, throat, and endotracheal tube swabs at the time of planned surgical procedure. These were assessed via quantitative real-time reverse-transcription PCR. The tracheal tissue windows excised during the tracheotomy were cultured for SARS-Cov-2 using Vero E6 and co2 cells. Serum taken at the time of procedure was also assessed for antibody titers against SARS-Cov-2, via neutralization assays.

Results: A total of 37 patients were included in the study. PCR swab testing yielded 9 positive results. None of the 35 individuals who underwent tissue culture were positive for SARS-CoV-2. All 18 patient who had sera sampling demonstrated neutralization antibodies at a minimum titer of 1:80.

There was no correlation between sample CT values nor sample quantities with the number of days since the onset of symptoms ($P > .05$).

Conclusion: Our results did not demonstrate COVID-19 infectivity at the time of tracheotomy. The authors agree that the data do not undermine national and international guidance on tracheotomy after day 10 of mechanical ventilation and using FFF3/N95 masks. However, given the length of time to procedure in our data, infectivity at 10 days cannot be ruled out. We do, however, advise that a preoperative negative PCR swab is not necessary. We also recognize that antibody titer levels may serve as a useful adjunct for assessment of infectivity in these patients.

Voice Pathologies and Perception

Melissa M. Mortensen, MD (Presenter); Tejas Kollu; Priya Uppal; Melissa Thomas; Rafael S. Cardona, MD

Introduction: Different qualities of speech have been shown to influence public perception. The aim of this study is to investigate how the general population assesses different voice conditions based on the following qualities: intelligence, friendliness, attractiveness, leadership ability, and employability.

Method: A standard excerpt of the Rainbow Passage was recorded by male and female patients with different voice conditions for a total of 12 recordings. The recordings were embedded in a Qualtrics survey with questions pertaining to intelligence, friendliness, attractiveness, leadership ability, and employability. Amazon MTurk was used to crowdsource survey respondents. Two-way analysis of variance and uncorrected Fisher least significant difference test at a significance level of .05 were used to compare the mean scores.

Results: A total of 2083 responses were included in the final data set. The female control voice was scored as more intelligent, friendly, attractive, more likely to be a Fortune 500 leader, and more employable when compared with the female abductor spasmodic dysphonia, female adductor spasmodic dysphonia, female muscle tension, and female vocal fry voices ($P < .0001$). Female respondents assigned lower attractiveness, Fortune 500 leadership, and employability scores compared with male respondents when evaluating the female abductor spasmodic dysphonia, the female polyp, and the female vocal fry voices ($P < .05$).

Conclusion: This study demonstrates that voice pathologies among female patients are more critically appraised compared with male patients. This public perception of voice pathology among female patients is useful for physicians to be aware of in their care and assessment of voice pathology patients.

Work Productivity Improvement After Voice Therapy in Professional Voice Users

Amanda Hu (Presenter); Linda Rammage; Tanya K. Meyer, MD

Introduction: Professional voice users (PVUs) require their voice for their job. Work productivity is affected when PVUs

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have voice disorders. Voice therapy is a common treatment option for voice disorders, but there are few studies demonstrating its effect on work productivity. The goal of this study was to evaluate the change in work productivity in PVUs after voice therapy.

Method: PVUs whose primary treatment for their voice disorder was voice therapy were prospectively recruited at an academic voice center. Participants completed a 7-week voice therapy course from January 2018 to December 2020. Participants completed the validated Work Productivity and Activity Impairment questionnaire (WPAI), general self efficacy scale (GSES), and Voice Handicap Index–10 (VHI-10) before and after voice therapy. Sample size calculation to test a 2-tailed significance level of .05 ($\alpha = .05$) with 80% power ($\beta = .20$) yielded an estimate of 18. Statistical analysis was completed with SPSS.

Results: A total of 26 PVUs (100% female, mean age 48.9 years, majority teachers) were recruited; 20 had complete data. Patients reported a $40.5\% \pm 27.4\%$ improvement in work impairment (presenteeism; $P < .00$) and $26.0\% \pm 27.8\%$ improvement in activity impairment ($P < .00$). There was no change in work hours missed due to sickness (absenteeism). Patients had high GSES (34.8 ± 3.7) and borderline abnormal VHI-10 (13.1 ± 9.2). The changes in GSES and VHI after completing voice therapy were not significant.

Conclusion: PVU had an improvement in work productivity (presenteeism, but not absenteeism) after completing voice therapy for their voice disorder.

Otology/Neurotology

Access to Experienced CI, Surgeons and Audiology Is Socioeconomically Determined

Alexander Chern, MD (Presenter); Rahul K. Sharma; Anil K. Lalwani, MD

Introduction: Previous studies have identified socioeconomic disparities in access to cochlear implantation. This study examines socioeconomic determinants of access to experienced cochlear implant (CI) surgeons and postoperative audiologic care using New York Statewide Planning and Research Cooperative System data.

Method: Secondary analysis of a prospective claims database was performed. Adults (>18 years) who underwent cochlear implantation from 2010 to 2017 with at least 1 audiology visit claim within first year of implantation were observed. Multivariate logistic regression controlling for age, race/ethnicity, gender, and insurance status was used to predict frequency of audiology visits (>50th percentile in claims for audiology visits after cochlear implantation); CI, complications, and having been operated on by a high-volume surgeon (surgeon with >75th percentile in CI, claims over a 7-year period; 69 CI, surgeries/year).

Results: A total of 796 adult subjects (53.5% female, 44.2% non-White) were analyzed. Average age of implantation was 60.7 years; 30.2% had their CI, from a high-volume surgeon. On multivariate logistic regression, non-White race (odds ratio

0.19; 95% CI, 0.11–0.32, p75th percentile volume: 0.12, 0.03–0.40, p50th percentile in postoperative audiology visit claims, 25–50th percentile volume: 1.97, 1.12–3.53, $P = .02$; 50th–75th percentile volume: 4.15, 2.51–6.99, $P < .01$).

Conclusion: Among patients undergoing CI, access to experienced surgeons and frequent postoperative audiology visits are in part determined by socioeconomic factors. This has important consequences as more experienced surgeons had fewer complications. Future studies are needed to address barriers to experienced care for CI, recipients.

Application of Machine Learning to Predict Hearing Outcome in Tympanoplasty

Hajime Koyama, MD (Presenter); Tsukasa Uranaka, MD; Akinori Kashio, MD, PhD; Yu Matsumoto, MD, PhD; Tatsuya Yamasoba, MD, PhD

Introduction: This study aims to investigate the applicability of machine learning technique to predict the postoperative outcomes of tympanoplasty for chronic otitis media patients.

Method: A retrospective analysis was conducted. A total of 105 chronic otitis media patients (114 ears, mean age: 55.0 years) who received tympanoplasty from January 2017 to December 2020 at a tertiary hospital were included in this study. Favorable outcome was defined as a postoperative air–bone gap of <15 dB. The accuracy of predicting the outcome was compared between a classical scoring model and a machine learning model. In the classical scoring model, ears were stratified by middle ear risk index (MERI) into mild (MERI 0–3, $n = 80$) and moderate (MERI 4–7, $n = 34$) groups. In the machine learning model, age, preoperative air–bone gap, middle ear granulation or effusion, otorrhea, previous surgery, ossicular status, lottion of the tympanic perforation, and smoking were selected as independent variables. Data were randomly divided into training and test set. Random forest algorithm was applied to analyze the data, and prediction accuracies of classification in training and test set were calculated.

Results: In total, 39 ears had middle ear granulation or effusion. Some 56 ears had otorrhea, and 21 ears had previous operation. Four ears had ossicular chain problem, and 37 patients were smokers. The average postoperative air–bone gap was 14.1 ± 11.2 dB, and 75 (65%) ears had favorable outcomes. The prediction accuracy by MERI scoring was 62.3%, and those in the random forest algorithm in train data and test data were 86.1% and 74.3%, respectively.

Conclusion: The machine learning technique has the potential to predict the postoperative outcomes of tympanoplasty or chronic otitis media patients.

Association of Pediatric Hearing Quality and Sports Participation: A Population-Based Study

Renata M. Knoll, MD (Presenter); Elliott D. Kozin, MD; Neil Bhattacharyya

Introduction: Sports-related injuries, such as concussion, during childhood may result in negative developmental consequences. Auditory dysfunction is recognized to be a possible

sequela of sports-related concussion; however, few large-scale epidemiological studies have quantified the association between hearing quality and sports-related activity in the pediatric population.

Method: The National Health and Nutrition Examination Survey for the 2015–2016 cycle was utilized to determine the association of sports activities and hearing quality in children aged 5 to 15 years. Sports for the present analysis included basketball, American football, soccer, baseball, and swimming. Hearing was qualitatively assessed based on responses from the audiology questionnaire and grouped into 2 groups: “excellent” or “less than excellent” hearing. Deafened patients were excluded. The distribution of quality of hearing was compared with a chi-square test.

Results: Among the estimated 47.1 million children that were assessed (52.2% male; mean age, 10.2 years), 63.4% (29.9 million) were physically active and practicing basketball ($n = 8.1$ million), football ($n = 5.3$ million), soccer ($n = 6.6$ million) baseball ($n = 4.3$ million), and swimming ($n = 5.6$ million). Subjective abnormal hearing quality was more frequent among children who played football compared with those that did not (36.5% and 26.8%, respectively; odds ratio: 1.56 [95% CI, 1.23–2.00]; $P = .001$). Other sports, such as basketball and soccer, did not have this association with hearing quality ($P = .496$ and $P = .852$, respectively).

Conclusion: Our findings suggest a notable association between practice of a potentially high-concussion sport and hearing quality. Children practicing football are 1.56 times more likely to report abnormal hearing quality.

Automated CT Temporal Bone Segmentation for Applications in Neurotologic Surgery

Alexander Lu (Presenter); Andy S. Ding; Zhaoshuo Li; Jeffrey H. Siewerdsen, MS, PhD; Russell H. Taylor, PhD; Francis X. Creighton, MD

Introduction: Semiautonomous and autonomous surgical robots have the potential to improve surgical safety in neurotology. However, such methods require automated, efficient, and accurate segmentations of preoperative imaging for registration to patient anatomy. This study investigates the accuracy of an automated method to segment relevant temporal bone anatomy in cone-beam computed tomography (CT).

Method: We developed a computational pipeline around the symmetric normalization registration method, producing an automated pipeline that predicts segmentations of a new image based on a labeled atlas. To evaluate accuracy, we manually segmented each of 16 deidentified high-resolution cone-beam CT images of the temporal bone, labeling each voxel corresponding to an anatomical region (eg, ossicles, labyrinth, facial nerve, external auditory canal, dura, etc) with a different tag. Predicted segmentations from our automated method were compared against this ground truth using Hausdorff distance and Dice score. The right-sided template was reflected across the midline to evaluate the left side. Runtimes were

documented to determine computational requirements of this method.

Results: The average Hausdorff distances and Dice coefficients between predicted and ground truth were as follows: malleus (0.106 ± 0.007 mm, Dice: 0.836 ± 0.014), incus (0.129 ± 0.029 mm, Dice: 0.846 ± 0.029), stapes (0.257 ± 0.214 mm, Dice: 0.353 ± 0.140), labyrinth (0.175 ± 0.081 mm, Dice: 0.847 ± 0.063), and facial nerve (0.761 ± 0.413 mm, Dice: 0.551 ± 0.101). A 24-core machine with 8-GB RAM completed 1 registration in 5 minutes.

Conclusion: We demonstrate submillimeter accuracy for automated segmentation of temporal bone anatomy compared with hand-segmented ground truth using our template registration pipeline. This method is not limited by the significant dependence on training data volume that plagues more complex deep learning models. Rapid runtime and low computational requirements further underscore this method’s translational potential.

Catchment Profile of Large Cochlear Implant Centers in the US

Ashley M. Nassiri, MD, MBA (Presenter); Elizabeth L. Perkins, MD; Meredith A. Holcomb, AuD; Andrea L. Bucker, AuD; Aniket A. Saoji, PhD; Matthew L. Carlson, MD

Introduction: In an effort to better understand factors influencing the under-utilization of cochlear implants (CIs) in the US, we sought to characterize the catchment area and patient profile of high-volume CI, centers.

Method: All patients undergoing CI, surgery at four participating large CI, centers between 2015 and 2020 were retrospectively identified. The patients’ home addresses were used to calculate travel distances and determine urban vs rural residential areas (urban area defined as >1000 individuals/square mile).

Results: Over the 5-year study period, 4489 CIs were implanted in 3234 unique recipients (1042 children and 2192 adults). Nearly 39% of patients underwent bilateral implantation (sequential or simultaneous), 63% of whom were children. The annual number of unique patients undergoing CI, increased by 23% over the 5-year study period. Patients traveled an average of 114 miles each way, and adult patients were more likely to travel farther compared with pediatric patients (127 vs 87 miles, respectively; $P < .001$). While 68% of patients resided outside of a 50-mile radius, the extent of patient reach was largely limited to a 200-mile radius, which encompassed 88% of patients. Rural residents comprised 65% of the patient population and traveled farther compared with urban residents (123 vs 100 miles, $P < .001$).

Conclusion: While large CI, centers serve geographically dispersed patient populations, patient access beyond a 200-mile radius is limited, potentially creating watershed areas between centers. Outreach programs aimed to expand catchment areas must take travel burden and access to local care into consideration.

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Characteristics of Patients With Homozygous Mutations in the Otoferlin Gene

Eugenia Carmela López Simón (Presenter);
Patricia Corriols Noval; Minerva Rodríguez Martín;
Ramón Cobo Díaz; Belen Salvatierra Virio

Introduction: Auditory neuropathy secondary to p.Gln829X mutation in the otoferlin gene (OTOF) is the third genetic cause of prelocution deafness in Spain's population. Otoacoustic emissions (OAEs) are preserved while brainstem auditory evoked potentials (BAEPs) appear absent or severely distorted.

Method: A retrospective and descriptive study of the clinical and audiological characteristics of all patients with genetic testing of p.Gln829X mutation (OTOF gene) was made from 2000 to 2020. The genetic diagnostic was carried out by the Molecular Genetics Unit (Ramon and Cajal Hospital) and IMOMA (Asturias).

Results: We genetically screened 26 patients from 5 different families with a diagnosis of congenital profound hearing loss due to otoferlin gene mutation in 1 member. There was a total of 14 men (54%) and 12 women (46%), born between 1921 and 2017. Some 35% of subjects did not carry the mutation and therefore had normal hearing; 27% were heterozygous carriers of Q829X mutation with normal hearing, and the remaining 35% carried Q829X mutation homozygosity, suffering from bilateral profound deafness. We highlight the fact of 1 patient with hearing loss and the mutation in heterozygosis. Otoscopy examination was normal in 100%, and apart from 1 case, the OAEs were preserved. In contrast, BAEPs were altered in every patient. According to the treatment, 50% used hearing aids and the other 50% were cochlear implanted with good hearing levels.

Conclusion: Most patients with Q829X heterozygous mutation in the otoferlin gene have normal hearing. However, the homozygous form manifests in bilateral profound deafness with normal OAEs after birth. The moderately high prevalence of this mutation in the Spanish population could produce a significant false-negative rate in newborn hearing screening programs using OAEs. For all of these reasons, it is important to suspect it in order to place cochlear implants as soon as possible.

Computational Modeling of Cholesteatoma Pathogenesis

Sudeepti Vedula (Presenter); Marissa Ilaria;
Mohammed Hussain; Joseph Salguero; Kabeer Munjal;
Robert Jung, MD

Introduction: Cholesteatoma is characterized by accumulation of invasive and destructive keratinizing epithelium in the temporal bone. Although the retraction pocket (RP) theory of pathogenesis is well accepted, a detailed, stepwise description of pathogenic events after RP formation is lacking. We propose that the unique migratory nature of the tympanic membrane/external auditory canal skin heavily contributes to cholesteatoma formation. We used computational engineering methods to explore this possibility.

Method: For a base structure, we used a finite element model (FEM) of the tympanic membrane and middle ear (TM/

ME) published by the University of Antwerp. SolidWorks software was used to make the FEM deformable, and MATLAB software was used to model migrating epithelium, which was overlaid on the deformable TM/ME model.

Results: Our deformable TM SolidWorks model had a 9-mm diameter, 0.1-mm thickness, and material properties with Young's modulus $3.4 \times 1 \text{ N/m}^2$ and a mass density of $1.2 \times 1 \text{ kg/m}^2$. Squamous epithelium migrated at a rate of $0.097 \text{ } \mu\text{m/min}$ (consistent with in vivo rates), expanding radially from the TM center toward the annulus. When confronted with a fixed obstacle, the migrating epithelium showed a buckling pattern. Deformations induced in the TM resulted in altered patterns of epithelial migration.

Conclusion: This is the first attempt to model acquired cholesteatoma formation using computation methods. We explored interactions between RP formation and epithelial migration, which should not be ignored when proposing mechanisms for cholesteatoma pathogenesis. Computational modeling offers the optimal medium to explore our hypothesis. Given that no computational model existed, we developed this model to fill a knowledge gap in the ongoing pursuit of a complete theory of cholesteatoma pathogenesis.

Developing a Regional Cochlear Implant Consortium: Do Complication Profiles Differ?

Matthew R. Bartindale, MD (Presenter); Kevin Peterson;
Jeffrey Singh; Ariana Kenney; Douglas D. Backous, MD

Introduction: We developed a regional cochlear implant (CI) consortium to expand patient access to expert surgical care with audiology services closer to home. We hypothesize that this model offers a safe and viable practice model.

Method: This retrospective study at a tertiary center included adult patients who received a unilateral CI, by a single surgeon from July 2017 to October 2019. Preoperative evaluation and postoperative medical care were coordinated in the patient's locale as needed. Audiology care was performed by independent consortium clinics in the patient's home community. Demographics, comorbidities, otologic history, and complications were documented for each patient.

Results: A total of 110 patients received a CI. Some 71 received audiological care from consortium clinics and 39 at our clinic. The average distance traveled for surgical care was 107.2 miles for local and 34.4 miles for consortium patients ($P = .0001$). Consortium patients were more likely to be older (75.4 years vs 69.6 years, $P = .0296$), have diabetes mellitus (18.3% vs 4.2%, $P = .0381$), and have a cardiac history (32.3% vs 9.9%, $P = .0092$). No significant difference in patient gender ($P = .5285$), autoimmune conditions ($P = .2105$), smoking status (current $P = .0623$, former $P = .1691$), anticoagulation status ($P = .0543$), or body mass index ($P = .4539$) were noted. There was no significant difference in complication rates between the 2 groups ($P = .8540$).

Conclusion: More comorbidities were noted in the consortium group, yet there was no significant difference in complication rates between the 2 groups. Preoperative coordination of medical issues allowed us to expand CI, access beyond our

traditional reach at our tertiary center. This model is a viable way to safely expand CI, care to new groups of patients.

Diagnostic Yield of CT Imaging in Pulsatile Tinnitus

Natalia Kuhn, ENS, MC, USNR (Presenter); Matthew Studer; Candace E. Hobson, MD

Introduction: The workup of pulsatile tinnitus (PT) generally involves computed tomography (CT) or magnetic resonance imaging; however, the etiology of PT often remains unknown. The goal of this study is to quantify the rate at which CT yields a diagnosis for patients with PT, as well as to identify factors that may predict diagnostic imaging.

Method: This is a retrospective review of patients presenting to a tertiary care center with pulsatile tinnitus who underwent CT temporal bones and/or CT angiography head/neck between 2015 and 2020. Variables that were analyzed include patient demographics, PT laterality and duration, the ability to modify PT with venous compression, treatment, and symptom resolution after treatment. The diagnostic yield of CT scanning and the specific diagnoses were recorded.

Results: A total of 136 patients (80.8% female) met inclusion criteria, with an average age of 50.3 years; 75.7% (103) had unilateral PT, 19.9% (27) had bilateral PT, and 4.4% (6) had unspecified laterality. Of the patients, 30.9% (42) could modify their PT with venous compression of the internal jugular vein. A specific diagnosis was found on CT in 39% (53) of patients. The breakdown of diagnoses in those 53 patients was 42.2% (24) sigmoid sinus dehiscence/diverticulum, 32.1% (17) skull base dehiscence, 17% (9) idiopathic intracranial hypertension, 11.3% (6) semicircular canal dehiscence, 9.4% (5) dominant venous system, and 3.8% (2) other vascular findings. Some CTs yielded multiple diagnoses. Patients with modifiable PT were significantly more likely to have diagnostic CT imaging than patients with nonmodifiable PT (61.9% vs 29.0%, $P < .002$). Patients with diagnostic CTs had a significantly longer duration of symptoms than those with nondiagnostic CTs (37.6 vs 16.7 months, $P = .048$). Common surgical treatments included resurfacing, decompression and reconstruction of the sigmoid sinus, skull base, and semicircular canal; Diamox was a common medical treatment.

Conclusion: CT scanning is nondiagnostic in the majority of patients with PT. Diagnostic scans are more likely in patients with modifiable PT and in patients with a longer duration of symptoms.

Early Hearing Preservation Outcomes With New Slim Lateral Wall Electrode Using Electrocochleography

Amit Walia, MD (Presenter); Jacques A. Herzog, MD; Matthew A. Shew, MD; Cameron C. Wick, MD; Nedim Durakovic, MD; Craig A. Buchman, MD

Introduction: We assess early hearing preservation (HP) outcomes of patients implanted with the new Slim 20 lateral wall array (CI624); compare early HP outcomes with and without

real-time electrocochleography (RT-ECochG); and explain the role of RT-ECochG feedback to improve HP. We believe this abstract is suitable for a late-breaking abstract as we are the first to report early HP outcomes for a new Slim 20 lateral wall electrode (CI624). Since the CI624's release in May 2020, it is becoming increasingly popular among centers as a potential HP array. To our knowledge, there have not been any discussions at major conferences or published studies reviewing experiences with the CI624. Based on our early experience with 29 implantations using this electrode, we have found poor HP outcomes 1 month postoperatively with preservation in only 16 of the recipients. As a result, we began using real-time monitoring of cochlear health during the insertion (ie, electrocochleography [ECochG]) to potentially improve HP outcomes with the CI624. By using real-time ECochG (RT-ECochG) and particularly focusing on minimizing trauma at the end of insertion, we achieved superior early HP rates with this array (8/9 patients, 88.9%). Our preliminary data suggest that full insertion of the CI624 without ECochG results in unpredictable and relatively poor HP outcomes. We suspect that this is related to the CI624 being a longer electrode than previous hybrid arrays resulting in trauma to the apical-most hair cells and neural elements at full insertion. Thus, RT-ECochG may be required for predictable early HP using the CI624. As a result of the COVID-19 pandemic, we were unable to achieve sufficient implantations for submission of an abstract in January 2021. However, we have now performed 9 implants with the CI624 in the past 6 months using RT-ECochG for HP candidates. We believe that our experience with and without ECochG has resulted in an early critical finding that may influence how this implant is used in HP candidates.

Methods: A longitudinal study was designed with postlinguistically deafened adults undergoing implantation with CI624 from 2020 to 2021. Pure-tone audiometry preoperatively and 1 month postoperatively were obtained. HP was defined as low-frequency pure-tone average (LFPTA; 125, 250, 500 Hz) <80 dB. Intracochlear RT-ECochG was used to guide insertion for 9 patients. When there was >5 μ V ECochG response drop, array adjustments (ie, withdrawal ~ 1 mm, 5° anti-modiolar rotation) were made to facilitate response recovery.

Results: A total of 38 implants were performed. There was no scalar translocation on postoperative CT scans and mean apical insertion angle was $338.1^\circ \pm 86.4^\circ$. Full insertion was performed in most cases; however, partial insertion was performed if the RT-ECochG response dropped during insertion of the final 3 electrodes ($n = 4$). Of the 29 patients where RT-ECochG was not used, 16 (55.2%) had low-frequency HP postoperatively with preoperative LFPTA 42.4 ± 16.4 dB and threshold shift to 83.9 ± 27.8 dB. Among the 9 patients where RT-ECochG was used, 8 (88.9%) had low-frequency HP postoperatively with preoperative LFPTA 46.5 ± 16.0 dB and threshold shift to 62.6 ± 19.0 dB. Difference between threshold shift postoperatively with and without RT-ECochG was significant ($P = .002$, Mann-Whitney U test).

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Conclusion: RT-ECochG–guided insertion may be required for consistent HP outcomes following CI624 implantation. This may allow the surgeon to decide the depth of electrode insertion in the effort to preserve low-frequency hearing. Further investigation is needed to evaluate whether long-term HP can be maintained using CI624.

Educational Benefit of ORBEYE Exoscope vs Microscope in Otologic Surgery

Anya Costeloe (Presenter); Nathan C. Tu, MD; Seilesh C. Babu, MD

Introduction: This study examines whether visualizing otologic surgeries in a 3-dimensional exoscope view improves medical student and fellow educational experience.

Method: This was a prospective study at a teaching hospital performed between October 2019 and December 2020. Medical students on an ear, nose, and throat (ENT) rotation; ENT residents; and neurotology fellows were included. Surveys in 3 parts were administered including a baseline preobservation, after observing the first surgery with either exoscope or microscope and after observing the second surgery with the opposite device from the first surgery. The key outcome variables were image clarity, depth perception, level of motion sickness, understanding of middle ear anatomy and ability to identify the tympanic segment of the facial nerve, cochleariform process, oval window, and round window. Subjects graded their responses on a scale of 1 to 10 (1 *worst*, 10 *best*). Statistical analysis was performed, and a P value $<.05$ was considered significant.

Results: In total, 22 participants completed surveys. There was a significant improvement in the comprehension of middle ear anatomy after observation with the exoscope ($P = .002$) but not with the microscope ($P = .762$). The clarity and depth perception were significantly better with the exoscope ($P = .00000004$, $P = .000002$), while there was slightly higher level of nausea with the exoscope ($P = .015$). Whether the exoscope or microscope was observed first did not affect preferred method or level of improvement. Overall, 95.5% of participants preferred the exoscope to the microscope. There was no significant difference in results between medical students, junior, and senior residents, illustrating that the exoscope benefits all levels of medical education.

Conclusion: This is the first study comparing the educational benefit of the exoscope compared with the microscope in otolaryngology. The results demonstrate that the exoscope allows for better visualization of the surgery and anatomy in medical education.

Electrode Position and Clinical Outcomes in Revision Cochlear Implantation

Arianna R. Winchester (Presenter); Emily Kay-Rivest; Qianhui Shao; J. Thomas Roland Jr; Babak Givi, MD; Daniel Jethanamest

Introduction: Revision cochlear implantation (CI) is a rare scenario that poses unique challenges in achieving optimal electrode positioning and clinical outcomes. We investigated

the frequency of revision CI, at our center with a focus on electrode array positioning and hearing outcomes.

Method: All adult and pediatric CI, from 2011 to 2020 were reviewed, and revision cases were selected. Demographics, indications for revision, radiologic and surgical details, complications, and audiologic outcomes were analyzed. Intraoperative radiographs were independently reviewed by 2 investigators to determine angular depth of insertion (aDOI) in primary and revision CI.

Results: During the study period, 88 ears in 69 patients (40 adults, 29 children) underwent revision CI. Indications included medical/surgical uses (infection, trauma, device migration, suboptimal insertion, retrocochlear lesions; 40, 45.5%), hard failure (33, 37.5%), and soft failure (15, 17%). Eleven patients (16%) required more than 1 revision; 1 required 3 revisions. The average time to revision was 4.4 years. A device from the original manufacturer was used in 81.4% of cases ($n = 86$). Audiologic outcomes after revision improved significantly when comparing the mean best sentence in quiet scores before and after revision (from: 67.0 to: 89.5, $p45^\circ$ shallower than original insertions).

Conclusion: Revision CI, surgery is overall infrequent but generally leads to improved clinical outcomes. Most revisions are due to hard failures and medical/surgical uses, in which the success rate in improving hearing is high. Revision electrode insertions achieve a comparable depth to primary insertions.

Ergonomics of Otologic Surgery: Endoscope vs Microscope

Annie E. Arrighi-Allisan (Presenter); Katherine L. Garvey; Kevin Wong, MD; Ameya A. Jategaonkar; Maura K. Cosetti, MD; Alfred-Marc Iloreta, MD

Introduction: The comparative postural health of surgeons performing endoscopic and microscopic otologic surgeries has been a topic of active debate, with many nascent or anecdotal reports suggesting the latter encourages suboptimal ergonomics. Using inertial body sensors to measure joint angles, this study sought to objectively evaluate and compare the ergonomics of trainee and attending surgeons during endoscopic and microscopic otologic surgeries.

Method: Six subjects (4 trainees, 2 attendings) performed 15 otologic surgeries (9 microscopic, 6 endoscopic) while wearing 11 inertial measurement units (IMU) affixed to either side of each major joint. IMU data, sampled at 128 Hz, were used to calculate joint angles. Ideal neck and trunk joint angles (ie, $<10^\circ$ in either direction) were determined by the validated Rapid Entire Body Assessment tool. Positive angles indicate joint flexion, while negative angles signify extension. Subjects completed a modified NASA Task Load Index to assess mental and physical exertion and pain after each surgery. Komogorov–Smirnov test was used to confirm normality, and Student t test was employed to detect differences between groups.

Results: Trainees demonstrated significantly more neck (10.92° vs -4.79° , $P = .05$) and back (16.48° vs 3.66° , $P = .01$) flexion during microscopic surgeries compared with endoscopic

surgeries. However, these differences were not significant when attending neck and back angles were included in the analyses (neck: 5.26° microscopic vs -4.79° endoscopic, $P = .119$; back: 4.41° microscopic vs 3.66° endoscopic, $P = .46$). Levels of mental, physical, and temporal demand and pain did not differ significantly between endoscopic and microscopic techniques or between trainee and attending surgeons.

Conclusion: Our data suggest that trainees operate with higher-risk neck and back positions when performing microscopic otologic surgery compared with endoscopic cases. This difference does not endure when accounting for attending ergonomic data, suggesting that experienced otologists may adopt healthier compensatory posture over time.

Factors Associated With Limited Auditory Outcomes Following Adult Cochlear Implantation

Erika Leec (Presenter); Jordan Hochman; Justyn Pisa

Introduction: Many patients are successful in achieving useful hearing sensation after cochlear implantation (CI). However, performance varies widely, and a proportion of patients have limited audiometric outcomes. While there are some well-documented determinants of poor performance, there remains a cohort of patients who do not meet expectations. Preoperative prognostication is desirable to temper expectations, ensure value of the intervention, and reduce risk where possible. The objective of the study is to evaluate variables associated with the most limited speech outcomes following CI.

Method: We performed a retrospective review of a single CI, program's cohort of (344 ears) patients implanted between 2011 and 2018 whose 1-year postimplantation AzBio scores fall 2 standard deviations below the median. Exclusion criteria include skullbase pathology, pre/perilingual deafness, cochlear anatomic abnormalities, English as an additional language, and limited electrode insertion depth. Overall, 26 patients were identified.

Results: The study population's postimplantation net mean AzBio score is 18% compared with the program's 47% ($P < .001$). This group is older (71.8 vs 59.0 years, $P < .001$) with a longer duration of hearing loss (26.4 vs 18.0 years, $P < .01$) compared with the general cohort. Preoperative AzBio scores are 14% lower ($P < .001$). Escalating comorbid status was associated with worse performance ($P < .05$).

Conclusion: Older patients with a longer duration of hearing loss were found to have more limited performance. Net benefit tended to decrease with comorbidity. The importance of a lower preoperative AzBio score is unclear but possibly relates to age and duration of impairment.

Gene Therapy for Hair Cell Regeneration: Review of the First in Man Inner Ear Gene Therapy Trial

Hinrich Staecker, MD, PhD (Presenter); Douglas E. Brough, MD; Lawrence Lustig, MD; Charles Della Santina, MD; Kevin Sykes, MD; Lloyd Klickstein, MD

Introduction: We review results of CGF166 delivery to the inner ear, discuss the challenges of developing molecular therapeutics for the inner ear, and understand the process of developing novel therapeutics. We have just finished a database lock on our last long-term follow-up patients for this phase 1 trial.

Methods: Using an Ad5-based vector system, we delivered the human atonal homolog *hath1* driven by the glial fibrillary acidic protein promoter to the inner ear via a laser fenestration of the stapes footplate. Inclusion criteria were based on pure-tone hearing thresholds between 125 and 8000 Hz in adults up to age 75 years without a history of genetic hearing loss. Patients with conductive hearing loss and Ménière's disease were excluded. Using a dose escalation design 20 to 60 μ L of concentrated vector solution were infused. Outcomes measures included pure-tone hearing thresholds from 125 Hz to 16,000 Hz, speech discrimination, auditory brain stem responses, vestibulo-ocular reflexes, caloric testing, and subjective visual vertical. Patients were followed for 6 months after vector delivery. Additional testing included serial magnetic resonance imaging scanning to look for cochlear inflammation and determination of anti-Ad5 titers.

Results: Of the initial cohort there were 3 responders and no significant adverse events. No patients with vestibular deficits were enrolled, and there was no change in vestibular function. Infusion of vector through the footplate was tolerated, and no change in conductive hearing loss was seen as a result of the procedure. Based on scaling calculations, vector dose infused was at the lower end of the predicted effective dose.

Conclusion: Infusion of molecular therapeutics via the stapes footplate is feasible and overall safe. There were some responders suggesting that manipulation of the atonal regulatory pathway can induce hair cells regeneration. Improvements in patient selection and delivery are needed.

Hearing Aids Enhance Music Enjoyment in Individuals With Hearing Loss

Alexander Chern, MD (Presenter); Michael W. Denham, MPhil; Rahul K. Sharma; Alexis S. Leiderman; Anil K. Lalwani, MD

Introduction: Patients with hearing loss (HL) exploring rehabilitation with hearing aids (HAs) frequently express concern about the impact of HAs on music enjoyment; the potential impact of HL and HA use on music enjoyment is poorly studied. Our study investigates music appreciation in HA users with varying levels of HL.

Method: A cross-sectional music enjoyment survey was distributed to adult (>18 years) bilateral HA users recruited from July 2020 to January 2021. Exposure variables include HL (better ear pure-tone average [PTAB]) and speech discrimination (word recognition scores [WRS]) based on most recent audiogram. Outcome variables included self-reported, validated measures of music enjoyment (pleasantness, musicality, naturalness) with and without HAs assessed with a visual analog scale (0–10; 10 indicates the highest level of enjoyment, 0

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the least). Information on music background/preferences, HA usage, and demographics were also collected.

Results: A total of 77 bilateral HA users completed the study. The mean (SD) age was 65.2 (18.2) years; 46 (59.7%) were female. Mean (SD) PTAB was 56.0 (15.3) dB. Thirteen (16.9%) subjects had mild HL (PTAB 26–40 dB), 50 (64.9%) moderate to moderately severe HL (PTAB 41–70 dB), and 14 (18.2%) severe HL or worse (PTAB \geq 71 dB). The mean (SD) length of HA use was 17.9 (14.6) years. Among all subjects, HAs (compared with no HAs) provided increased self-reported enjoyment of music in pleasantness (HA 6.99, no HA 5.69, $P < .01$), musicality (HA 7.51, no HA 6.12, $P < .01$), and naturalness (HA 6.88, no HA 5.92, $P = .01$). In multivariable regression, increasing severity of HL and worsening WRS were associated with decreased self-reported music enjoyment (adjusted $P < .05$) across all measures with and without HAs, adjusting for sex, age, education, race, HA type, age of HL diagnosis, duration of HL, duration of HA use, musical preference, and musical experience.

Conclusion: HA users report increased music enjoyment when using HAs compared with without HAs. However, the increased severity of HL and worsening WRS were independently associated with decreased self-reported music enjoyment both with and without HAs.

Hearing Durability and Trajectory After Radiosurgery for Vestibular Schwannoma

Christian Fritz (Presenter); Dennis Bojrab II, MD; Nathan C. Tu, MD; Christopher A. Schutt, MD; Seilesh C. Babu, MD

Introduction: We stratify patients into groups according to their baseline hearing function and analyze hearing outcomes following radiosurgical treatment of vestibular schwannoma (VS).

Method: This retrospective case series was performed in a tertiary neurotology referral center on patients treated with gamma knife radiosurgery (GKRS) for VS between March 2007 and March 2017. Exclusion criteria included pretreatment American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) class C/D hearing level, neurofibromatosis type II, history of previous surgical resection, and follow-up less than 1 year. The main outcome measure was hearing function assessed both by preservation of serviceable hearing (AAO-HNS class A/B) and by preservation of baseline hearing (\leq 20 dB change in pure-tone average [PTA]) after GKRS.

Results: A total of 93 patients were included in this study. The median duration of audiometric follow-up was 41 months (interquartile range, 19–81). Patients with pretreatment class A hearing status maintained serviceable hearing for a longer duration in the posttreatment period ($P = .005$) yet did not maintain hearing to within 20 dB of baseline for a longer duration than patients with class B hearing ($P = .294$). Analysis of changes in PTA after radiosurgery revealed a common hearing trajectory comprised of an acute, rapid decline in function, followed by stabilization, and then a delayed phase of slow decline after 36 months. Patients with better pretreatment hearing (WRS of 100%) experienced a more precipitous

initial decline in hearing function than the group of patients with worse pretreatment hearing (WRS $<$ 100%; $P = .033$).

Conclusion: Normalization to baseline hearing using the quantitative PTA-based outcome measure afforded a more precise description of hearing trends compared with assessment by preservation of serviceable hearing. An understanding of year-by-year hearing trajectories and the concept that patients with better hearing may experience a larger initial decline in hearing function (rise in PTA) could prove useful for counseling patients on hearing expectations with the utmost accuracy prior to treatment.

Hearing Preservation Outcomes Following New Slim Lateral Wall Electrode Implantation

Natalie M. Schauwecker, MD (Presenter); Ankita Patro, MD; Robert Labadie; Alejandro Rivas; David S. Haynes, MD, MMHC; Elizabeth L. Perkins, MD

Introduction: In 2017 a thin, lateral wall electrode array (EA), the HiFocus SlimJ, was introduced by Advanced Bionics to promote hearing preservation (HP) in cochlear implantation (CI). This study reports hearing and speech outcomes with the Slim J at a high-volume CI, center and explores rates of implant failure and necessary revisions in the setting of malfunction from recent EA anomalies.

Method: A retrospective chart review was conducted to identify adults implanted with the HiFocus SlimJ EA between 2017 and 2020. Candidates who met HP criteria had a low-frequency pure-tone average (LFPTA) less than 80 dB at 125, 250, and 500 Hz preimplantation. Demographic variables as well as pre- and postoperative audiometric and speech performance outcomes were collected. Implants concerning for failure underwent integrity testing.

Results: A total of 65 implanted patients met criteria for HP, with an average LFPTA of 55.6 (range 15.0–80.0). At activation, 33 (50.8%) patients had HP and a mean LFPTA shift of 14.6 dB (range –28 to 62). Of those who met hybrid criteria preoperatively ($n = 45$, LFPTA less than 65 dB), 34 (75.6%) patients had hearing preserved at activation. CNC scores improved significantly from 21% (range 0%–60%, $P < .0001$) preoperatively to a mean of 45% (range 0%–86%, $P < .0001$) at 6 months and 52% (range, 0%–92%, $P < .0001$) at 12 months. A total of 5 (7.7%) patients underwent revision surgery due to poor performance and failure confirmed with integrity testing.

Conclusion: The HiFocus SlimJ EA is a slim, lateral wall electrode that offers successful hearing preservation. Thus far, a small proportion of patients in this cohort have undergone revision due to implant failure. We aim to report long-term HP rates and further monitor device failures.

Impact of Comorbid Conditions on Surgical Complications Following Mastoidectomy

Sudeepti Vedula (Presenter); Dhvani Shihora; Stefanie Legalia; Christina H. Fang, MD; Robert Jyung, MD; Jean Anderson Eloy, MD

Introduction: Comorbid conditions have been shown to be linked to poorer surgical outcomes in otolaryngology. The goal of this study is to examine the association between comorbid conditions and postoperative complications following mastoidectomy.

Method: The National Surgical Quality Improvement Program was queried for all mastoidectomy procedures performed between 2005 and 2016. Univariate and multivariate logistic regression were performed to determine the association between comorbidities and postsurgical complications of mastoidectomy.

Results: A total of 5492 cases of mastoidectomy were identified. Most patients were between the ages of 41 and 60 years (37.7%), male (52.7%), and White (63.1%). The most common comorbid conditions of these patients were metabolic syndrome (4.7%), dyspnea (2.8%), and chronic obstructive pulmonary disease (COPD; 2.4%). Patients with these comorbidities had a higher incidence of overall surgical complications (odds ratio [OR] 2.685; 95% CI, 2.679–2.691; $P < .001$), and medical complications (OR 1.260; 95% CI, 1.258–1.261; $P = .029$). However, the presence of these comorbidities did not have a significant association with length of hospital stay.

Conclusion: In patients who underwent mastoidectomy, metabolic syndrome, COPD, and dyspnea use were associated with an increased incidence of surgical and medical complications. These comorbidities should be considered when educating patients on the risk of postoperative complications following mastoidectomy.

Impact of Race on Cochlear Implant Access and Utilization

Geethanjeli N. Mahendran (Presenter); Tyler Rosenbluth; Candace E. Hobson, MD

Introduction: Cochlear implant (CI) utilization rates for American adults are estimated at 6% to 10%. While multiple factors contribute to this low rate, there are limited published data investigating racial and socioeconomic disparities in adult CI. In this study, we aim to compare rates of CI, referral and CI, across patients of different racial and socioeconomic backgrounds and to compare audiometric profiles of these patients.

Method: This is a retrospective review of adult patients who underwent CI, evaluation (CIE) or cochlear implantation at a tertiary care institution from 2010 to 2020.

Results: A total of 504 patients underwent CIE; 388 met CI, eligibility criteria and 269 underwent cochlear implantation. The racial breakdown of patients who underwent CIE was 68.5% White, 18.5% African American (AA), and 12.3% Asian. In contrast, Atlanta is 40.9% White, 51% AA, and 4.4% Asian ($P < .001$); Georgia is 60.2% White, 32.6% AA, and 4.4% Asian ($P < .001$). AAs referred for CIE had significantly worse hearing (mean pure-tone average [PTA] 92 dB, 13.9% word recognition score [WRS]) than White (mean PTA 85.8 dB, $P = .003$; 24.2% WRS, $P = .01$) and Asian patients (mean PTA 85.1 dB, $P = .02$; 27.1% WRS, $P = .02$). AAs undergoing CIE also had significantly worse AzBios scores

than Whites and Asians did: AzBios worse-hearing ear 7.96% for AAs, 18.3% for Whites ($P = .001$), and 20.4% for Asians ($P = .001$). There was no significant difference in cochlear implantation rates between eligible AA and White patients; however, CI-eligible Asians were significantly less likely to undergo implantation than White patients were ($P < .001$). There were no significant differences in the breakdown of public vs private insurance across races, but it is worth noting that Medicaid does not cover adult CI, in the state in which this study was conducted.

Conclusion: AAs undergo CIE and cochlear implantation at rates disproportionately lower than expected based on local demographics. In addition, AAs have significantly worse hearing at the time of CI, referral than White and Asian patients do. Identifying and increasing awareness of these disparities are essential steps to improving CI, access for potentially disadvantaged populations.

In-Office Bone Anchored Hearing Implants in a Veteran Population

Lane D. Squires, MD (Presenter); Jackson King

Introduction: The minimally invasive punch technique for bone anchored implantation has not been studied in a veteran population to date. Offering an in-office surgical option for veterans at the VA follows the nationwide trend toward moving more procedural care out of overloaded operating rooms and improved cost savings. We examine the safety, feasibility, and outcomes of our case series of veterans with bone anchored hearing implantation under local anesthetic in an office-setting.

Method: In this study, we analyze a case series of minimally invasive ponto surgeries (MIPS) accomplished under local anesthetic in an VA clinic setting spanning a 2-year period from 2018 to 2020. Safety and feasibility data are presented, as well as major and minor complication rates. These outcomes are compared with historical reports. Patient-reported tolerability of procedure is surveyed.

Results: A total of 20 MIPS procedures were performed on veterans under local anesthetic in the office setting. Mean follow-up for patients was 17.1 months. No major complications were reported. Minor complications were not significantly different from historical reported data on bone anchored hearing implantation. No procedures were aborted, and all veterans tolerated procedures well by surveyed responses. SSQ-8 survey data collected show an overwhelmingly positive experience for implanted veterans.

Conclusion: This is the first reported series of MIPS to be done under local anesthesia in a VA clinic setting. Herein, we show patient tolerability, safety, and consistently excellent outcomes without major complications. We urge consideration of this procedural approach to be more widespread in a veteran population.

Laminin-Induced Schwann Cell Migration and Neuronal Growth of Spiral Ganglia

Carly Misztal (Presenter); Stefania Gonlves, MD; Olena Bracho; Christine T. Dinh, MD

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Introduction: Growth of spiral ganglion neurons toward electrode contacts may improve hearing outcomes after cochlear implant (CI) surgery. Laminin is an extracellular matrix protein that can bind to B1-integrin receptors and promote Schwann cell migration and survival, which provide physical scaffolds and trophic support for neurites to grow. In this study, we investigate how laminin affects Schwann cell migration and neuronal axon extension in spiral ganglion cultures in vitro to explore the potential benefit of laminin-coated electrodes.

Method: Spiral ganglia were harvested and cultured from neonatal rats. Migration assays were created by culturing spiral ganglia against low- (5 µg/mL) or high-dose (1.2 mg/mL) laminin in a 2-well insert dishes. After insert removal, cells were treated with B1-integrin antibody (0 or 1 µg/mL) for up to 96 hours. Immunostaining for Tuj1 (neuronal cell marker) and S100 (Schwann cell marker) was performed at 0 and 96 hours. Confocal microscopy was used to visualize neurite outgrowth and Schwann cell migration. Images were measured with ImageJ software.

Results: Schwann cell migration and neurite outgrowth toward laminin-coated wells were observed in both low- and high-dose laminin conditions. Treatment with B1-integrin antibody decreased Schwann cell migration and neurite outgrowth toward laminin-coated wells, suggesting that Schwann cell migration is dependent on laminin activation of B1-integrin receptor. Furthermore, spiral ganglion cultures required high-dose laminin to induce cell aggregation into neuronal ganglia with radially projecting axonal tracts, which may be beneficial for signal transduction after cochlear implantation.

Conclusion: Laminin induces Schwann cell migration through activation of B1-integrin receptors, which in turn initiates neurite outgrowth from spiral ganglia cultures. These findings suggest that laminin coating may promote Schwann cell migration and neurite growth toward CI, electrodes, which can potentially improve hearing outcomes after CI, surgery.

Phase 1/2 Study of Neurotrophin OTO-413 for Hearing Loss

Peter G. Volsky, MD (Presenter); James M. Robinson; Alice Blaj, PharmD; David Moore, PhD; Victoria Sanchez, AuD, PhD; Jeffery J. Anderson, PhD

Introduction: Research shows that cochlear synaptopathy plays a role in hearing loss. Treatment with brain-derived neurotrophic factor (BDNF) repairs synaptic processes and restores hearing function in animal models. OTO-413, a sustained-exposure formulation of BDNF for intratympanic (IT) administration, is under evaluation for the treatment of hearing loss.

Method: This was a randomized, double-blind, placebo-controlled phase 1/2 study. Men and women aged 21 to 64 years were enrolled between December 2019 and August 2020. Pure-tone thresholds ranged from normal levels to moderately severe hearing loss (pure-tone average of ≤ 70 dB at 1,

2, and 4 kHz). Self-reported difficulty hearing in noise was confirmed by digits-in-noise (DIN) test scores greater than -12.5 dB signal-to-noise ratio (SNR) in the study ear. Four ascending dose cohorts of at least 8 subjects, each received a single IT injection of OTO-413 or placebo. Safety and hearing function were monitored over a 12-week follow-up. Hearing assessments included DIN, words-in-noise (WIN) test, and American English matrix test (AEMT).

Results: OTO-413 was well-tolerated across all dose cohorts ($n = 29$) with a similar frequency of adverse events compared with placebo ($n = 10$). There were no serious adverse events. Six of 9 (67%) subjects treated with the highest dose of OTO-413 (0.30 mg) showed a clinically meaningful improvement on at least 1 of the 3 speech-in-noise tests at both day 57 and 85 vs 0 of 8 (0%) for placebo. A clinically meaningful improvement was defined as a minimum change of -3 dB SNR (DIN) or -2 dB SNR (WIN and AEMT). Performance on the sentence-based AEMT favored OTO-413, with 4 of 9 (44%) OTO-413 subjects experiencing a clinically meaningful improvement at both day 57 and 85 compared with 0 of 7 (0%) placebo subjects at any single time point. Statistical analysis was not performed because of the small samples.

Conclusion: These results demonstrate the safety of OTO-413 and suggest therapeutic benefit over placebo in a small sample size. These findings support further clinical development of OTO-413 for the treatment of hearing loss.

Predicting CSF Leak After Posterior Fossa Surgery

Michael H. Freeman (Presenter); Nathan Cass; Elizabeth L. Perkins, MD; Nauman Manzoor; Kareem Tawfik; Marc Bennett, MD

Introduction: This work seeks to establish expected rates of postoperative cerebrospinal fluid (CSF) leak after translabyrinthine (TL) and retrosigmoid (RS) surgery for posterior fossa tumor resection and to determine the impact of preoperative risk factors on postoperative CSF leak rates.

Method: A retrospective case series analysis was conducted with postoperative CSF leak as the primary outcome measure. All TL or RS cases at a single tertiary referral center over 10 years were included in the analysis.

Results: A total of 437 patients underwent TL ($n = 326$) or RS ($n = 111$) approaches for posterior fossa tumors. Median age was 51.5 years, median body mass index (BMI) was 28.3, and mean tumor length in maximal dimension was 2.67 cm. CSF leak occurred in 16.4% of cases but was more likely in obese patients (21.5%) than in nonobese patients (11.7%). Lumbar drains were the most frequent management strategy (62.5% of leaks), with 30.5% of leaks ultimately requiring VP shunt placement. Multivariate logistic regression comparing age, sex, ethnicity, tumor laterality, diabetes, hypertension, tumor size (4 cm), and obesity ($BMI > 30$) demonstrated a statistically significant relationship between obesity and postoperative CSF leak (odds ratio = 1.82) with no other variables approaching significance. Linear regression analysis demonstrated increased CSF leak rate with increasing tumor length ($P < .05$).

Conclusion: Obesity appears to significantly increase the risk of postoperative CSF leak. Increasing tumor length in the maximal dimension also appears to increase CSF leak risk.

Progression of Hearing Loss in Observed Non-growing Vestibular Schwannoma

Alexander L. Luryi, MD (Presenter); Seilesh C. Babu, MD; Dennis Bojrab; John Kveton; Elias Michaelides; Christopher A. Schutt, MD

Introduction: Vestibular schwannoma treated with observation may lead to accelerated hearing loss even without tumor growth. This study aims to assess hearing outcomes in observed vestibular schwannoma (VS) with focus on non-growing tumors.

Method: This was a retrospective review of patients with sporadic VS undergoing at least 3 years' observation as initial management at 2 tertiary neurotology centers from 2007 to 2017. Main outcome measures were overall and yearly changes in pure-tone averages (PTAs) and word recognition scores (WRS) normalized to corresponding changes in the contralateral ear.

Results: During the study period, 39 of 105 included patients (37.1%) had tumor growth and 66 (62.9%) did not. Patients with tumor growth had a mean normalized increase in PTA of 8.0 dB HL ($P = .008$) relative to the contralateral ear, corresponding to a normalized average worsening of their PTA of 1.8 dB per year. Patients with non-growing tumors <5 mm in maximal dimension did not have significant ongoing hearing loss compared to the contralateral ear ($P > .05$). Patients with non-growing tumors ≥ 5 mm in the maximal dimension had a mean increase in PTA of 7.4 dB HL ($P = .001$) relative to the contralateral ear, corresponding to an average of 2.0 dB HL per year, which was statistically similar to the loss observed in growing tumors regardless of size ($P > .05$). A normalized decline in PTA of at least 5 dB HL was seen in 72% of patients with growing tumors, 53% of patients with non-growing tumors ≥ 5 mm, and 38% of patients with non-growing tumors <5 mm.

Conclusion: A long-term analysis of hearing outcomes in observed vestibular schwannoma is presented. With observation, VS greater than 5 mm is associated with continued hearing loss even without tumor growth, while non-growing tumors less than 5 mm are not associated with continuing hearing loss. These data inform expectations for observed VS for both providers and patients.

Prolonged Duration of Deafness in Single-Sided Deafness Cochlear Implantation

Ashley M. Nassiri, MD, MBA (Presenter); Katherine P. Wallerius, MD; Aniket A. Saoji, PhD; Brian A. Neff, MD; Colin L. Driscoll, MD; Matthew L. Carlson, MD

Introduction: Prolonged duration of deafness is often considered a strong negative prognostic factor in speech perception outcomes for traditional bilateral hearing loss cochlear implant (CI) recipients; however, the association of this feature in CI recipients with single-sided deafness (SSD) is not yet well characterized.

Method: SSD was defined as a pure-tone average (PTA) >70 dB with normal hearing in the contralateral ear (10 years) and the remaining referent cohort.

Results: Seven SSD patients with prolonged duration of deafness (mean 22 years, SD 12) were compared with 28 SSD referent patients with duration of deafness less than 10 years (mean 2.4 years, SD 2). The average follow-up duration was 10 months (SD 7 months). At last follow-up, the average consonant-nucleus-consonant (CNC) scores were 48% (SD 24, range 26–84) and 54% (SD 15, range 10–78) for the prolonged duration of deafness and referent cohorts, respectively ($P = .3$). The average AzBio in quiet scores was 69% (SD 12, range 64–93) and 69% (SD 18, range 24–97) for the prolonged duration of deafness and referent cohorts, respectively ($P = .6$). In a separate analysis evaluating the duration of deafness as a continuous variable across both cohorts, Spearman correlation coefficients for associations of duration of deafness with most recent CNC and AzBio scores were -0.02 ($P = .92$) and 0.02 ($P = .93$), respectively.

Conclusion: These data suggest that duration of deafness is not strongly associated with speech perception outcomes in SSD CI recipients. Consequently, prolonged duration of deafness alone should not preclude CI, in SSD patients.

RAD51 Inhibitor and Radiation Toxicity in Vestibular Schwannoma Cells

Torin P. Thielhelm (Presenter); Scott Welford, PhD; Eric A. Mellon, MD, PhD; Fred Telischi, MD; Michael E. Ivan, MD; Christine T. Dinh, MD



Introduction: Ionizing radiation can initiate the formation of double-stranded breaks (DSBs) in DNA that activate cell death pathways. Tumors can evade radiation-induced cell death by upregulating cell-cycle arrest and DNA repair proteins. In this study, we describe upregulation of the DNA repair protein RAD51 in response to radiation-induced DSBs in vestibular schwannoma (VS) and investigate the utility of RAD51 inhibitor, RI-1, in enhancing radiation toxicity.

Method: To identify therapeutic targets, we used high-throughput antibody arrays to quantify the expression of 60 cell-cycle proteins on radiation-resistant VS and age-matched nonirradiated controls. To analyze whether RAD51 inhibition can enhance radiation toxicity, primary VS cells were cultured on 96-well plates and 16-well slides, exposed to radiation (0, 6, 12, or 18 Gy) and treated with RI-1 (0 or 5 μ M). Immunofluorescence was performed at 6 hours for H2AX (DSB marker), RAD51 (DNA repair protein), and p21 (cell-cycle arrest protein). Viability assays were performed at 96 hours. Data were analyzed with 2-way analysis of variance with post hoc testing.

Results: Microarray analysis suggests that VS may resist radiation by upregulating RAD51 DNA repair. In addition, primary VS cells demonstrated increases in RAD51 (DNA repair), in response to radiation-induced expression of H2AX (DNA damage). Irradiated VS cells also demonstrated upregulation in p21, suggesting that VS cells enter cell-cycle arrest to

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repair injured DNA. Addition of RI-1 reduced the expression of RAD51, resulting in increased H2AX expression and reduced viability in some VS.

Conclusion: VS may evade radiation injury by entering cell-cycle arrest and upregulating RAD51-dependent repair of radiation-induced DSBs in DNA. Although there is heterogeneity in responses among individual VS, RI-1 can reduce RAD51-dependent DNA repair to enhance radiation toxicity in VS cells. Further investigations are warranted to understand the mechanisms of radiation resistance in VS and determine whether RI-1 is an effective radiosensitizer in VS patients.

Revision Stapes Surgery: Hearing Symptoms and Associations With Intra-operative Findings

Alexander L. Luryi, MD (Presenter); Amy Schettino; Elias Michaelides; Seilesh C. Babu, MD; Dennis Bojrab; Christopher A. Schutt, MD

Introduction: Stapes surgery for otosclerosis sometimes requires revision due to recurrent or persistent conductive hearing loss (CHL). This study aims to examine the associations between hearing symptoms and intraoperative findings as well as outcomes after revision stapes surgery.

Method: Patients treated with revision stapes surgery for otosclerosis from 2008 and 2017 at a tertiary otology referral center were reviewed retrospectively. Primary outcome measures were postoperative air–bone gap (ABG), air conduction (AC), and bone conduction (BC) pure-tone averages (PTAs).

Results: During the study period, 120 patients underwent revision stapes surgery. Some 88 patients (73%) had a gradually progressive recurrent CHL, 11 (9%) had sudden recurrent CHL, 11 (9%) had persistent CHL despite prior surgery, and 10 (8%) had no CHL and underwent revision surgery for other reasons. Of 110 patients with CHL, the most common intraoperative findings were prosthesis displacement with (42%) or without (41%) incus necrosis, normal anatomy with good prosthesis placement (7 patients, 6%), and abundant scar tissue (6 patients, 6%). AC thresholds and ABGs in these patients improved from averages of 56.9 and 24.3 dB to 38.6 dB ($P = .05$). In total, 3 patients (2.5%) developed sensorineural hearing loss with an increase of BC PTA of at least 15 dB HL, all of whom had a gradual recurrent CHL ($P > .05$). There were no cases of facial weakness, reparative granuloma, or procedure abortion.

Conclusion: Revision stapes surgery is safe and confers significant hearing improvement in patients with both persistent and recurrent CHL, although patients with persistent CHL see less improvement with revision.

Revisiting the Paradigm on Hearing Preservation in Medium-to-Large Vestibular Schwannoma

Robert J. Macielak, MD (Presenter); Katherine P. Wallerius, MD; Skye K. Lawlor, MD; Christine M. Lohse, MS; Matthew L. Carlson, MD

Introduction: Prior studies have reasoned against attempts to preserve functional hearing in medium-to-large vestibular

schwannoma (VS) in which hearing preservation is less likely, instead proceeding with a translabyrinthine approach. In light of more recent quality-of-life data indicating minimal differences among surgical approaches and a paradigm considering cochlear implantation (CI) in this population, we sought to review hearing preservation results in a large cohort including patients with tumors ≥ 15 mm in maximum cerebellopontine angle (CPA) dimension.

Method: A consecutive series of patients with VS who underwent microsurgery between January 2000 and May 2020 was identified. Baseline, intraoperative, and postoperative patient and tumor characteristics were collected. Serviceable hearing was defined by a pure-tone average 50%.

Results: A total of 243 patients had serviceable hearing preoperatively and sufficient postoperative data for study inclusion. Of these tumors, 50 (21%) were confined to the internal auditory canal (IAC), and the median tumor size was 16.2 mm (interquartile range [IQR] 11.3–23.2) for tumors with a CPA component. For all tumors, the median fundal fluid cap was 2.3 mm (IQR 0.0–4.7). A retrosigmoid approach was used in 223 (92%) cases and a middle cranial fossa approach was used in 20 (8%). There was an inverse relationship between tumor size and probability of successful hearing preservation ($P < .001$). The rate of serviceable hearing preservation in patients with tumors in the IAC, CPA < 15 mm, and CPA ≥ 15 mm was 32 (64%), 24 (28%), and 10 (9%), respectively.

Conclusion: Functional hearing preservation in VS with ≥ 15 -mm CPA extension is possible in approximately 10% of cases. Furthermore, hearing preservation microsurgery offers anatomical cochlear nerve preservation and cochlear patency in many cases, allowing for possible future CI. These findings challenge the notion of favoring translabyrinthine surgery for patients with medium-to-large sized tumors when preoperative serviceable hearing is present.

Salvage Following Failed Primary Treatment of Vestibular Schwannomas

Emily Kay-Rivest, MD, MSc, FRCSC (Presenter); Douglas Kondziolka; John Golfinos; Sean McMenomey; David Friedmann; J. Thomas Roland Jr

Introduction: The objective of this study was to evaluate patient outcomes following salvage microsurgical resection (MS) and salvage stereotactic radiosurgery (SRS) after failure of primary treatment with either modality for vestibular schwannomas (VS).

Method: A retrospective chart review of patients with more than 1 intervention for their VS was performed. Clinical, radiological, surgical, and radiosurgical data were collected. Patients were divided into 4 groups: SRS followed by SRS ($n = 7$), MS followed by SRS ($n = 61$), SRS followed by MS ($n = 6$), and MS followed by MS ($n = 9$), and outcomes were evaluated.

Results: A total of 83 patients were included. Patients who underwent SRS first were on average older at the time of diagnosis and had smaller tumors. For the SRS followed by SRS group, the mean interval between treatments was 53 months, no patient developed facial weakness, and 14% (1 patient)

developed new trigeminal sensory loss. In the MS followed by SRS group, 3% (2 patients) developed facial weakness following SRS. In this same group, 7% (4 patients) developed trigeminal nerve deficits and 7% developed facial spasms. In the SRS followed by MS group, 2 of 6 patients developed worse facial function after salvage MS. Finally, in the MS then MS group, 1 patient had a complete facial paralysis post-operatively while the remaining patients (n = 6) had House-Brackmann (HB) scores of 2 or 3. Within this same group, we compared the use of a different surgical approach to the same approach. Gross-total resection occurred more commonly when a different approach was used, although not statistically significant ($P = .29$) and facial nerve outcomes were similar ($P = .86$). Cerebrospinal fluid leaks occurred more frequently when using the same approach, although the difference was not statistically significant ($P = .15$). In our total cohort, 6 patients (7%) required a third treatment after their original salvage.

Conclusion: Salvage SRS carries low rates of facial nerve dysfunction, even following previous SRS. Salvage MS has poorer facial nerve outcomes, although HB scores greater than 3 are achievable, and selecting an alternative approach may result in better outcomes.

A Second Independent Phase Ib Demonstrates Hearing Improvement With FX-322

John Ansley, MD (Presenter); Carl LeBel, MD; Susan King, MD; Sam Wilson, MD; Christopher Loose, MD; Will J. McLean, MD

Introduction: FX-322, a small-molecule combination designed to regenerate hair cells, demonstrated an increase in word recognition (WR) and words-in-noise (WIN) testing in a double-blind, placebo-controlled study of 23 subjects with permanent sudden sensorineural hearing loss (SSNHL) or noise-induced hearing loss (NIHL) (presented at the American Academy of Otolaryngology [AAO] 2019). Further, the effect was durable for 13 to 21 months (presented at the AAO, 2020). A second single-dose study recently has been completed to assess 2 different formulation preparations in subjects with permanent SSNHL, NIHL, or idiopathic SNHL. The abstract describes an outcome of the clinical study that became available only after the original abstract deadline and could not be completed prior to the deadline. These results have not been presented, accepted for presentation, or published at any other scientific meeting or journal.

Methods: A total of 33 subjects with permanent SSNHL, NIHL or idiopathic SNHL were dosed unilaterally in an open-label study with the contralateral ear serving as a control. All protocols were approved by the Institutional Review Board, and subjects were consented for multiple clinic visits out to 90 days for otoscopy, pure-tone audiometry, speech intelligibility, and adverse events.

Results: Of the 33 dosed subjects, 6 showed statistically significant improvements in WR, exceeding the 95% confidence intervals defined in Thornton and Raffin (1978). In addition, 34% of FX-322 treated subjects showed WR increases of at least 10% (absolute). In contrast, no significant changes were

seen in untreated contralateral ears. Consistent with the previous study, WR improvements primarily occurred in ears that started with a greater WR deficit. Pooled data and analysis across multiple FX-322 trials to date will also be presented.

Conclusion: This work demonstrates that in a second independent single-dose study FX-322 is associated with statistically significant improvements in WR and supports the continued evaluation in multiple populations to determine the ranges of SNHL that FX-322 might address as an ear, nose, and throat (ENT)-administered therapeutic for hearing restoration.

Sigmoid Sinus Thrombosis After Translabyrinthine Surgery

Nathan Cass, MD (Presenter); Michael H. Freeman; Elizabeth L. Perkins, MD; Nauman Manzoor; Matthew O'Malley; David S. Haynes, MD, MMHC

Introduction: Changes to dural venous flow may alter intracranial pressures and translabyrinthine (TL) surgery involves manipulation of the sigmoid sinus. We sought to characterize the incidence of sigmoid sinus thrombosis after TL surgery for posterior fossa tumor resection, and determine association with postoperative cerebrospinal fluid (CSF) leak, hydrocephalus, or need for long-term CSF diversion.

Method: We performed a retrospective chart review of all patients undergoing TL surgery for posterior fossa tumor over a 10-year period at a single tertiary referral center, evaluating for incidence of immediate postoperative sigmoid sinus thrombosis as well as postoperative CSF leak, hydrocephalus, and shunt placement.

Results: A total of 326 patients with posterior fossa tumors underwent TL excision over a 10-year period. Median age was 50 years and mean tumor length 2.58 cm. The incidence of postoperative sigmoid sinus thrombosis on magnetic resonance imaging was 14.4%. One patient was noted to have additional transverse sinus thrombosis and placed on warfarin. CSF leaks were no more likely to occur in those with thrombosis (12.8%) compared with those without thrombosis (15.4%). No patients with sigmoid sinus thrombosis developed hydrocephalus or required a shunt. However, 24.5% of patients with CSF leaks and 75% of those with postoperative hydrocephalus eventually underwent shunting.

Conclusion: Sigmoid sinus thrombosis occurs frequently after TL surgery but is not associated with an increased incidence of CSF leak, hydrocephalus, or need for long-term CSF diversion. Systemic anticoagulation, as suggested by some groups, appears to be unnecessary for preventing complications of isolated sigmoid sinus thrombosis.

Skull Vibration Induced Nystagmus Test, Otolith and Canal Vestibular Function

Sebastien Schmerber, MD, PhD (Presenter); Christol Fabre; Ludovic Giraud; Philippe Perrin; Georges Dumas

Introduction: We aim to establish in unilateral peripheral vestibular lesions (UVL) patients a relationship between skull vibration induced nystagmus (SVIN) different components

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(horizontal, vertical, torsional) and the results of different structurally related vestibular tests.

Method: This is a retrospective cohort study. SVIN test, canal vestibular test (CVT; caloric test + video head impulse test [VHIT]), otolithic vestibular test (OVT; ocular vestibular evoked myogenic potential [oVEMP] + cervical vestibular evoked myogenic potential [cVEMP]) were performed on the same day in 63 patients with UVL (age <65 years) and 10 normal subjects. This population was divided as follows: group-Co (control group), group-VNT (dizzy patients with no OVT or CVT alterations), group-O (OVT alterations only), group-C (CVT alterations only), group-M (mixed alterations). SVIN slow-phase velocity (SPV) was analyzed by groups and compared with vestibular tests results.

Results: The SVIN-SPV horizontal component was significantly higher in group-M than in the other groups ($P = .005$) and correlated with alterations of lateral-VHIT ($P < .001$), caloric test ($P = .002$), and oVEMP ($P = .006$). SVIN-SPV vertical component was correlated with the anterior-VHIT and oVEMP alterations ($P = .007$ and $P = .017$, respectively). SVIN-SPV torsional component was correlated with the anterior-VHIT positivity ($P = .017$). In 10% of patients of the group-VNT, SVIN was the only positive test.

Conclusion: SVIN-SPV is significantly higher in patients with combined canal and otolith lesions. SVIN-SPV analysis in UVL shows significant correlation with T hypofunction, horizontal VHIT gain asymmetry, and oVEMP results suggesting a strong contribution of the horizontal canal and at a lesser degree of the utricle. SVIN reflects primarily alterations in the VIIIth nerve superior root territory. SVIN is sometimes the only positive test in rare patients with unexplained dizziness.

Superior Semicircular Canal Dehiscence Impact on Cochlear Implant Audiologic Outcomes

William G. Kady, DO (Presenter); Nathan C. Tu, MD; Kenny Lin; Pedrom C. Sioshansi, MD; Dennis Bojrab II, MD; Seilesh C. Babu, MD

Introduction: We aim to determine whether adult cochlear implant (CI) users with superior semicircular canal dehiscence or near dehiscence experience clinically significant differences in audiological outcomes when compared with CI, users with normal temporal bone anatomy.

Method: This is a retrospective review of CI, users with radiographically confirmed superior semicircular canal complete dehiscence or near dehiscence. Study participants had cochlear implantation between 2010 and 2020. Fifteen individuals were identified to have complete superior canal dehiscence, 28 individuals with near dehiscence, and 67 controls with normal temporal bone anatomy. The primary audiological outcome analyzed was preoperative and postoperative AzBio scores, change in AzBio scores, and presence or absence of superior semicircular canal dehiscence (SSCD) on imaging. A secondary outcome measure was the duration of deafness prior to implantation, defined as the length of time with minimal usable hearing as reported to the audiology team by the patient/family.

Results: A total of 938 patients underwent cochlear implantation with 110 patients having met inclusion criteria. The mean AzBio score for the normal temporal bone anatomy group improved from 35.2% (SD 28.2) preoperatively to 70.3% (SD 25.7) postoperatively, an improvement of 35.1% (SD 28.6). The mean AzBio score for the near dehiscent temporal bone anatomy group improved from 26.6% (SD 28.9) preoperatively to 64.5% (SD 30.6) postoperatively, an improvement of 37.9% (SD 27.9). The mean AzBio score for the dehiscent temporal bone anatomy group improved from 26.3% (SD 20.4) preoperatively to 65.1% (SD 27.6) postoperatively, an improvement of 38.7% (SD 26.9). Using the 1-way analysis of variance, no statistically significant difference in audiological outcomes exists between the 3 groups.

Conclusion: Patients with complete or near-complete radiographic superior canal dehiscence at the time of CI, surgery have similar speech perception scores compared with non-SSCD adult CI, users.

Temporal Bone Resection for Skull Base Malignancy: Review and Analysis

Matthew McCracken, MS (Presenter); Kavya Pai; Claudia I. Cabrera, MD, MS; Benjamin Johnson, MD; Akina Tamaki, MD; Nauman Manzoor, MD

Introduction: Malignancies involving the temporal bone (TBM) are rare and often confer a poor prognosis due to advanced stage. Curative management involves surgical resection, but outcomes are varied in the literature due to heterogeneous pathology and smaller institutional cohorts. The aim of this study is to provide a synthesis of survival and recurrence outcomes data reported in the literature for patients that underwent temporal bone resection (TBR).

Method: A systematic review was conducted in December 2020 according to the PRISMA 2009 guidelines. We included titles that reported survival and/or recurrence rates after lateral or extended (subtotal, total) TBR for curative treatment of TBM. Patients with melanoma, parotid malignancies, and other rare tumors were excluded. Patients with squamous cell carcinoma and complete data on time to event, vital status, Pittsburgh stage, and type of surgical resection were included in the final Cox proportional hazards regression model.

Results: Survival data were collected from 27 retrospective studies, resulting in a pooled cohort of 307 patients with a mean follow-up time of 51.6 months. Recurrence rates for patients with early stage disease (stages 1 and 2) and advanced-stage (stages 3 and 4) were 19% and 54%, respectively. The adjusted Cox regression adjusted by stage and resection type revealed an increased risk of death for stage 3 and 4 disease (hazard ratio [HR] 3.16 [95% CI, 1.48, 6.74], $P < .01$, and 5.71 [2.75, 11.9], $P < .01$), respectively. However, there was no difference in the risk of death by resection type.

Conclusion: Advanced-stage malignancies involving the temporal bone portend poor overall survival compared with early stage disease. It is plausible that unstudied factors such as nodal disease and use of adjuvant radiation influence these outcomes. Larger prospective multi-institutional studies

are needed to ascertain prognostic factors for survival and recurrence.

Treatment of Tinnitus With Sound Conditioning Therapy

Angela Ronderos, MD (Presenter); Alejandro Garcia, MD; Daniela Gonzalez, MD; Clemencia Baron, AuD; Juan Manuel Garcia, MD

Introduction: The efficacy of sound-conditioning therapy (SCT) in the treatment of tinnitus has not been widely established; however, patients report a subjective benefit attributed to therapeutic frequency-modulated noise. This is explained by a central auditory system hyperactivity that counteracts the maladaptive mechanism of tinnitus. The general objective of this study is to evaluate in patient with tinnitus who have normal and mild to moderate hearing loss the use of SCT combined with counseling in a tinnitus clinic at Bogotá, Colombia.

Method: A retrospective observational study was conducted evaluating 18 patients treated with SCT in our hospital between 2018 and 2020. Demographic variables, classification, and degree of hearing loss and tinnitus were evaluated. The intensity of tinnitus was quantified in dB sensation level (SL) and measured with the visual analog scale (VAS). Quality of life was evaluated with the Tinnitus Handicap Inventory (THI) and Tinnitus Reaction Questionnaire (TRQ). For statistical analysis a paired *t* test was used for parametric data and a Wilcoxon signed-rank test for nonparametric data.

Results: Patients received SCT for 4 to 6 months with 2 daily customized sound sessions and periodic counseling based on cognitive behavioral therapy (CBT) principles. After treatment, there was a significant decrease ($P < .01$) for all outcomes measured including a mean difference in tinnitus intensity of 7.6 dB (4.59–10.75; 95% CI), VAS score of 4.5 (3.54–5.57; 95% CI), TRQ score of 36.44 (29.83–43.06; 95% CI) and THI score of 33.1 (25.65–40.57; 95% CI) compared with baseline.

Conclusion: SCT should be available as an alternative in patients with tinnitus treated by a multidisciplinary team. This study shows the improvement in symptoms and quality of life after treatment with SCT combined with counseling. Further studies can be conducted with a larger sample size and longer follow-up periods to show the overall effect of SCT.

Use of Telemedicine in an Otolaryngology Outpatient Clinic During COVID-19

Franklin M. Wu (Presenter); Ruben Ulloa; Carlos Stellanos, MHS; Janet S. Choi, MD; Courtney Voelker, MD, PhD

Introduction: This study aims to explore the role of telemedicine in an otology outpatient clinic during the COVID-19 pandemic. We investigated the pattern of follow-up after initial telemedicine visits and concordance rate between the diagnoses from the initial telemedicine visit and in-person follow-up visit.

Method: All new patients who had telemedicine encounters with 3 providers at a tertiary care center otology outpatient clinic between April and October 2020 were included. Retrospective chart review was performed to collect patient demographics, clinical information, and follow-up plans. Primary outcomes included whether the patients needed an in-person or telemedicine follow-up and diagnostic concordance between the initial telemedicine and follow-up in-person encounters. Multivariate logistic regression analyses were conducted to assess associated factors.

Results: A total of 348 new patients were seen for a telemedicine visit during the study period. Of these patients, 136 (39.1%) had an in-person follow-up visit and 46 (13.2%) had a telemedicine follow-up appointment. Multivariate regression models revealed that the chief complaint category was not significantly associated with in-person follow-up visit status. Hispanics were less likely to have a follow-up visit compared with Whites (odds ratio: 0.27; 95% CI, 0.11, 0.64). The diagnostic concordance rate between the telemedicine visit and in-person visit with otoscopy was 75.7%. Demographic factors, chief complaint category, and visit time were not significantly associated with diagnostic concordance.

Conclusion: Many patients were able to have their needs met through an initial telemedicine visit in an otology outpatient setting during COVID-19. Diagnostic concordance between initial telemedicine and in-person follow-up visits was high. Although an in-person assessment is necessary for a full assessment of patients, telemedicine can be a useful tool for an initial evaluation of patients with otologic complaints during the COVID-19 pandemic.

Vestibular Dysfunction, Cognition, and Associated Sequela: Falls, Mobility, and Absenteeism

Thi A. Nguyen (Presenter); Jeffrey D. Sharon, MD

Introduction: Recent evidence has shown that vestibular vertigo is strongly associated with cognitive difficulties. We evaluated individuals with both vestibular vertigo and concomitant cognitive dysfunction to find whether there were associated effects on balance, mobility, and work ability.

Method: We performed multivariate analysis using data from the 2016 National Health Interview Survey (NHIS) of US adults. We evaluated whether individuals with both vestibular vertigo and cognitive dysfunction were more likely to suffer mobility and balance issues than individuals with either vestibular vertigo or cognitive impairment alone.

Results: Among individuals with vestibular vertigo, 34% have “some difficulty” thinking and 8% have “a lot of difficulty” thinking compared with 11% and 1% for those without vestibular vertigo, respectively. Those with a history of falls and vestibular vertigo had more than 4-fold increased odds of “difficulty remembering or concentrating” (odds ratio [OR] 4.48; 95% CI, 3.43 to 5.86) compared with individuals with either alone. Furthermore, individuals with both vestibular

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vertigo and cognitive dysfunction had more than 3-fold increased odds of falls (OR 3.25; 95% CI, 2.55 to 4.15), more than 8-fold odds of mobility issues (OR 8.52; 95% CI, 6.95 to 10.45), and more than 9-fold increased odds of missed work-days (OR 9.25; 95% CI, 3.21 to 15.28).

Conclusion: Our findings indicate that vestibular vertigo is not only associated with cognitive dysfunction, but vestibular vertigo and cognitive dysfunction together are associated with real-world consequences, including increased falls, decreased mobility, and increased work absenteeism.

Vestibular Imaging and Function in Congenital Inner Ear Malformations

Akinori Kashio, MD, PhD (Presenter); Alexander Dy, MD; Tsukasa Uranaka, MD; Hajime Koyama, MD; Chisato Fujimoto, MD, PhD; Tatsuya Yamasoba, MD, PhD

Introduction: In this study, we aim to investigate the association among cochlear anatomy, vestibular anatomy, and vestibular functions in children with profound sensorineural hearing loss.

Method: This is a retrospective study in an academic institution. A total of 41 pediatric patients with inner ear malformation (IEM) who had bilateral profound hearing loss and were candidates for cochlear implantation at the Tokyo University Hospital from January 1999 to October 2017 were reviewed. The type of cochlear malformation, the appearance of the semicircular canals (SCCs), and the volume of the vestibule were obtained from computed tomography imaging. To evaluate vestibular function, cervical vestibular evoked myogenic potential (VEMP) test, rotational chair test (RCT), and caloric test were conducted.

Results: Of 82 ears in 41 patients, the most frequent IEM was an incomplete partition (IP) II (29.3%) followed by isolated vestibular organ anomaly alone (20.7%) and IP I (18.3%). A total of 61 ears showed vestibular organ malformation. Of these, 48 ears had abnormal vestibule. Among 65 ears with various cochlear malformations, 39 (60%) had coexisting malformation in vestibule. common cavity (CC), IPI and cochlear hypoplasia (CH) IV had a high incidence of coexisting malformation of vestibule (100%, 93%, and 100%, respectively) whereas the incidence in IP I and IP III were low (17% and 0%, respectively). Some 58 ears (71%) showed abnormal VEMP. Abnormal vestibular volume was significantly associated with a nonreactive VEMP finding ($\chi^2[4, N = 82] = 30.09, P < .001$). Of 65 ears with vestibular organ malformation, 45 had abnormal lateral SCCs, and abnormal lateral SCCs were also associated with abnormal caloric and RTC results ($P < .001$).

Conclusion: Among patients with IEM, the second most frequent type was isolated vestibular organ anomaly without coexisting cochlear malformations. The co-incidence of malformation of vestibule in IP II and IP III were relatively low compared with CC, IP I, and CH IV. Abnormal vestibule volume was significantly associated with a nonreactive VEMP finding. Abnormalities in lateral SCC were also associated with abnormal caloric and RCT results.

Patient Safety and Quality Improvement

ERAS Protocols for Outpatient Operations in Otolaryngology: Review of Literature

Kevin Chorath (Presenter); Sara Hobday; Beatrice C. Go; Alvaro G. Moreira, MD; Karthik Rajasekaran, MD

Introduction: Enhanced recovery after surgery (ERAS) protocols are patient-centered, evidence-based pathways designed to reduce complications, promote recovery, and improve outcomes following surgery; these protocols have been successfully applied for the management of head and neck cancer, but relatively few studies have investigated the applicability of these pathways for other outpatient procedures in otolaryngology. Our goal was to perform a systematic review of available evidence reporting the utility of ERAS protocols for the management of patients undergoing outpatient otolaryngology operations.

Method: A systematic literature review was conducted using MEDLINE via PubMed, EMBASE, SCOPUS and gray literature to identify studies that evaluated ERAS protocols among patients undergoing otologic, laryngeal, nasal/sinus, pediatric, and general otolaryngology operations. We assessed the outcomes and ERAS components across protocols as well as the study design and limitations.

Results: A total of 8 studies met the inclusion criteria and were included in the analysis. Types of procedures evaluated with ERAS protocols included tonsillectomy and adenoidectomy, functional endoscopic sinus surgery, mastoidectomy, and septoplasty. A reduction in postoperative length of stay and hospital costs was reported in 2 and 3 studies, respectively. Comparative studies between ERAS and control groups also showed persistent improvement in pre- and postoperative anxiety and pain levels, without an increase in postoperative complications and readmissions rates.

Conclusion: A limited number of studies discuss implementation of ERAS protocols for outpatient operations in otolaryngology. These clinical pathways appear promising for these procedures as they may reduce length of stay, decrease costs, and improve pain and anxiety postoperatively.

Hearing Loss and Risk of Falls in Elderly

Natalia Baraky (Presenter); Paula Rodrigues; Leticia Baraky

Introduction: Hearing loss is a condition of great impact for elderly individuals, being the most common sensory deficit in this population. It is known that falling from one's own height is also an important disabling event and that it may be related to several contributing factors. Several studies indicate that hearing problems are strictly related to the increased risk of falls.

Method: This is a descriptive cross-sectional study, carried out on a population sample of 117 individuals aged between 60 and 90 years and who were being followed up at the Health Department for the Elderly, in the city of Juiz de Fora, between 2017 and 2018. Data were collected from questionnaire, otoscopic examination and audiometric evaluation at frequencies

of 500 Hz and 4 KHz. Chi-square test was applied, and a *P* value less than .05 for univariate analysis between hearing loss and falls and associated factors.

Results: Hearing impairment was observed in 23 individuals (19.6%), and at least 1 episode of falling by 42 (35.9%) was described, 7 of which were identified with hearing loss. The association between hearing loss and falls in the sample showed a *P* value of .84. As for the association between sex and falls, in the female population (*n* = 95), falls were reported by 36.8%. In the male population (*n* = 22), 31.8% reported falls. The *P* value for gender and falls was .84. In the population that lived unaccompanied (*n* = 31), the presence of falls was 41.9%, with a *P* value of .55.

Conclusion: There was no statistically significant association between falls and factors such as hearing loss, sex, and living together.

Impact of Standardization in M&M Reporting Within an Otolaryngology Department

Maximilian C. Stahl (Presenter); Sydney Jiang, MD; Diana Zarowin; Christina J. Yang, MD; Vikas Mehta, MD, MPH

Introduction: The morbidity and mortality (M&M) conference identifies areas for improvement in patient care and safety. To more effectively capture potential cases, especially “near-misses,” we attempted to standardize reporting and presentation of cases by developing a rubric for identifying potential cases and streamlining electronic reporting of possible cases so they could be done in real-time.

Method: This is a retrospective chart review of adverse events reported from November 2016 and December 2019. Adverse events were categorized as pre- or postimplementation of a standardized reporting and conference format, which occurred on July 1, 2018. Patient demographic data, inpatient vs outpatient setting, adverse event versus near-miss event, and attending physician subspecialty were collected.

Results: A total of 280 cases were reported between November 2016 and December 2019 (109 preimplementation, 171 postimplementation). There were 209 adult cases (81 pre-, 128 postintervention) and 71 pediatric cases (28 pre-, 43 postimplementation). The average age of all reported cases was 42.2 (95% CI, 16.8–67.6). There was a 56.9% increase in total cases reported postintervention. The average number of cases reported per month was 6.1 (± 4.6) preimplementation and 10.1 (± 8.6) postimplementation (*P* = .025). The rate of near-miss event reporting increased by 78.5% in the postimplementation period. In addition, the rate of cases reported in the outpatient setting increased by 12.6% in the postintervention period. Subspecialties with an increased rate of event reporting postimplementation were pediatrics (8.6% increase), rhinology (27.5% increase), sleep (43.4% increase), and neurotology (186.8% increase).

Conclusion: The implementation of a standardized reporting and conference format significantly increased the total number of cases reported per month and the incidence of near-miss event reporting. These qualitative and quantitative changes led

to the development of several quality improvement initiatives within our department that have the potential to improve patient care throughout our system.

Is Giving Patients Your Personal Phone Number Good Clinical Practice?

Matthew D. Adams (Presenter); Jeff Wong, MD; Aileen Wertz, MD; Thorsen W. Haugen, MD

Introduction: Communication between patients and Medical providers is a major barrier to care, with some providers giving their personal phone number (PPN) to patients to increase accessibility. We investigated the following (1) extent to which patients utilize their provider’s PPN, (2) effect of this practice on patient satisfaction, (3) provider’s ability to predict abuse of this practice, and (4) evolving provider perceptions.

Method: A prospective, randomized study from August to December 2020 wherein 9 otolaryngology providers enrolled subjects during a 2-week period. Subjects were randomized to either receive their PPN or not. Providers predicted the likelihood of abuse after each encounter. Subjects were allotted 4 weeks to use their provider’s PPN, and all calls/texts were documented. At the conclusion of the study, subjects were surveyed using Press Ganey provider satisfaction metrics. Providers were also surveyed before and after the study to assess their likelihood in providing patients with their PPN and the impact of this practice on work demands.

Results: Of the 507 subjects enrolled, 266 (52.5%) were randomized to the PPN group. A total of 42 calls/texts from 24 subjects occurred, with 7 considered inappropriate. Of the 10 subjects predicted to abuse the PPN, only 1 was accurately identified. Subjects in the PPN group had a greater mean composite satisfaction score than those in the control group (4.8 vs 4.3; Welch’s *t* test, *P* < .0011). Providers indicated they were more likely to give patients their PPN at the end of the study (Wilcoxon signed-rank test, *P* < .0313), and the provider’s perceived impact of this practice on workload was lower at the conclusion of the study (Wilcoxon signed-rank test, *P* < .0469).

Conclusion: Our study demonstrates a low rate of patient utilization of provider PPNs and poor predictive ability of providers to assess which patients will abuse it. Giving patients their provider’s PPN was associated with improved patient satisfaction. We recommend contextualizing appropriate communication with patients when employing this practice to minimize patient misuse.

Patient and Provider Satisfaction With Telemedicine in Otolaryngology

Phoebe E. Riley, MD (Presenter); Jakob Fischer; Anthony Tolisano; Edward D. McCoul, MD, MPH; Ryan Nagy; Charles Riley

Introduction: The year 2020 has been marked by the COVID-19 pandemic, creating a worldwide public health emergency, resulting in otolaryngologists adopting telemedicine to facilitate access to care. The objective of this study is to evaluate

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patient and provider satisfaction with telemedicine encounters across 3 otolaryngology practices.

Method: A telephone-based, cross-sectional survey of patients undergoing telemedicine encounters for routine otolaryngology appointments was performed between April and July 2020. Patients were asked about their satisfaction, the factors affecting care, and demographic information. A provider survey was emailed to staff otolaryngologists. The survey asked about satisfaction, concerns for reimbursement or liability, encounters best suited for telemedicine, and demographic information. The results were analyzed with descriptive statistics and a multivariable logistic linear regression model to determine odds ratios.

Results: A total of 325 patients were surveyed, demonstrating high satisfaction with telemedicine (average score, 4.49 of 5 [best possible answer]). Patients perceived “no negative impact” or “minor negative impact” on the encounter due to the lack of a physical examination or face-to-face interaction (1.86 and 1.95 of 5, respectively). High satisfaction was consistent across groups for distance to travel, age, and reason for referral. A total of 25 providers were surveyed, with an average satisfaction score of 3.44 of 5. Providers reported “slight” to “somewhat” concern about reimbursement (40%) and liability (32%).

Conclusion: Given patients’ and providers’ levels of satisfaction, there is likely a role for telemedicine in otolaryngology practice that may benefit patient care independent of the COVID-19 pandemic.

Portable HEPA Purifiers to Eliminate Airborne SARS-CoV-2: A Systematic Review

David T. Liu, MD (Presenter); Katie M. Phillips, MD; Marlene Speth, MD, MA; Gerold Besser, MD, PhD; Christian A. Mueller, MD; Ahmad R. Sedaghat, MD, PhD

Introduction: Current epidemiologic predictions of COVID-19 suggest SARS-CoV-2 mitigation strategies must be implemented long term. In-office aerosol-generating procedures (AGPs) pose a risk to staff and patients while also necessitating exam room shutdown to allow aerosol decontamination by indwelling ventilation. This review summarizes the current state of knowledge on portable high-efficiency particulate air (HEPA) purifiers’ effectiveness in eliminating airborne SARS-CoV-2 from indoor environments.

Method: Medline, Embase, Cochrane databases, and the World Health Organization COVID-19 Global literature on coronavirus disease were systematically searched for original English-language published studies on (“HEPA” OR “Purifier” OR “Filter” OR “Cleaner” OR “Filtration”) AND (“COVID” OR “COVID-19” OR “SARS-CoV-2” OR “Coronavirus”) indexed up to January 14, 2021. Additional relevant studies were identified by searching the reference lists of included articles. Two authors (D.T.L. and A.R.S.) independently reviewed abstracts and full-text studies.

Results: Ten published studies have evaluated the effectiveness of portable HEPA purifiers in eliminating airborne SARS-CoV-2 using relevantly sized surrogate particles. Nine

studies evaluated aerosols and submicron particles similar in size to SARS-CoV-2 virions, while 1 study evaluated particles with diameters up to the submillimeter range. In all studies, portable HEPA purifiers were able to significantly reduce airborne SARS-CoV-2 surrogate particles. The addition of portable HEPA purifiers augmented other decontamination strategies such as ventilation.

Conclusion: Experimental studies provide evidence for portable HEPA air purifiers’ potential to eliminate airborne SARS-CoV-2 and augment primary decontamination strategies such as ventilation. Based on filtration rates, additional air exchanges provided by portable HEPA purifiers may be calculated and room shutdown times after AGPs potentially reduced.

Recalls of Otolaryngologic Devices Approved by US FDA, 2003-2019

Keon M. Parsa, MD (Presenter); Ish Talati; William Gao

Introduction: Medical devices used in otolaryngology are regulated by the US Food and Drug Administration (FDA) via a 2-tiered pathway (510[k] vs premarket application [PMA]) based on risk to patients. Recall rates of otolaryngologic devices approved via different pathways have not previously been studied.

Method: This retrospective cross-sectional analysis used the publicly available FDA Ear, Nose, and Throat Devices Panel to query all 510(k) and PMA approvals for moderate- and high-risk otolaryngologic devices between 1976 and 2019. Associated recall events available from 2003 to 2019 were extracted. Approvals were categorized by subspecialty, device type, supporting clinical data, and PMA supplement type. Logistic regression characterized the odds of recall for each device type and subspecialty.

Results: A total of 1061 (57.8%) 510(k) and 778 (42.3%) PMA device applications and modifications were approved. Most (56.4%) of 510(k) clearances provided supporting evidence, with surgical devices least likely to be accompanied by clinical data (3.1%), closely followed by diagnostic devices (4.3%). There were 120 recall events associated with 42 (3.96%) unique otolaryngologic devices cleared via the 510(k) pathway, compared with 25 recall events for 5 (0.64%) unique PMA devices. The 510(k) device approvals were more likely to be recalled than PMA device approvals (odds ratio [OR] 3.67; 95% CI, 2.38–5.88; $P < .0001$). 510(k) surgical devices (OR 2.1; 95% CI, 1.1–4.4; $P = .03$) were more likely to be recalled than diagnostic devices. Devices designated for laryngology (70.0%) and general otolaryngology (25.0%) made up most recalls.

Conclusion: Otolaryngologic devices approved by the FDA via the 510(k) pathway exhibit greater recalls than those approved via the PMA pathway. However, overall recall rates for FDA-approved devices are low. Given the balance between regulation and innovation, postmarket surveillance and ongoing regulatory improvements are critical to ensure optimal safety of medical devices.

Retrospective Analysis of Post-tracheostomy Complications

Molly M. Murray (Presenter); Joseph Zenga, MD



Introduction: Tracheostomies are commonly performed by a variety of specialty physicians with a vast array of techniques, but there is a lack of granular data regarding the best tracheostomy practice. We aimed to elucidate surgical, disease, and patient factors that contribute to tracheostomy complications.

Method: A retrospective case series with chart review was performed for patients who underwent tracheostomy by any technique for any indication between 2011 and 2018 at a single academic tertiary care center. Data collection included patient, disease, provider, and surgical factors that may affect 90-day tracheostomy complications, hospital readmissions, subsequent surgeries, and mortality.

Results: A total of 697 patients were included. Of these, 521 (75%) had severe comorbidity (ACE-27 score of 3). In total, 70 (10%) patients had at least 1 tracheostomy-related complication within 90 days, of which postoperative hemorrhage was most common ($n = 35$), and the median time for complication was postoperative day 11. Only the presence of a known difficult airway was significantly associated with a 90-day complication (odds ratio 0.41; 95% CI, 0.20–0.86). Fourteen patients required immediate return to the operating room, and 3 patients died of their complication, all within 3 days of tracheostomy placement. Lastly, 263 (40%) patients died within 30 days of tracheostomy placement.

Conclusion: While complications after tracheostomy are infrequent, occurring in 10% of patients, they are often life-threatening. For patients with a known difficult airway preoperatively, a heightened level of preparedness to immediately manage complications, specifically accidental tracheostomy decannulation or hemorrhage, is required. Although tracheostomy complications may not directly result in the death of a patient, 30-day mortality is high: 40% of 697 patients. This underscores the urgent need for preoperative multidisciplinary, especially palliative care, evaluation to determine if the patient is a safe, reasonable candidate for tracheostomy.

Searching for Medical Information in the Age of Social Media

Deborah X. Xie, MD (Presenter);
C. Matthew Stewart, MD, PhD

Introduction: Despite the ubiquity of the internet, no studies have investigated when, how, or why patients turn to online websites for medical information. The aim of this study was to understand the patterns of usage surrounding these resources for health information.

Method: An online survey was distributed through Amazon Mechanical Turk asking individuals about their general usage patterns of social media and their use of social media and online resources for health care information. Descriptive analyses were performed.

Results: A total of 765 responses were collected (mean age 41.5 ± 13.4 years, 56.7% female). Nearly all (98.0%)

respondents report using any form of social media. Approximately half (48.1%) of social media users posted medical or health-related content within the past year. Common motivations for posting include connecting with others who have similar conditions and searching for treatment options or advice. Of all respondents, 576 (75.3%) received care from a medical provider (physician, nurse practitioner, physician assistant) in the past year. Most of these patients (94.8%) looked up information about their provider, symptoms, diagnosis, or treatment on the internet. While search engines were the most commonly used platform (86.8%), 76.9% of patients searched at least 1 platform of social media for this information.

Conclusion: Approximately half of social media users post medical or health-related content, often in search of support and advice. Nearly all people who had a medical appointment in the past year searched online for information related to their symptoms, diagnosis, treatment, or medical provider.

Shared Decision-Making and Decisional Conflict in Otolaryngologic Surgery During COVID-19

Nneoma Wamkpah, MD (Presenter); Sophie Gerndt;
Dorina Kallogjeri; Jay Piccirillo; John Chi

Introduction: The unpredictable nature of the COVID-19 pandemic portends further uncertainty in patient decision-making. This study explores decisional conflict and patient-specific concerns for people undergoing otolaryngologic surgery during the pandemic.

Method: This was a prospective, single-institution, cross-sectional study of English-speaking adults undergoing otolaryngologic surgery, conducted from April 22 to August 31, 2020. Individuals who were non-English speaking, lacked autonomous medical decision-making capacity, underwent emergent surgery, or had a communicative disability were excluded. The primary outcome of decisional conflict was measured using the validated “SURE” screening questionnaire. Relationships between decisional conflict and patient demographics were assessed via bivariate analyses, multivariable logistic regression, and conjunctive consolidation. The secondary outcome of patient-specific concerns was obtained through open-ended interview and qualitatively assessed using thematic analysis with open coding.

Results: There was a 41% response rate (182 of 444 patients). The median age was 60.5 years (range 18–88); 92 patients (51%) were women. Decisional conflict was more prevalent in non-White compared with White participants (difference 18%; 95% CI, 0.6%–37.0% and adjusted odds ratio 3.0; 95% CI, 1.2–7.4). Combining information from multiple variables through conjunctive consolidation, the group with the highest rate of decisional conflict was non-White patients with no college education, receiving urgent surgery. “Intraoperative” and “postoperative concerns” were the most common patient-specific concerns. Among those patients reporting concerns about COVID-19, the majority had decisional conflict.

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Conclusion: This study highlighted factors associated with decisional conflict and emphasized the need for physicians to engage in shared-decision making with patients. The COVID-19 pandemic contributed to decisional conflict. Consistent discussion of risks and benefits is essential. The role of race and decisional conflict needs further study.

Pediatric Otolaryngology

Bimodal CI, Pitch/Prosody Perception Differences among Children and Adults

Akiko Sugaya (Presenter); Ryotaro Omichi; Yukihide Maeda; Kunihiro Fukushima; Shin Kariya; Mizuo Ando

Introduction: This study aims to evaluate pitch recognition and prosody perception among prelingual pediatric cochlear implant (CI) users compared with postlingual adult CI, users.

Method: Adults and school-age children who had received CI, surgery in Okayama University Hospital were recruited in this study. The participants of both age groups were bilateral, unilateral, and bimodal CI, users. Several adults with normal hearing were also enrolled as the control group. The original “Pitch Recognition and Emotional Prosody Perception Tests” were used in this study. The pitch test consisted of 18 questions asking which of 2 piano notes had the higher frequency, while the prosody test consisted of 12 questions asking participants to report their impression as 1 of 4 listed emotions after listening to presented monosyllable sound vocalizations. The test results among bilateral, unilateral, and bimodal CI, users of both groups were compared by 1-way analysis of variance (ANOVA) and post hoc tests ($P < .05$).

Results: A total of 19 school-aged CI, users and 20 adult CI, users participated in this study. The control group consisted of 10 normal-hearing adults. The average pitch and prosody test scores were almost completely accurate for the normal-hearing control group but were low among the participating children and adult CI, users, without showing any notable differences between the groups. The ANOVA and post hoc test results revealed that the pitch test performance levels for bimodal adult CI, users were significantly better than those for the bilateral ($P < .05$) and unilateral ($P < .01$) CI, users. No notable differences were observed in test scores among the 3 pediatric CI, user groups.

Conclusion: Among the tested adults, bimodal users performed better in the pitch tests than the bilateral and unilateral adult CI, users did. In contrast, the test results for participating children with congenital hearing loss did not demonstrate any significant differences among bilateral, unilateral, and bimodal CI, users. The pitch and prosody acquisition mechanism may be different between children and adult patients with congenital and acquired hearing losses.

Adolescent Immunization Rates and Surveillance in Pediatric Otolaryngology Clinics

Michal Trope, MD (Presenter); Raisa Tikhtman, MD; Francis Real, MD, Med; Stacey Ishman, MD, MPH

Introduction: In 2019 the Centers for Disease Control and Prevention reported that 54.2% of adolescents aged 13 to 17 years had completed the human papillomavirus (HPV) vaccination series, but the rate within many pediatric otolaryngology clinics is currently unknown. The purpose of this study was to identify how frequently immunization history was collected for patients seen in a pediatric otolaryngology clinic and determine the HPV vaccine completion rate when immunizations were recorded.

Method: This was a retrospective chart review of 13- to 26-year-old patients who presented to a pediatric otolaryngology outpatient clinic from January 2018 to January 2019. Immunization data were collected from our electronic medical record system and included vaccines recommended in early adolescence (11–12 years), including HPV-2, HPV-4, HPV-9, and tetanus, diphtheria, and pertussis (Tdap). Immunization data were analyzed, and vaccination rates were computed.

Results: Within the outlined time period, 4606 patients were seen. The mean age was 16.2 ± 2.7 years; 52% were female, 13.4% were Black, 81.3% were White and 5.3% were other. Of the 4606 patients, only 773 (17%) had vaccine information recorded. Of the 773, 81.4% received at least 1 Tdap vaccine dose, 75.8% received at least 1 HPV vaccine dose and 43.5% completed the HPV vaccine series (HPV-2, HPV-4 or HPV-9). Therefore, only 7% of the patients seen in clinic were reported to be adequately vaccinated for HPV prevention.

Conclusion: Overall, only 14% of patients in our clinic had at least 1 Tdap dose recorded. In addition, only 7% of patients were found to have completed the HPV vaccination series. This is likely due to noncommunicating electronic medical record systems and infrequent screening for immunization. Of the patients with recorded vaccinations, only 44% completed the HPV vaccination series. Therefore, there exists an opportunity to increase the vaccination rate of pediatric otolaryngology patients through improved surveillance and implementation of vaccination programs. Such an intervention could significantly decrease the incidence of HPV-related diseases, including oropharyngeal squamous cell carcinoma.

Aerodigestive Clinic Reduces Health Care Utilization While Increasing Access to Care

Keith D. Volner, DO (Presenter); Agnes Montgomery; Christine Gould; Brian Liming

Introduction: Aerodigestive patients are complex pediatric patients that require substantially increased health care needs compared with the general population. This study aimed to objectively evaluate the health care utilization outcomes of a multidisciplinary aerodigestive clinic.

Method: We retrospectively analyzed the electronic medical records of children ≤ 17 years old seen in the Aerodigestive Clinic at Tripler Army Medical Center between April 2015 and June 2020. The number of emergency department (ED), primary care (PC), specialty care (SC), ancillary care (AC), and teleconsult (TC) encounters were tallied before and within 1 year of the initial visit.

Results: A total of 261 children were included during the study period. Comparing visits before aerodigestive evaluation to after aerodigestive evaluation, there were 6630 encounters before and 6454 after, representing a 2.7% reduction in appointments overall ($P = .601$). The number of ED (-37.5% , $P < .001$) and PC (-39.9% , $P < .001$) visits decreased, while SC ($+21.6\%$, $P = .272$), AC ($+18.4\%$, $P = .051$), and TC ($+14.6\%$, $P = .562$) visits increased. PC visits accounted for nearly one-third (31%) of all visits prior to the initial aerodigestive clinic visit but only 19% of visits after. The distribution of visits differed strongly among age groups. While PC visits decreased for all age groups, ED visits decreased by nearly half (-48.1% , $P < .001$) for ages 1 to 17 years, and there was no change for <1-year-olds. Conversely, TCs increased significantly for <1-year-olds ($+47.3\%$, $P = .011$).

Conclusion: There is a statistically significant reduction in the number of ED and PC visits for patients seen in a multidisciplinary aerodigestive clinic with a concomitant increase in the number of ancillary, specialty, and TC encounters. These findings emphasize the positive impact that the multidisciplinary clinic has on health care utilization for pediatric aerodigestive patients.

Applicability of TI-RADs in Pediatric Thyroid Nodules

Stephen Hadford, MD (Presenter); Brandon Hopkins, MD; Daniel Hewes, MD; Rachel Georgopoulos

Introduction: The Thyroid Imaging Reporting & Data System (TI-RADs) is used to stratify the risk of nodules and guide further workup. The application of this system was validated in adult patients with thyroid nodules, without clear evidence of its applicability in the pediatric population. The objective of this study was to examine if TI-RADs and its components are useful in predicting which thyroid nodules are malignant in the pediatric population.

Method: A retrospective chart review of all patients less than 18 years old, with a listed diagnosis code for thyroid pathology from January 1, 2010, through January 1, 2020, was performed. Patients with a thyroid ultrasound and a radiologist recorded TI-RADs score of documented thyroid nodules were included. Data on FNA, final pathology, and any surgical intervention were collected as well.

Results: A total of 55 patients were identified, including 12 males and 43 females. The age range was 5 to 18 years, with an average age of 15 years. Of the patients who underwent thyroidectomy or biopsy, 7 were malignant and 14 were benign. The distribution among TI-RADs scores was 13% in 1, 18% in 2, 22% in 3, 16% in 4, and 18% in 5. Of the patients who had an underlying malignancy, 42% had a TI-RADs score of 3, 29% had a TI-RADs score of 4, and 29% had a TI-RADs score of 5. Of the TI-RAD findings, taller than wide had the highest positive predictive value of 0.5. Echogenicity not being hypoechoic had a strong negative predictive value (0.5–1.0).

Conclusion: The metrics used in TI-RADs had a relatively low positive predictive value for identifying an underlying malignancy and stronger negative predictive values. Given the

more aggressive nature of nodules in the pediatric population, the threshold to biopsy a nodule should be lower than indicated in the traditional TI-RADs grading system.

Association of Mast Cells in Pediatric Larynx With Aerodigestive Disease

Emily L. Mace (Presenter); Shilin Zhao, PhD; Christopher T. Wootten, MD; Ryan H. Belcher, MD



Introduction: Mast cells have been implicated in respiratory, digestive, and global inflammatory disorders, but the role of mast cell inflammation within the larynx and subsequent aerodigestive pathology is poorly understood. This study analyzes the association of mast cells found on supraglottic biopsy with aerodigestive diseases.

Method: This study was approved by the Vanderbilt Institutional Review Board. Pediatric patients undergoing otolaryngology aerodigestive procedures were consented between 2014 and 2019, and biopsies of the supraglottic larynx were collected at the time of their surgery. Pathologists reviewed the biopsies for the presence and number of mast cells. The patients' electronic health records were reviewed for relevant demographic data and clinical diagnoses present at the time of biopsy.

Results: A total of 464 patients were biopsied and assessed for mast cells. Patients with mast cells present in their biopsy were significantly more likely to have gastroesophageal reflux disease (GERD) with an odds ratio [OR] of 2.36 (CI, 1.47–3.77; $P < .05$), more likely to have laryngomalacia with an OR of 2.98 (CI, 1.80–4.94; $P < .05$), more likely to have laryngeal anomalies with an OR of 2.32 (CI, 1.52–3.55; $P < .05$), and more likely to have obstructive sleep apnea (OSA) with an OR of 2.16 (CI, 1.35–3.45; $P < .05$). Mast cells were also evaluated as a continuous variable, and higher numbers of mast cells in the larynx correlated with increasing odds of GERD ($P < .05$), laryngomalacia ($P < .05$), and laryngeal anomalies ($P < .05$).

Conclusion: Mast cells are associated with inflammatory conditions, although little is known about their presence in laryngeal inflammation. The results from our study demonstrate an association between mast cells in the pediatric larynx with GERD, laryngomalacia, laryngeal anomalies, and OSA. Our study also showed that higher number of mast cells correlates with increased odds of GERD, laryngomalacia, and laryngeal anomalies indicating that these inflammatory conditions have an impact on the larynx that can be demonstrated cellularly.

The Association of Pediatric Laryngeal Eosinophils With Eosinophilic Esophagitis

Emily L. Mace (Presenter); Shilin Zhao, PhD; Christopher T. Wootten, MD; Ryan H. Belcher, MD

Introduction: Eosinophils have previously been found in laryngeal biopsies; however, their significance and associated pathology have not been well studied as in the lungs and esophagus. This study evaluates the presence of eosinophils in

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the pediatric larynx and its association with eosinophilic esophagitis (EoE).

Method: This study was approved by the Vanderbilt Institutional Review Board. During aerodigestive pediatric otolaryngology procedures between 2014 and 2019, biopsies of the supraglottic larynx were collected. Biopsies were reviewed by pathologists for the presence and number of eosinophils. A proportion of patients also underwent esophageal biopsy when medically indicated. The patients' electronic health records were reviewed for relevant demographic data and clinical diagnoses present at the time of biopsy.

Results: A total of 464 patients were biopsied and assessed for eosinophils. Review of the specimens revealed 31 (6.7%) patients with eosinophils in their laryngeal biopsies. Of these patients, the median number of eosinophils per hpf was 1 with a standard deviation of 1.68. Patients with eosinophils in their biopsy had a significantly higher prevalence of eosinophilic esophagitis at 13%, compared with those without eosinophils, with a prevalence of 3% ($P = .009$). EoE patients with laryngeal eosinophils also had higher levels of eosinophils on esophageal biopsy, with a mean of 73 cells per hpf; in comparison, EoE patients without laryngeal eosinophils had a mean of 21 eosinophils on esophageal biopsy.

Conclusion: Despite the larynx being positioned directly between the esophagus and lungs, little is known about the pathologic and physiologic impact of eosinophils on the larynx. This study shows the presence of eosinophils in the larynx is associated with a higher prevalence of EoE and higher levels of eosinophils on esophageal biopsy in patients with EoE.

Baseline Quality of Life in Children's Head-and-Neck Low-Flow Vascular Malformations

Sean S. Evans, MD (Presenter); Steven Goudy; Ching Siong Tey; Rachel Swerdlin; Matt Hawkins

Introduction: Low-flow head and neck vascular malformations (LFHNV) are complex lesions with poorly understood sequelae in pediatric patients. This study's purpose is to determine baseline quality-of-life (QOL) characteristics in patients with LFHNV.

Method: Institutional Review Board approved this retrospective review of a prospectively maintained database including demographic data, lesion diagnosis, location, and extent. PedsQL™ scores were collected using parent proxy data for children 2 to 7 years old and both patient and parent proxy data for patients ≥8 years old.

Results: A total of 94 consecutive patients were included between 2016 and 2019, mean age of 9.2 + 4.7 years. Diagnoses: lymphatic malformations (LM) = 50, venous malformations (VM) = 41, combined venolymphatic malformations (VLM) = 3. Parental overall QOL scores were lower than their child's in psychological (PsFD), school (ScFD), and social functioning domains (SoFD; $P = .02$; $P = .04$; $P = .03$). Lower parental scores were also noted in ScFD for submandibular/sublingual and oropharyngeal involvement ($g = -0.68$, $P = .03$; $g = -0.83$, $P = .04$), physical (PhFD), and SoFD for hypopharyngeal (HP) involvement ($g = -1.10$, $P = .03$;

$g = -1.40$, $P = .02$), SoFD for orbital involvement ($g = -0.87$, $P = .01$), PhFD, PsFD, and SoFD for increasing subsite number involvement (-0.30 , $P = .01$; -0.29 , $P = .03$; -0.27 , $P = .03$), and ScFD for those who received prior treatment ($d = 0.59$, $P = .04$). Parent proxy-reported emotional function (EFD) scores decreased with increasing age at presentation (-0.60 , $P < .01$), were higher in PhFD for VM vs LM ($d = -1.07$, $P = .01$) and lower in EFD for HP involvement ($g = -1.25$, $P = .05$). Child-reported scores in ScFD were lower in Black vs White children ($P = .04$); lower for PhFD, SoFD, and total domains with HP and laryngeal involvement ($g = -1.19$, $P = .04$; $g = -1.85$, $P < .01$; $g = -1.23$, $P = .04$); and lower in PhFD and SoFD and overall for increasing subsite involvement (-0.32 , $P = .03$; -0.38 , $P < .01$; -0.35 , $P = .02$).

Conclusion: Parent and patient QOL scores are reduced across multiple domains for HNLVVM's based on age, race, lesion location, disease burden, and prior treatment.

Caregiver- and Child-Reported Quality of Life in Snoring Children

Phoebe K. Yu, MD, MPH (Presenter); Jiayan Liu; Craig S. Derkay, MD; Susan Garetz; Stacey Ishman, MD, MPH; Cristina Baldassari, MD

Introduction: Caregivers report poor quality of life (QOL) in children with sleep-disordered breathing (SDB). The objective of this study is to assess the correlation between caregiver and child-reported QOL in children with SDB.

Method: In the Pediatric Adenotonsillectomy Trial for Snoring, healthy children with mild SDB (apnea-hypopnea index <3) were randomized to watchful waiting or adenotonsillectomy. At baseline, the validated Pediatric Quality of Life Inventory (PedsQL) with Total, Physical Health, and Psychosocial Health scores assessed global QOL in participating children 5 to 11 years old. We compared scores obtained from caregivers and participants and used multivariable regression to assess whether factors such as socioeconomic status, disease severity, and parenting style were associated with systematic deviations between parent and child report.

Results: PedsQL scores were available for 289 families. The mean age of children was 7.0 years, with 45% ($n = 132$) identifying as White. The mean total PedsQL score reported by parents was higher at 76.3 (indicating better QOL) than the mean child-reported score of 66.4 ($P < .001$). The correlation between parent and child total PedsQL scores was 0.04 for children 5 to 7 years old ($P = .56$) and 0.23 for children 8 to 11 years old ($P = .02$). Higher correlations were observed for psychosocial health scores compared with physical health scores. Increasing child age (estimate -2.45 ; CI, -3.75 , -1.14) and permissive parenting style (-3.72 ; CI, -7.10 , -0.34) were associated with a smaller difference between parent and child report.

Conclusion: Parent- and child-reported global QOL in school-aged children with mild SDB were weakly correlated. Further research is needed to assess whether similar trends are evident for disease-specific QOL metrics.

Characterization of Otolaryngologic Conditions in Children With Neonatal Abstinence Syndrome

Rita Wang (Presenter); Bitu Naimi; Zaroug Jaleel; Jessi Levi, MD

Introduction: Literature on otolaryngologic sequelae of children with neonatal abstinence syndrome (NAS) has been scarce to date. Prior reports suggest some otologic conditions associated with long-term NAS outcomes, but no comprehensive exploration of these relationships currently exists. Our study aims to characterize the breadth of otolaryngologic conditions diagnosed in children with NAS.

Method: We conducted a retrospective descriptive study of 524 children with NAS and otolaryngologic diagnoses born from January 1, 2014, to December 31, 2019, and evaluated at an otolaryngologic clinic at a tertiary care hospital. Diagnoses were categorized as otologic, oropharyngeal, sinonasal, and laryngeal conditions. Additional diagnoses of obstructive sleep apnea (OSA), congenital abnormalities of the head and neck, and audiology consults were noted separately. Analysis of covariance testing was used to test differences in the mean number of diagnoses.

Results: A total of 680 otolaryngologic diagnoses were analyzed across 524 patients. Otologic conditions comprised 34.9% of diagnoses, oropharyngeal conditions 26.8%, sinonasal conditions 18.4%, laryngeal conditions 5.3%, OSA 1.5%, congenital abnormalities 8.4%, and audiology consults 4.9%. Adjusting for covariates, there were a significantly higher number of otologic diagnoses compared with the other subcategories with a mean (SD) of 0.46 (0.83), followed by oropharyngeal 0.35 (0.55), sinonasal 0.24 (0.49), and laryngeal 0.07 (0.29).

Conclusion: Understanding the otolaryngologic sequelae of children with NAS is important as these conditions affect children's early development. Our results can help inform physicians in providing comprehensive pediatric care and management of patients born with NAS and guide further research in this field.

COVID-19 Impact on Operative Management of Pediatric Neck Abscesses

Mark A. Fadel, MD, JD (Presenter); Fendi Obuekwe; Jennifer L. McCoy, MA; Dennis Kitsko

Introduction: For multiple reasons, elective pediatric otolaryngology surgical procedures have declined during the COVID-19 pandemic. However, it is less clear how COVID-19 has affect acute care surgeries. The purpose of this study was to assess whether the prevalence of pediatric head or neck abscesses managed with operative drainage decreased compared with previous years.

Method: In a retrospective study, we evaluated medical records of 203 pediatric cases diagnosed with abscess of the head or neck and treated with incision and drainage at a large tertiary care children's hospital between the dates of April 1 and November 30 from 2015 to 2020. We compared outcomes

for each year from 2015 with 2019 with the same date range in 2020, which included location of the infection, abscess size, symptoms, duration of antibiotic treatment before and after operative intervention, microbiology, and the number of cases per year.

Results: The mean \pm SD presenting age in the 2015–2019 group was 5.10 ± 5.10 years and 2.24 ± 1.91 years in the 2020 group. Neck abscesses were more common than head abscesses from 2015 to 2019 (81.7% vs 18.3%), whereas only neck abscesses presented in 2020 ($P = .030$). The mean number of cases between 2015 and 2019 was 36 ± 3.81 , whereas the number of cases in 2020 was 23 ($P = .036$). The most common symptom was neck stiffness or swelling in both groups (2015–2019, 74.4% vs 2020, 100%, $P = .003$). Of those patients who underwent intravenous antibiotic therapy prior to presentation ($n = 43$), the mean number of days before admission was 1.98 ± 2.95 ($n = 40$) from 2015 to 2019 and 12.00 ± 10.39 ($n = 3$) in 2020 ($P = .008$). The percentage of cases with multiple strains cultured between 2015 and 2019 was 13.8% vs 18.2% in ($P = .007$).

Conclusion: There was a decrease in the number of operative head or neck abscesses in 2020 during the COVID-19 pandemic compared with the mean number per year from 2015 to 2019 within the same date range. COVID-19 mitigation strategies leading to reduced transmission of other viral and bacterial illnesses and a tendency toward prolonged medical management to avoid surgery during the pandemic are 2 possible reasons for this decrease.

Diagnostic Clues for Identification of Pediatric Foreign Body Aspirations

Brandon Truong (Presenter); Kimberly Luu, MD

Introduction: Foreign body aspiration (FBA) is a pediatric medical emergency that is often difficult to diagnose. Better understanding of its clinical presentation and workup may improve the diagnostic accuracy of FBA.

Method: We retrospectively reviewed clinical records of pediatric patients who presented to a tertiary care center with a potential diagnosis of FBA from 2010 to 2020. Demographic data, clinical history, physical examination, imaging, and bronchoscopy findings were collected.

Results: A total of 518 pediatric patients (mean age = 2.7 years) presented with suspicion of FBA. Of these, 390 (75.2%) sought treatment within 1 day of the inciting event, with 376 (72.5%) presenting initially to the emergency department. History findings indicative of FBA included wheeze (odds ratio [OR], 5.83; 95% CI, 3.65–9.30), respiratory distress (OR, 1.65; 95% CI, 1.02–2.66), and multiple encounters (OR, 5.46; 95% CI, 2.97–10.06). A supportive physical exam had a sensitivity of 60.8% and specificity of 88.4%. O_2 saturation at presentation was found to be statistically lower in patients with FBA (97.3% vs 98.6%, $P < .001$). Chest radiographs were obtained in 74.1% of patients ($n = 384$) with a sensitivity of 45.3% and specificity of 88.0%. Some 25 low-dose computed tomography (CT) scans were performed with a

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sensitivity of 100% and specificity of 85.7%. A total of 186 rigid bronchoscopies were performed, with 65.6% (n = 120) positive for FBA. Foreign bodies were more commonly found on the right (51.7%) than the left (38.3%), with few in the trachea or carina (9.1%); 80.8% consisted of organic material, predominantly nuts.

Conclusion: Accurate diagnosis of FBA requires careful history taking and examination. Observation of a lower O₂ saturation is suggestive of FBA. Chest radiographs have limited sensitivity; however, low-dose CT scans were highly sensitive and should be considered in the diagnostic algorithm for FBA.

Does Tracheoesophageal Fistula Repair Alter Outcomes of Laryngeal Cleft Repair?

Ivanna Nebor, MD (Presenter); Orna Katz Kadosh, MD; Meredith E. Tabangin, MPH; Charles Myer, MD; Catherine Hart, MD; Alessandro de Alarcon, MD, MPH

Introduction: Tracheoesophageal fistula (TEF) and laryngeal cleft (LC) are rare congenital airway anomalies that can coexist in some patients. However, the surgery-specific success rate of LC repair in children with associated TEF has not been well described. The aim of the study is to determine if the history of prior TEF alters the LC repair outcomes.

Method: A retrospective review was conducted of patients with LC with and without TEF/EA repair between January 2001 and November 2020. Data collected and analyzed included demographics, LC type, and LC with TEF/EA timing of repairs. The inclusion criteria were children with LC type I-III and deep notch who had all completed data.

Results: A total of 381 patients with LC were treated at our hospital. Of these, 283 patients met the inclusion criteria and were divided into 2 groups: LC (n = 242, 85.5%) and LC+TEF (n = 41, 14.5%). Revision repair was required in 43 patients (15.1%) with 8 (2.8%) needing a second revision repair. The first LC revision rate in the LC group was 36/242 (14.9%) compared with 7/41 (17.1%) in LC+TEF ($P = .72$). The second LC revision rate in the LC and LC+TEF groups was 7 (2.9%) and 1 (2.4%), respectively. The median time to revision in the LC group was 5.1 (interquartile range [IQR]: 3.45, 10.6) months, as compared with the LC+TEF group, which was 29.2 months (4.8, 44.2; $P = .07$). The median time between the first and second revisions for the 7 patients in the LC group was 28.55 (IQR: 10.7, 53.6) months and 6.5 months in 1 patient from the LC+TEF group.

Conclusion: The incidence of TEF and LC was 14.5% in our study. Based on our findings, a history of TEF repair was not associated with a higher revision rate than patients with LC alone. The history of TEF repair did not alter the outcomes of LC repair. Parents and families can be counseled that their outcomes are similar to LC alone patients.

Drug-Induced Sleep Endoscopy Findings in Obese Adolescents

Cristina Baldassari, MD (Presenter); Timothy Kearney

Introduction: Drug-induced sleep endoscopy (DISE) is increasingly used to assess upper airway collapse in pediatric

obstructive sleep apnea (OSA) patients. Data regarding DISE findings in obese adolescents with OSA is lacking; such information could be used to direct treatment and improve outcomes as controversy exists as to whether adenotonsillectomy (AT) or positive airway pressure is the standard therapy for this population. Our primary objective is to describe DISE findings in obese adolescents. We also sought to assess whether DISE findings predicted OSA resolution following AT.

Method: A 10-year review was conducted at our tertiary children's hospital of obese adolescents 12 to 21 years old with OSA (apnea-hypopnea index [AHI] ≥ 1) that underwent DISE prior to AT. All DISE procedures were scored using the modified VOTE classification.

Results: A total of 30 obese adolescents underwent pre-AT DISE and had both pre- and post-AT polysomnogram. The mean age of the adolescents was 14.6 (SD 2.7) years. Most patients had severe disease with a mean AHI of 36.5 (SD 29.5). The most common site of collapse noted on DISE was the oropharynx/lateral oropharyngeal walls, occurring in 93% (n = 28) of adolescents. Of the patients, 73% (n = 22) had multilevel obstruction. More than 50% of subjects had persistent OSA following AT. Although the site of collapse on DISE did not predict post-AT outcomes, adolescents with higher baseline AHI were more likely (odds ratio = 1.13; 95% CI, 1.01, 1.26) to have persistent OSA after AT.

Conclusion: The most common site of collapse on adolescent DISE is the oropharynx, which is amenable to surgical intervention. However, rates of persistent OSA following AT are high regardless of baseline DISE findings in obese adolescents. Future research is needed to assess if DISE-directed multilevel sleep surgery improves outcomes in this population.

Dysphagia Outcomes Following Surgery for Pediatric UVFI: A Systematic Review

Kastley M. Marvin, MD (Presenter); Michael J. Coulter, MD; Tzyynong L. Friesen, MD; Kimberly Morris, CCC-SLP-BCS-S, IBCLC; Christopher M. Johnson, MD; Matthew T. Brigger, MD, MPH

Introduction: Dysphagia is a frequent symptom of unilateral vocal fold immobility, although the outcomes of dysphagia following intervention are not well described. The objective of this study is to assess dysphagia outcomes following surgical management of unilateral vocal fold immobility in children.

Method: A systematic review of the medical literature was performed following PRISMA guidelines. An a priori protocol was defined to identify all articles that presented quantifiable outcome data in children under the age of 18 years who underwent surgical treatment to improve glottal competence for dysphagia. Two authors independently determined which references met inclusion criteria, extracted data, and assigned levels of evidence. Data were pooled using a random effects model where possible. The quality of studies was graded using the MINORS criteria.

Results: A total of 398 publications were screened, with 9 meeting inclusion criteria. A total of 115 patients were

included. Of these, 77% (95% CI, 66%, 87%) had preoperative swallowing symptoms. Surgical intervention for dysphagia included 66 injection laryngoplasties, 11 type 1 thyroplasties, and 10 ansa cervicalis to recurrent laryngeal nerve reinnervations. The articles consistently reported success in improving dysphagia symptoms, and limited pooling of the data demonstrated a mean improvement after surgical intervention in 79% (95% CI, 67%, 91%) of children. The reported rate of minor and major complications was 15% (95% CI: 1%, 29%). The MINORS criteria scores ranged from 5 to 12.

Conclusion: Surgical management of unilateral vocal fold immobility in properly selected children can be an important component of treating dysphagia when symptoms are present. The selection of surgical technique relies on both patient- and surgeon-related factors while providing a high rate of success in managing these complex children.

An Educational Pop-up Book Comforts and Empowers Children Before Surgery

Holly Cordray (Presenter); Chhaya Patel, MD; Kara K. Prickett, MD

Introduction: We evaluate a novel interactive pop-up book for pediatric preoperative education as a tool for managing anxiety and strengthening coping skills.

Method: A prospective randomized controlled trial of children ages 5 to 12 undergoing outpatient surgery was conducted from August to December 2020. Patients either read a pop-up book about general anesthesia (intervention) or received standard care (control). Patients self-reported their preoperative fear, expected pain, expectations and attitudes about the procedure, views of preoperative explanations, and coping strategies. Observer-rated anxiety and parent/caregiver satisfaction were also evaluated.

Results: A total of 151 patients enrolled, and 148 completed the study. Most patients (73.6%) had otolaryngology procedures. Pop-up book patients self-reported significantly less fear of anesthesia induction than standard-care patients, with a large effect size ($d = 0.95$; $P < .001$). Pop-up book patients expected less pain from the mask and the procedure, with medium-to-large effect sizes ($d = 0.61-0.79$; $P < .001$). The book facilitated more positive views of the procedure and of preoperative explanations, with medium-to-large effect sizes ($d = 0.58-1.20$; $P < .005$). Further, the book prepared patients to generate more adaptive coping strategies: greater proportions of patients reported positive active coping, distraction strategies, and support-seeking strategies ($P < .001$). However, observer-rated anxiety at anesthesia induction did not differ between groups ($P = .81$). Parents/caregivers were significantly more satisfied with their care if their child read the book ($P \leq .02$).

Conclusion: The pop-up book offers a child-focused resource for preoperative education that effectively alleviates children's preoperative fears, encourages positive coping, and improves caregiver perceptions of the care experience.

The Efficacy and Safety of Eustachian Tube Balloon Dilation in Children: A Meta-analysis

Mohamed A. Aboueisha, MD (Presenter); John Carter, MD; Edward McCoul, MD

Introduction: We analyze the efficacy of Eustachian tube balloon dilation in children; determine the safety of Eustachian tube balloon dilation in children; and compare between Eustachian tube balloon dilation and ventilation tube insertion in children. This the first meta-analysis and systematic review addressing the use of Eustachian tube dilation in children including all the articles in the literature up to March 20.

Methods: Original studies of balloon dilation Eustachian tuboplasty (BDET) in a pediatric population were identified in PubMed, Embase, Web of Science, Cochrane, Clinicaltrials.gov, and CINAHL. Outcomes of efficacy included tympanogram and audiogram findings. Adverse events were summarized for each study.

Results: Seven articles were included involving 408 children with a mean age of 9.9 years old (95% CI, 8.8, 11.1) with a mean follow-up of 19.2 months (95% CI, 15, 23). Type B tympanograms decreased after BDET from 64.2% (95% CI, 53.3, 73.8) to 16.1% (95% CI, 8.5, 28.4). Air-bone gap (ABG) decreased after BDET from a mean of 25.3 dB (95% CI, 18.9, 31.6) to 10.2 dB (95% CI, 8.9, 11.5). The pooled estimate of adverse events after BDET was 5.1% (95% CI, 3.2, 8.1), with most being self-limited epistaxis with no major adverse events reported. Three studies compared BDET with ventilation tube insertion. Analysis of postoperative ABG showed it was lower in the BDET group (SMD -0.92 dB; 95% CI, -1.5 , -0.35 ; $P = .002$).

Conclusion: Although data are limited, BDET \pm tympanostomy tube placement may offer a surgical advantage over tympanostomy tube placement alone in the treatment of otitis media with effusion in the pediatric population. The procedure was safe with no major adverse events, with the most common complication being epistaxis.

Epidemiology of Pediatric Facial Lacerations

Erico Rego (Presenter); Nikita Patel; Sudeepti Vedula; Christina H. Fang, MD; Christen Caloway, MD; Jean Anderson Eloy, MD

Introduction: Facial lacerations are the most common manifestation of pediatric facial trauma, but data on the epidemiology of pediatric lacerations are currently limited. The goal of this study is to evaluate the etiology and demographics of pediatric patients with facial lacerations.

Method: A retrospective analysis of the National Electronic Injury Surveillance System (NEISS) from the Consumer Product Surveillance System was performed. Cases of facial lacerations in pediatric patients between the ages of 1 month to 22 years from 2010 to 2019 were analyzed for primary diagnosis, patient demographics, and associated variables. Analyses of age groups were also performed: toddlers (age 0-4), children (age 5-12), teenagers (age 13-17), and young adults (age 18-21).

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Results: A total of 104,121 cases of facial lacerations in pediatric patients were identified, averaging 11,569 cases per year. The incidence of facial lacerations decreased as age increased, with toddlers making up the largest share of the caseload (45.5%). In all of age groups, the majority of cases were males (66.6%). The most common location of injury for all age groups was at home (46.8%). The most common cause of injury in both toddlers and children was tables/desks (14.55% and 7.03% respectively, both $P < .001$). In both teenagers and young adults, the most common cause of injury was basketball (20.06% and 18.31% respectively, both $P < .001$).

Conclusion: The major causes of facial lacerations in pediatric patients differ between young children and children older than 12 years. Our findings suggest that a focus on safety measures around tables for younger children and basketball for older children may help reduce the incidence of pediatric facial lacerations.

Evaluating the Impact of Health Disparities in Pediatric Thyroidectomy

Jesse Sanchez (Presenter); Beth Osterbauer; Daniel Kwon

Introduction: Health disparity is an area of increasing focus within the field of pediatric otolaryngology, with some studies describing worsened perioperative complications, burden of disease, and worsened outcomes in certain social and demographic groups. This is the first study to examine the impact of social, demographic, and economic factors in pediatric thyroidectomy.

Method: We retrospectively reviewed 228 patients identified with complete records from the thyroidectomy registry at the Children's Hospital of Los Angeles, a tertiary center that serves a wide range of patients referred from all over Southern California, between 2010 and 2020. Data collected from the medical records included ethnicity, primary language, insurance type, zip code, and other demographic information. Disease and treatment outcome data were analyzed with chi-square, Fisher exact test, and multivariable logistic regression.

Results: Based on preliminary data, we found that that 71% of our patients had public insurance. A larger percentage of those with public insurance were Spanish speakers (48% vs 4%, $P < .001$) and had shorter mean postoperative stays in the hospital (1.9 vs 3.2 days, $P = .04$). While not reaching statistical significance, children with public insurance tended to be younger (15.9 vs 14 years) and Hispanic (50% vs 31%). We found no differences in disease pathology, rates of perioperative complications such as nerve injury, or rates of postoperative complications such as hypocalcemia with respect to insurance type, ethnicity, or primary language. Additional geographic and socioeconomic analyses are pending.

Conclusion: While it is important to note that commonly reported outcome measures likely fall short in describing the impact and burden of disease in different groups, our findings suggest that safety net insurance systems that provide access to high-volume tertiary care centers can serve as an "equalizing factor" in children undergoing thyroidectomy. In addition, our results would refute the notion that lower socioeconomic

pediatric populations have a greater burden and or severity of thyroid disease.

Identification of Proteins for Epithelialization & Vascularization in Decellularized Tracheal Grafts

Riddhima Agarwal, MS (Presenter); Tandy Chiang, MD; Lumei Liu, PhD; Sayali Dharmadhikari, MS

Introduction: We describe challenges faced by otolaryngologists in the reconstruction of long-segment tracheal defects; compare the advantages and disadvantages of currently available scaffolds for tissue-engineered tracheas; and compare the intracellular proteomic profiles of syngeneic vs decellularized tissue-engineered tracheal grafts. This is a late-breaking abstract because additional time was needed to reach the 3-month endpoint of animal studies and complete subsequent mass spectrometry of postimplant tissue-engineered tracheal grafts.

Methods: Syngeneic tracheal grafts (STG) and sodium dodecyl sulfate-decellularized trachea (DTS) were orthotopically implanted in C57BL6 mice. Grafts ($n = 3$ /group) explanted at 3 months and preimplant scaffolds ($n = 4$ /group) were analyzed via mass spectrometry. Scaffold-5 Proteome Software and statistical analysis were used to identify polypeptides that function in epithelial and endothelial cell regeneration.

Results: Total numbers of proteins involved in epithelialization and vascularization were decreased in preimplant DTS and STG but recovered following implantation. The 4 most prevalent proteins involved in these processes were identical in postimplant DTS and STG. Amongst these, fatty acid synthase and vinculin had roles in both functions. Filamin-B, Ras GTPase-activating like protein, and laminin were involved only in epithelialization. Myosin-9, myoferlin, and complement C3 have roles in vascularization.

Conclusion: Our study shows that DTS grafts recapitulate the proteomic profile of STG grafts in terms of key intracellular pathways of regeneration, thus supporting their translational appeal.

The Impact of a Fast Track Questionnaire in Pediatric PVFMD

Erin Harvey (Presenter); Eileen Peterson; David Beste; Rachel Fee; Thomas Robey

Introduction: Paradoxical vocal fold motion disorder (PVFMD) can be a frequent cause of dyspnea in an otherwise healthy adolescent population. The current standard of care, when the diagnosis is suspected, includes referral to an otolaryngologist (ENT) prior to beginning laryngeal control therapy (LCT) with a speech-language pathologist (Scalp). We hypothesize that a "fast-track" screening questionnaire will improve time to treatment as well as decrease patient billing charges.

Method: A total of 258 patients (group 1, G1) who received traditional referral (TR) and were evaluated by ENT and Scalp in a pediatric voice clinic with a diagnosis of PVFMD between November 2013 and November 2017 were identified and

compared with 66 patients (group 2, G2) from October 2018 to November 2019 who were prospectively reviewed and fast-tracked (FT) for LCT through a designed screening questionnaire.

Results: The number of female patients (81% G1, 82% G2, $P > .05$) and median age (G1:14 years interquartile range [IQR] 4, G2: 14 years IQR 3, $P = .83$) were similar between the 2 groups. The median duration from symptom onset to Scalp referral was significantly shorter for the FT group (G1: 12 months, IQR 18; G2 8.5 months IQR 8, $P = .02$). The interval time from referral to provider visit was also significantly lower in the FT group: 4 weeks (IQR 3.5) in G1 (ENT visit) vs 3 weeks (IQR 3) in G2 (Scalp visit) ($P = .05$). More than half of the patients in G1, as well as G2, did not request additional LCT sessions with the Scalp after their initial voice clinic diagnosis and treatment (G1) or FT Scalp appointment (G2) (71% and 72%, respectively). The typical minimum patient charge for a respiratory specialist and voice clinic PVFMD evaluation in group 1 was \$5123 vs \$1649 for the FT patients in G2, thus an average savings of more than \$3000 per patient.

Conclusion: Using an FT screening questionnaire for pediatric PVFMD patients significantly helps decrease the time to treatment as well as patient charges without altering the response rate of LCT.

Impact of Language and Ethnicity on Pediatric Tracheostomy Outcomes

Nathan Garza (Presenter); Stephen Chorney; Yann-Fuu Kou; Romaine F. Johnson, MD, MPH

Introduction: Pediatric tracheostomy is associated with high health care costs and utilization. There is some evidence that these measures are affected by social determinants of health. Considering the complexity of pediatric tracheostomy care, understanding how language barriers may affect outcomes is important.

Method: We performed a retrospective case series of pediatric tracheostomy from 2009 to 2019. Children <18 years were included and divided by language and ethnicity. Tracheostomy outcomes were determined during the index hospital stay and subsequent visits until decannulation, aging out at 21 years old, or death. We used analysis of variance and the Pearson chi-squared test to determine statistically significant differences between the study groups.

Results: This study included 395 patients. Of these, 54 (14%) self-identified Spanish as their primary language, and 137 (35%) identified as Hispanic. Hispanic patients were older at the time of tracheostomy (9.3 vs 6.3 months, $P = .02$) and less likely to be premature (35% vs 50%, $P = .007$). Other risk factors were similar ($P > .05$). Perioperative outcomes were also similar including indications (most common was respiratory failure = 61%, $P = .16$), complications (7.3% vs 5.6%; $P = .64$), length of stay after tracheostomy (mean = 107 days, $P = .16$), and 30-day readmissions after index discharge (18% vs 22%, $P = .16$). Long-term outcomes were also similar: decannulation rate (26% vs 32%, $P = .55$), time to decannulation (chi-squared = 0.99, $P = .32$), and mortality (22% vs

17%, $P = .26$) were no different between language and ethnicity groups.

Conclusion: Language and ethnicity appear to have minimal impact on pediatric tracheostomy outcomes.

Lingual Tonsillectomy Outcomes in the Pediatric Population

Vincent R. Morrow (Presenter); Adrian Williamson, MD; Michele M. Carr, MD, DDS, Med, PhD; Steven W. Coutras, MD, FRACS

Introduction: Lingual tonsillectomy (LT) can be offered to treat obstructive sleep apnea in children; however, there are few previous studies that describe the outcomes and complications of this procedure. The goal of this study is to describe the postoperative outcomes and complications following LT.

Method: A retrospective review of pediatric patients who underwent LT was performed from January 1, 2013, to January 1, 2021. LT was completed using coblation in all patients. Only patients less than 18 years of age at the time of the procedure were included. Data collected included age, gender, body mass index z score, medical and surgical history, length of stay, and any postoperative complications that were identified. All statistical analyses were performed using R (version 4.0.3).

Results: A total of 175 patients were included in the study: 99 (56.6%) were male and 76 (43.4%) were female. The mean age was 8.27 years (95% CI, 7.75–8.79 years). Of note, 10 (5.71%) patients had a diagnosis of trisomy 21, 57 (32.57%) patients had a diagnosis of developmental delay, and 31 (17.71%) patients had a history of seizures or epilepsy. The mean apnea-hypopnea index for the group was 7.84 (95% CI, 5.81–9.86), and the mean oxygen nadir was 87.14% (95% CI, 86.08–88.20%). The mean postoperative length of stay was 1.05 days (95% CI, 1.00–1.10 days). Complications were seen in 26 (14.86%) patients and ranged from prolonged dysphagia (2 patients, 1.14%), poor oral intake requiring an emergency department visit or readmission (14 patients, 8.00%), postoperative bleeding requiring observation alone (5 patients, 2.86%), and postoperative bleeding requiring operative intervention (7 patients, 4.00%).

Conclusion: LT is a safe procedure for the pediatric population. Postoperative bleeding and need for readmission or ED visit for poor PO intake or pain control was rare.

Locked Down, Not Left Out: Unplanned Telepractice Amid COVID!

Vidhu Sharma, MS, ENT (Presenter); Kapil Soni; Amit Goyal

Introduction: The current COVID-19 pandemic has posed unforeseen challenges, including sudden loss of or limited access to health care services. One subgroup of individuals affected are the prelingual hearing-impaired children who need regular auditory verbal therapy (AVT). We share our experience of conducting unplanned remote telepractice for such children in a resource-constrained setting—the challenges faced and the barriers overcome.

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Method: The study was conducted at a tertiary care center in northwestern India. A total of 21 prelingual hearing-impaired pediatric cochlear implantees were enrolled after taking informed teleconsent from the parents/caregiver, commencing from the period of nationwide lockdown. Telepractice sessions were conducted by the parent under the supervision of the speech-language pathologist (Scalp) via video calls (or audio calls) employing home-based activities. At the end of 6 weeks, the Scalp administered a questionnaire via phone calls to ascertain the feedback and overall experience of the parents with telepractice, and their responses were compiled. Also, after 6 months of telepractice, the performance of the children was assessed using PS score, Infant-Toddler Meaningful Auditory Integration Scale score, and Speech Intelligibility Rating score. These were compared with baseline pre-teletherapy scores.

Results: The mean age of children was 5.8 years (2–13 years); 10 were male and 11 female. A majority of parents had a positive experience in terms of a better understanding of their child's learning challenges (90%), overall satisfaction level as ≥ 3 (90%), and willingness to recommend telepractice to others and feasibility (57%). Post-teletherapy performance scores showed satisfactory improvement.

Conclusion: Implementing unplanned telepractice posed a variety of challenges. The sudden switch over from office-based therapy to telepractice posed difficulties for not only the child and parent but for the Scalp as well. The challenges we faced necessitated out-of-the-box thinking on a situation-to-situation basis, yielding encouraging opportunities and overall encouraging results.

Mechanical Ventilation and Middle Ear Effusions Among Tracheostomy-Dependent Children

Erin M. Wynings, MD (Presenter);
Stephen R. Chorney, MD, MPH; Hussein Jaffal, MD;
Rachel St. John, MD; Romaine F. Johnson, MD, MPH

Introduction: The natural history of middle ear effusions (MEE) in tracheostomy-dependent children requiring ventilatory support is not well described.

Method: A retrospective cohort study analyzed all children less than 2 years of age having a tracheostomy placed at a tertiary center between 2015 and 2020. Children with at least 1 documented tympanometry examination were included. Primary outcomes were rates of MEE, defined as a flat tympanogram with normal external canal volume, among children requiring or not requiring mechanical ventilation in the first 24 months after tracheostomy.

Results: A total of 94 children were included. The median age at tracheostomy was 4.6 months (interquartile range [IQR]: 2.9–6.2), 67% (63/94) were born before 37 weeks gestation, and 18% (17/94) had a craniofacial syndrome or trisomy 21 diagnosis. Each child obtained a median of 2 tympanometry exams (IQR: 1–3) during a period of 14.1 months (IQR 6.6–27.8) of follow-up after tracheostomy placement. Children on mechanical ventilation at the time of

tympanometry were more likely to have MEE (odds ratio [OR]: 2.7; 95% CI, 1.4–5.2; $P = .001$). Within 24 months after tracheostomy placement, 82% of children on mechanical ventilation developed MEE compared with 45% of children not on mechanical ventilation (hazard ratio: 2.9; 95% CI, 1.5–5.7, $P = .001$). An MEE that persisted on at least 2 consecutive exams was not statistically more common for children who were on a ventilator (OR: 2.9; 95% CI, 0.6–12.8, $P = .10$). When controlling for age at exam, gestational age, craniofacial syndrome, and trisomy 21 diagnosis on logistic regression, ventilator dependence significantly predicted the presence of MEE (OR: 2.5; 95% CI, 1.3–4.8, $P = .006$).

Conclusion: Children with a tracheostomy are more likely to develop MEE if they require mechanical ventilation. Clinicians should recognize this risk factor and appropriately assess candidacy for tympanostomy tube placement.

Medical Therapy +/- Sinus Surgery for CF Exacerbations: Crossover Analysis

Drew H. Smith, MD, MS (Presenter);
Jeffrey Falco, MD (Presenter); Thomas W. Holmes, MD;
Brian Shirley, PNP-BC; John D. Prosser, MD

Introduction: Cystic fibrosis (CF) leads to chronic rhinosinusitis (CRS). This crossover analysis investigates any potential differences in pulmonary function outcomes among CF patients receiving both medical management (MM) and functional endoscopic sinus surgery (FESS) vs MM alone for CF exacerbation.

Method: The data were prospectively collected. Diagnosis of CF and age ≤ 18 years were required. Pulmonary function test (PFT) values were obtained from July 2011 to March 2020. All patients were hospitalized and treated for CF exacerbations with MM with FESS or MM alone. For crossover analysis, data from patients who had FESS with MM initially or MM alone initially were selected in an alternating fashion. Two-way analysis of variance with repeated measures was used to determine the effect of receiving FESS with MM vs MM alone on PFT outcomes (forced expiratory volume in 1 second; FEV1) over time (during admission, at discharge, at 3 months, at 6 months, and at 12 months). A P value less than .05 was considered significant.

Results: Thirteen patients, 7 of whom had FESS with MM initially and 6 of whom had MM alone initially, and 20 events of both FESS and MM were included for analysis. For PFT outcomes, there was no statistically significant 2-way interaction between treatment type and time ($P = .492$). In addition, the main effect of treatment did not show a statistically significant difference in FEV1 between trials ($P = .737$). Irrespective of treatment, there was a statistically significant increase in FEV1 of 12.60 (95% CI, 1.91 to 23.29) from prehospitalization to discharge ($P = .014$). There was also a statistically significant increase in FEV1 from prehospitalization to 6 months posthospitalization of 9.40 (95% CI, 0.99 to 17.81; $P = .021$). There was no statistically significant association between treatment type and hospital readmission at 6 months ($P = .270$) or at 12 months ($P = .265$).

Conclusion: There was no significant difference between PFT outcomes in pediatric patients hospitalized for CF exacerbation treated with MM with or without FESS at any time interval. There was no association between hospital readmission at 6 months or at 12 months and treatment of FESS with MM or MM alone.

Olfactory Testing to Improve COVID-19 Screening in School Children

Kaitlyn Tholen, MD (Presenter); Sarah Gitomer, MD; Jill Kaar, MD; Brian Herrmann, MD; Daniel Beswick, MD; Maxene Meier, MD

Introduction: We analyze olfactory changes in the pediatric SARS-CoV-2 population and compare with results in adults to determine if chemosensory screening may uniquely identify early infection; establish a screening tool for objective evaluation of olfaction in pediatric COVID-19 patients; and recognize the discrepancy between objective and patient-reported olfactory function in pediatric patients. This project includes significant new data since the initial submission date that strengthened our research amid the evolving COVID-19 pandemic. Our study analyzes smell disturbances in children during the COVID-19 pandemic in a largely asymptomatic cohort, which makes it unique compared with some recent studies. This project positively contributes to the olfactory research for pediatric COVID infections and demonstrates both COVID-19-related olfactory changes (ie, good smells are noxious) and children's discrepancies in self-reported vs objective sense of smell.

Methods: Children aged 5 to 21 years undergoing SARS-CoV2 polymerase chain reaction testing for preoperative screening for nonrespiratory illnesses at a tertiary pediatric hospital were enrolled from June 2020 to April 2021 and were administered subjective questionnaires and a 40-question Smell Identification Test (SIT) within 2 weeks of COVID testing. Patients with prior history of olfactory dysfunction were excluded. Data were summarized with descriptive statistics.

Results: In total, 47 patients completed SIT testing (19 positive [40%] and 28 negative [60%] for COVID; mean age = 12.0 years; 63% female). There was no significant difference in overall SIT score or individual question responses between positive and negative patients, but 44% reported that certain foods smelled noxious. Overall, 26 patients (55%) were normosmic yet 44 (94%) denied subjective change in their sense of smell or taste.

Conclusion: There was no statistical difference in olfactory function between otherwise asymptomatic COVID-positive and negative children. Our findings suggest a discrepancy between objective and patient-reported olfactory function in pediatric patients.

Pediatric Cystic Fibrosis Utilizing SNOT-22 and PFTs: A Demographic Study

Thomas W. Holmes, MD (Presenter); Brian Shirley, PNP-BC; John D. Prosser, MD

Introduction: While the presence of chronic rhinosinusitis has been well established in the pediatric cystic fibrosis population, the role that demographics play in the disease has not been well described. A better understanding of any possible disparities would be an important factor to take into account while treating this patient population.

Method: This retrospective review was completed at a tertiary-referral academic pediatric otolaryngology practice. Patients with cystic fibrosis and age less than or equal to 18 years were included. Sinonasal Outcome Test-22 (SNOT-22) and pulmonary function test values were obtained as available at each visit to the multidisciplinary pediatric cystic fibrosis clinic from February 22, 2019, to March 10, 2020. Demographics including age, race, gender, and genotype were collected. Patients were then classified based upon demographics.

Results: A total of 413 SNOT-22 scores were obtained from the 102 patients over the course of the study. While SNOT-22 scores were similar, the average forced expiratory volume in 1 second (FEV1) value for patients of color was 72.7% compared with 88.0% for White patients ($P = .018$). Patients aged 0 to 4 years had the lowest average SNOT-22 score at 8.22 when compared with the age groups 5 to 12 years (SNOT-22 average 10.7) and 13 to 18 years (SNOT-22 average 12.7). There was no difference in subjective and objective findings when comparing gender and genotype.

Conclusion: Patients of color had statistically worse pulmonary function based on FEV1 values when compared with Caucasian patients. However, a minority of patients had similar subjective quality-of-life findings based on SNOT-22 scores.

Pediatric Endoscopic Sinus Surgery: Analysis of Practice Patterns and Complications

Sydney Thomas (Presenter); Guodong Liu, PhD; Meghan N. Wilson, MD

Introduction: Large-scale studies of endoscopic sinus surgery (ESS) in the pediatric population are lacking. This study aims to evaluate pediatric ESS practice patterns in the United States and determine associations between demographics, comorbidities, procedures performed, and 30-day complication rates.

Method: This investigation used the MarketScan database. Patients in the United States under the age of 18 years who underwent ESS during 2016 to 2018 were identified. Data regarding cohort demographics, surgical procedure, and 30-day postoperative events (inpatient stay, complications, emergency department [ED] visits, readmissions) was collected. Univariate and multivariate analyses were performed to analyze results.

Results: The database included 2981 patients who met criteria for inclusion. ESS was performed on an outpatient basis in 94.5%. Children were split into 3 age groups for analysis: age <8 years ($n = 511$), age 8 to 12 years ($n = 707$), and age 13 to 18 years ($n = 1763$). Only 2.6% had a balloon sinuplasty as part of their surgery. Multivariate linear regression showed

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that children 8 years and older were significantly ($P < .05$) more likely to have more extensive sinus surgery performed as were children with allergic rhinitis (odds ratio [OR] 1.3) and cystic fibrosis (OR 2.0). Adenoidectomy was performed in 25.7% of patients, with those <8 years statistically more likely to have adenoidectomy. A total of 19.4% had a complication, ED visit, or readmission postoperatively, with patients having a diagnosis of asthma, cystic fibrosis, and immunodeficiency having higher rates ($P < .05$). Those older (13 years and older) and with a history of immunodeficiency were less likely to have a complication or readmission ($P < .05$).

Conclusion: ESS is performed in all age groups, although older children are more likely to have extensive surgery involving multiple sinuses. Adenoidectomy is more frequently performed in children younger than 8 years old, and balloon sinuplasty is infrequent in the pediatric population. A postoperative complication or ED visit occurred in 19% of children, indicating a role for improved postoperative care to reduce morbidity in these patients.

Personalized Virtual Tracheotomy-Tube Design in Pediatric Congenital Airway Malformations

Sean S. Evans, MD (Presenter); Julianna Bonilla-Velez

Introduction: Congenital airway malformations (M) are rare anatomic variants that can be life-threatening in children. The highly variable disease spectrum prevents standard care protocols. Virtual modeling is a novel technology for personalized medical solutions when conventional strategies fail.

Method: This is a feasibility study demonstrating the use of personalized virtual modeled tracheostomy tubes (TT) for pediatric patients (0–18 years) with M in a tertiary pediatric hospital. Patients had respiratory complications from intraluminal mispositioning leading to TT obstruction that did not improve despite multiple iterations of standard and custom-length and/or -shape TT trials. The process included airway computed tomography acquisition with virtual 3-dimensional airway reconstruction and TT modeling with triplanar customization and refinement. Models were transferred to Bivona Corporation for TT fabrication using industry-standard materials and processes. Serial tracheoscopies to assess position were performed. Retrospective chart review of 5 patients managed with personalized TT was completed. Outcomes included visualized resolution of granulation/ulceration and frequency of TT-related tracheoscopies before and after personalized TT placement.

Results: Three patients with M and recurrent TT-related respiratory complications were managed with personalized TT. All patients demonstrated resolution of visualized TT-related obstructive granulation and ulceration on serial endoscopies. All patients underwent less frequent tracheoscopies (interval between procedures increased from an average of 4.9 to 22.4 days, 50 to 180 days, and 11 to 16 days for each of these patients, respectively). One patient had de-escalation to a discharge-appropriate ventilator following implementation. Two additional patients were managed prophylactically

and suffered no TT-related complications (no urgent tracheoscopies required).

Conclusion: Personalized TT design is a feasible tool for physicians treating patients with M. Further studies are needed before widespread application of this technology in clinical settings.

Profound OSA Among Children With Sleep Disordered Breathing

Alexander Hansen (Presenter); Christopher Liu; Katie Liu; Jorena Lim; Romaine F. Johnson, MD, MPH

Introduction: We aim to determine if a polysomnography (PSG)-defined condition, profound obstructive sleep apnea (OSA; apnea-hypopnea index [AHI] >50), can be used to stratify the patient's disease severity; and to determine risk factors for profound OSA (AHI >50) among children <18 years old and the risk of perioperative complications.

Method: We conducted a retrospective analysis of children <8 years of age with PSG-confirmed severe OSA (AHI >10) from January 2019 to December 2019. We divided patients into severe (AHI 10–50) and profound OSA (AHI >50). AHI >50 is considered profound OSA to stratify disease severity and the need for urgent evaluation and treatment. We collected demographic, clinical, and perioperative data, including respiratory events and readmissions. We determined the odds ratio for having profound OSA using logistic regression and the risk of perioperative complications.

Results: A total of 451 children had severe OSA, and 13.5% had profound OSA. The median age was 5.6 years, with 272 (60%) males. There were 14 (3.1%) Asian, 118 (26%) Black, 78 (17%) White, and 225 (49%) Hispanic patients. The mean AHI was 20.8 for the severe group and 80.5 for the profound group. Children with profound OSA were older (7.9 vs 6.3 years, $P < .001$), had a higher body mass index (BMI; 26.3 vs 21.2, $P < .001$), had more respiratory complications after tonsillectomy (28% vs 12%, $P < .001$), and longer length of stays (1.5 vs 1.2 days, $P = .02$). BMI was the principal risk factor for profound OSA (odds ratio [OR] = 1.05; 95% CI, = 1.03 to 1.07, $P < .001$). The predicted probability of profound OSA was 10% for the 50th (BMI = 18), 28% for the 95th (BMI = 37), and 45% for the 99th percentile (BMI = 49). Children with profound OSA were 3 times more likely to have respiratory complications after tonsillectomy (OR = 3.03; 95% CI, 1.57–5.83, $P = .001$).

Conclusion: Profound OSA in children is associated with increasing BMI. Children with profound OSA also had more perioperative complications. These data support the continued routine use of PSG among obese children.

Prophylactic Inhaled Corticosteroids for the Management of Recurrent Croup

Lauren E. Sowa, MD (Presenter); Christian Francom, MD; Jeremy Prager, MD; Paul Stillwell, MD; Paul Houin, MD; Sarah Gitomer, MD

Introduction: Croup is characterized by a barking cough, inspiratory stridor, hoarseness, and varying degrees of respiratory

distress. Acute croup episodes are often treated with oral or intravenous corticosteroids. Recurrent croup is defined as more than 2 to 3 episodes of acute croup in the same patient and often mimics reactive airway disease. We hypothesized that inhaled corticosteroids given at the first respiratory viral prodrome can lower the number and severity of recurrent croup episodes in children without fixed airway lesions.

Method: A retrospective chart review over an 18-month period was performed at a large tertiary care pediatric hospital following Institutional Review Board approval. Eligible patients younger than 18 years who were referred to either pediatric pulmonology or pediatric otolaryngology for recurrent croup were identified. Information regarding demographics, the number and severity of episodes both pre- and postintervention, medical history, workup, bronchoscopy results, treatment modalities, and clinical improvement were included in the analysis. A Fisher 2-tailed exact test was used to compare the number of croup episodes against the level of improvement.

Results: A total of 76 patients were included in our analysis; 60 male and 19 female with a mean age of 5.2 years. Of these, 42 had >5 episodes of croup, 27 had 3 to 5 episodes, and 4 had 2 episodes prior to intervention. Diagnostic laryngoscopy/bronchoscopy was performed in 17 patients (22%), with 65% showing a normal exam without fixed lesions. Some 49 patients (67%) were treated with inhaled steroids, 12 of whom were lost to follow-up. Of the remaining 37, 89% saw improvement with reduced severity and overall number of episodes of croup. In addition, patients with >5 episodes of croup (26) as compared with <5 (11) were more likely to improve with inhaled steroids, with a *P* of .07.

Conclusion: The novel use of inhaled corticosteroids showed promise as a preventative treatment to mitigate the severity and frequency of recurrent croup episodes.

Risk Factors for Subglottic Stenosis Following Respiratory Syncytial Virus Hospitalization

Tariq A. Salem (Presenter); Gresham Richter, MD; Elijah Bolin; James R. Gardner, MD; Isabella Zaniletti

Introduction: Respiratory syncytial virus (RSV) is a major cause of hospitalization in the pediatric population potentially using subglottic stenosis (SS). We sought to identify patient-specific characteristics for the development of SS following hospitalization for RSV bronchiolitis.

Method: We performed a multicenter retrospective cohort study using the Pediatric Health Information System for admissions from January 2008 to December 2019. Children <3 years old with bronchiolitis and RSV were included. All patients with a history of prematurity were excluded. The primary outcome was the development of SS. To determine factors associated with the outcome of interest, we performed multivariate logistic regression; covariates in the model were gastroesophageal reflux disease (GERD), bronchopulmonary dysplasia (BPD), congenital heart disease (CHD), associated

airway anomalies, sepsis, pneumonia, length of stay, and airway interventions (laryngoscopy with dilation, microlaryngoscopy, and laryngotracheoplasty). Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were calculated for each.

Results: There were 185,309 patients in the final analytic sample, of which 15,454 (8.3%) subsequently developed SS. The incidence of SS following a hospitalization for RSV bronchiolitis is 3045 per year. Of the patients who developed SS, there were 382 subsequent encounters for endoscopy with balloon dilation and 74 encounters for laryngotracheoplasty. When holding other selected variables constant, factors associated with SS were GERD (aOR = 3.9; 95% CI, = [3.3,4.6]), BPD (aOR = 6.0; 95% CI, = [4.9,7.3]), CHD (aOR = 1.8; 95% CI, = [1.5,2.0]), and associated airway anomalies (aOR = 19.8; 95% CI, = [16.2,24.1]). Children with a diagnosis of sepsis (aOR = 0.5; 95% CI, = [0.4,0.7] or pneumonia (aOR = 0.2; 95% CI, = [0.1,0.3]) were less likely to develop SS.

Conclusion: GERD, BPD, CHD, and associated airway anomalies are risk factors for the development of subglottic stenosis in children younger than 3 years of age after admission for RSV bronchiolitis. Sepsis and pneumonia were not associated with an increased likelihood of SS.

The Safety and Efficacy of Pediatric Open Bedside Tracheostomy

Ory Madgar (Presenter); Reut Kassif Lerner; Stav Devons-Sberro; Noa Rozendorn; Eran Alon; Eldar Carmel

Introduction: Traditionally, pediatric tracheostomy has been viewed as a technically demanding procedure with a high complication rate, requiring the routine use of a formal operating room. Pediatric bedside tracheostomy in an intensive care unit (ICU) setting has not been widely reported, in contrast to the widespread adult bedside ICU tracheostomy. Transport of these critically ill, multiple life support systems-dependent patients can be technically difficult, labor intensive, and potentially risky for these patients. The aim of our study was to demonstrate the safety and efficacy of performing a bedside tracheostomy in the pediatric ICU.

Method: We performed a retrospective analysis of all pediatric patients undergoing tracheostomy at a tertiary care center, between January 1, 2013, and December 31, 2019. Intraoperative and postoperative complications were compared between the 2 groups.

Results: During the study period, 117 pediatric patients underwent tracheostomy, 57 (48.7%) were performed bedside while 60 (51.3%) were performed in the operating room. Patients' age ranged from 2 weeks to 17 years of age, with a median age of 16 months. No case of bedside tracheostomy necessitated a shift to the operating room. There was no difference in 30-day morbidity (*P* = .42) or mortality (*P* = .49) between the 2 groups.

Conclusion: As our results suggest, pediatric open bedside tracheostomy in an ICU setting is a safe and efficient procedure.

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Seasonal Analysis of Pediatric Single-Stage Laryngotracheoplasty

Colin W. Fuller, MD (Presenter); James R. Gardner, MD; Courtney Wright; Deanne King, MD, PhD; Gresham Richter, MD; Andre Wineland

Introduction: Single-stage laryngotracheoplasty (ssLTP) is an important surgical option in the management of subglottic stenosis. Some surgeons prefer to avoid performing this procedure during peak cold and flu season. This retrospective study analyzes the impact of season on pediatric ssLTP surgical outcomes.

Method: Billing records were analyzed to identify primary ssLTPs performed at our institution in children (<18 years) from January 2004 through April 2020. Demographic and operative details including sex, age, preexisting tracheostomy, and level(s) of stenosis were captured via chart review. Patients were divided into 2 groups: those who underwent surgery during viral season (October to March, inclusive [VS+]) and those who underwent ssLTP at other times (VS−). Outcomes included duration of intubation, duration of intensive care unit (ICU) stay, and complications including need for reintubation, need for subsequent tracheostomy, contraction of RSV, and others. A 1-tailed noninferiority trial using chi-square and *t* tests was performed, as well as post hoc 2-tailed versions of these tests. The threshold for statistical significance was $P < .05$.

Results: A total of 34 ssLTPs were identified, 26 VS+ ssLTPs and 8 VS− ssLTPs. One patient underwent simultaneous tracheal resection with ssLTP. Some 31 patients had subglottic stenosis; of the remainder, 3 had isolated tracheal stenosis, 1 had isolated glottic stenosis. Demographics between the 2 groups were similar with regard to age, gender, tracheostomy status, and level of stenosis. VS+ ssLTPs had fewer mean ICU days (14.5 to 25.7) and intubated days (8.6 to 12.1) than VS− ssLTPs did. VS+ ssLTPs were less likely to suffer 1 or more complications (15/26 to 6/8), including subsequent tracheostomy (4/26 vs 3/8). One- and 2-tailed tests of each variable demonstrated $P > .05$.

Conclusion: This single-institution study demonstrates non-inferior outcomes of ssLTP during from October to March. In fact, VS+ ssLTPs had better outcomes in each comparison, although no difference achieved statistical significance. Variation in the institutional burden of viral illness may affect these findings.

Smell Status in Children Infected with SARS-CoV-2

Zhanna Mokoyan, MD (Presenter); Irina Meytel; Anna Babayan; Ulyana Malyavina; Yuri Rusetsky

Introduction: This study aimed to evaluate the olfactory status in children with laboratory-confirmed SARS-CoV-2 using subjective and psychophysical methods.

Method: This is a prospective clinical cross-sectional study of 79 children aged 5 years and older with SARS-CoV-2 infections confirmed by reverse-transcription polymerase

chain reaction-based testing. All children were hospitalized at the National Medical Research Center for Children's Health (Moscow, Russia) in April and May 2020. The 21st item of the Sinonasal Outcome Test–22 questionnaire and odor identification test were used for smell assessment. Children were examined twice during the hospitalization, and a telephone survey was conducted 60 days after hospital discharge.

Results: Immediately after confirmation of COVID-19, smell impairment was detected in 86.1% of children by means of the identification test and in 68.4% of children by means of the survey ($P = .010$). After 5 days, the survey revealed a statistically significant decrease in the number of patients with hyposmia (41 of 79, 51.9%). On the first visit, the mean identification test score corresponded to “hyposmia” (9.5 ± 2.7), while on the second visit, the average value was 13.1 ± 1.9 , which corresponded to “normosmia.” According to the telephone survey, recovery of the olfactory function occurred within 10 days in 37 of 52 patients (71.2%), 11 to 29 days in 12 children (23.1%), and later than 30 days in 3 cases (5.7%).

Conclusion: In the pediatric population, olfactory dysfunction is an early and common symptom of COVID-19. Psychophysical testing was found to be more sensitive compared with the subjective survey (84.0% vs 66.7%, $P = .010$). Olfactory function in children with COVID-19 tends to recover quickly. On day 5, statistically significant positive dynamics were observed, and the overwhelming majority of patients (94.3%) had no subjective olfactory complaints within the first month; after 2 months, normal smell function was found in all patients according to the survey.

Standardizing Opioid Use After Pediatric Tonsillectomy Without Increasing Postoperative Returns

Holly Cordray (Presenter); Kathleen Smith, RN, CPNP; Kara K. Prickett, MD

Introduction: Opioid prescription after pediatric tonsillectomy is common and highly variable, and it may not offer improved pain control over over-the-counter medications. Our objective was to evaluate the efficacy of a standardized post-tonsillectomy analgesic protocol that prioritizes opioid-sparing regimens for young children.

Method: A quality improvement project was conducted to standardize postoperative analgesic prescribing after hospital-based tonsillectomy ± adenoidectomy beginning in July 2019. Children 7 to 21 years received weight-based dosing of acetaminophen, ibuprofen, and acetaminophen-hydrocodone. Returns to the system were monitored prospectively. In 2021 a review was conducted of the 18 months before and after analgesic standardization. Opioid prescriptions, volume of narcotic prescribed, and postoperative returns to the system within 30 days were monitored.

Results: Across 2018 to 2020, 4083 cases were performed in the hospital setting. The frequency of opioid prescriptions for tonsillectomy ± adenoidectomy decreased significantly after analgesic standardization, from 38.7% to 24.1% ($P < .001$). For cases in which opioids were prescribed, the average

prescribed volume of the narcotic per kilogram of patient weight also decreased significantly poststandardization, from 7.9 mL/kg to 5.3 mL/kg ($P < .001$). Despite decreased opioid prescription number and volume, no change occurred in the frequency of returns to the system ($P = .42$).

Conclusion: Standardized analgesic protocols effectively reduced the utilization and volume of postoperative opioid prescriptions without a concomitant increase in returns to the system. Use of an opioid-sparing regimen for patients <7 years did not appear to compromise pain management.

Swallowing Assessment of Children Using a Tracheostomy Speaking Valve

Stephen R. Chorney, MD, MPH (Presenter);
Ashley B. Brown, CCC-Scalp; Hussein Jaffal, MD;
Romaine F. Johnson, MD, MPH

Introduction: Speaking valves have an uncertain benefit on swallowing physiology for children with a tracheostomy.

Method: A retrospective cohort study included tracheostomy-dependent children at a tertiary hospital between 2015 and 2020. All tracheostomies were placed under 12 months of age. The primary objective was acceptance of thin consistencies on videofluoroscopic swallowing studies (VFSS) or functional endoscopic evaluation of swallowing (FEES) between children tolerating and not tolerating a speaking valve. Secondary objectives compared Functional Oral Intake Scale (FOIS) rating and Secretion Severity Scores (SSS) among groups.

Results: A total of 55 children with a median age at tracheostomy of 4.5 months (interquartile range [IQR]: 2.3–6.2) were included. A total of 45 children underwent 52 VFSS, and 19 children underwent 19 FEES examinations. During VFSS, 67% were wearing a speaking valve for a median of 5.2 months (IQR: 3.4–11.0). There was no difference in age at tracheostomy ($P = .27$) or at VFSS ($P = .42$) between those wearing and not wearing a speaking valve. Rates of thin consistency penetration (21% vs 33%, $P = .31$), aspiration (7% vs 10%, $P = .73$), or pharyngeal residue (25% vs 40%, $P = .27$) were not different between groups. An FOIS of 3 or higher was identified for 40% of children with a speaking valve compared with 9% without ($P = .01$). During FEES, 47% were wearing a speaking valve for a median of 1.4 months (IQR: 0.3–6.1). There was no difference in age at tracheostomy ($P = .78$) or at FEES ($P = .94$) between groups. Rates of premature spillage (75% vs 63%, $P = .99$), pooling (56% vs 78%, $P = .60$), delayed swallow (57% vs 44%, $P = .99$), penetration (43% vs 33%, $P = .99$), or aspiration (38% vs 11%, $P = .29$) were similar. However, pharyngeal residue (57% vs 0%, $P = .03$) was higher among children wearing a speaking valve during FEES. High SSS rates were not different between groups (33% vs 20%, $P = .51$).

Conclusion: Children tolerating tracheostomy speaking valves had higher FOIS scores but increased thin pharyngeal residue on FEES. Penetration, aspiration, and SSS were not

influenced by speaking valve use, suggesting uncertain physiological benefit of this device.

Understanding Public Perceptions Regarding Cochlear Implant Surgery in Children

Lisa Zhang (Presenter); Andy S. Ding; Deborah X. Xie, MD;
Francis X. Creighton, MD

Introduction: Recent studies demonstrate approximately 40% of eligible pediatric patients undergo cochlear implantation. The goal of this study was to understand public perceptions about pediatric cochlear implantation to identify barriers resulting in this low utilization.

Method: Participants completed a web-based survey ranking pediatric quality-of-life subdomains as well as their willingness to accept a 5% minor complication rate (changes in taste, vertigo) and a 1% major complication rate (infections requiring hospitalization, meningitis, reimplantation, facial paralysis, and cerebrospinal fluid leak) if their child required cochlear implant surgery.

Results: A total of 246 respondents (male 54%, mean age 36 years [range 19–68]) were included. Insurance coverage (27%) and fear of having their child undergo surgery (24%) were selected as top reasons for low utilization. Communication ability was most commonly selected as the most important quality-of-life subdomain (37%). Respondents indicated they were more willing to tolerate higher rates of all minor complications to achieve their highest quality-of-life priority but not for any major complications (both $P < .05$). In terms of predicting actual complication rates, respondents significantly overestimated all major surgical complications (all $P < .0001$) except for rates of postoperative vertigo, which was significantly underestimated ($P = .0023$).

Conclusion: Respondents indicated fear of surgery as a significant reason for low utilization of pediatric cochlear implantation but also significantly overestimated the occurrence of major postoperative complications. We hope our study will help frame discussions about pediatric cochlear implantation with regard to identifying quality-of-life priorities and managing expectations in risk tolerance with patients and their families.

Urgent Adenotonsillectomy in Patients Hospitalized After Outpatient Polysomnography

Marika Mousset (Presenter);
Abdulrahman Althubaiti, MBBS, FRCSC; Natalie Kelly;
Amanda Onwuka, PhD, MPH; Tandy Chiang, MD;
James M. Ruda, MD

Introduction: The role of urgent adenotonsillectomy (T&A) following polysomnography (PSG) in pediatric obstructive sleep apnea (OSA) is not well described in the literature. This study investigates the clinical characteristics, preoperative PSG abnormalities, and postoperative respiratory interventions in children urgently admitted after polysomnography.

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Method: A retrospective cohort study was performed at our tertiary care pediatric hospital examining all children urgently admitted following outpatient PSG from 2010 to 2018. Patients, 1 to 18 years of age, who were urgently admitted following PSG were compared with a control group of patients with severe OSA who had planned elective adenotonsillectomy performed during the same study interval. Demographics, comorbidities, preoperative PSG findings, and postoperative respiratory support requirements were compared between groups.

Results: A total of 30 children were immediately hospitalized following polysomnography. The control group was composed of 547 children. Compared with controls, case patients were predominantly male, younger (median age 2.9 years vs 5.8 years; $P = .001$), and more often had neuromuscular disorders ($P = .0004$), congenital airway obstruction ($P < .0001$), asthma/reactive airway disease ($P < .0001$), and prematurity ($P < .0001$). Similarly, case patients had PSG results with significantly higher median non-rapid eye movement (REM)/REM apnea-hypopnea indices (AHIs; non-REM AHI 38.5 vs 18), peak CO_2 (59.5 vs 50 torr), lower O_2 nadirs (50% vs 77%), higher need for O_2 supplementation ($P < .0001$), and positive-pressure support requirements postoperatively ($P < .001$) including home-going oxygen ($P < .0001$) or positive-pressure support ($P = .02$) than controls did.

Conclusion: In our series, patients receiving T&A following urgent hospitalization post-PSG were younger, had more comorbidities, higher postoperative respiratory requirements, and higher degree of severe OSA than similar patients not admitted after outpatient PSG. In this population, more intense postoperative support may be required given these underlying features.

Using the Craniovertebral Angle to Quantify Intraoperative Ergonomic Risk

Natalie Kelly (Presenter); Marike Mousset; Abdulrahman Althubaiti, MBBS, FRCSC; Amanda Onwuka, PhD, MPH; Tran Bourgeois, MPH; Tendency Chiang, MD

Introduction: Surgical intervention of the oral cavity and oropharynx compels the otolaryngologist to adopt an abnormal neck posture including a forward head position (FHP). This position shifts the center of gravity, using the upper body to drift backward, creating ergonomic risk that can result in pain and limitation in range of motion. We have identified that tonsillectomy places the surgeon at higher ergonomic risk, particularly in the neck and trunk regions. These regions can be objectively quantified by calculating craniovertebral angle (CA). The CA measures FHP, and individuals who consistently maintain CA values outside of mean CA are at risk for neck pain and injury. The aim of our study was to quantify CA during tonsillectomy and validate the interrater reliability of our approach.

Method: A prospective study was conducted by evaluating neck posture during 11 tonsillectomies. Lateral images of the surgeon were captured every minute throughout the procedure in a standardized method. Images were assessed by 3 raters,

measuring the CA, defined as the angle between a horizontal line through C7 vertebrae and another line that passes through C7 and the tragus of the ear. Interrater reliability of CA was evaluated for 3 raters using the kappa statistic. Per prior publications, reports of neck pain are frequent when the CA value was $<50^\circ$; thus, we defined an abnormal posture if the CA was $<50^\circ$.

Results: Average CA during tonsillectomy was 24.9° . The range of values was from 10° to 55° , and 100% of procedures had at least 1 assessment of abnormal posture. The lowest interrater reliability was 0.77 (CI: 0.67, 0.87) and the highest was 0.82 (CI: 0.74, 0.90).

Conclusion: Poor posture during tonsillectomy places otolaryngologists at ergonomic risk. The CA is an important indicator of future neck pain and injury, and a pathologic neck position during tonsillectomy was identified in this study. Given the high interrater reliability of CA, our approach to assessing surgical ergonomics can be used to objectively quantify the effect of intraoperative interventions designed to mitigate ergonomic risk.

Professional and Personal Development

Changes in Otolaryngology Career Preferences During Training

Ryan M. Carey, MD (Presenter); Alyssa M. Civantos; Daniel O. Kraft; Kearney J. James, MD; Michael J. Ruckenstein, MD; Tiffany N. Chao, MD

Introduction: Perspectives on different otolaryngology career options and practice settings may develop over the course of residency.

Method: A cross-sectional survey was distributed to program coordinators at 109 accredited otolaryngology programs for dissemination to residents. Residents were asked to respond to questions on sociodemographic factors, preferred future practice settings (academic hospital, nonacademic hospital, mixed hospital and private practice, solo private, group private), and their impressions of different aspects of clinical practice (autonomy, mastery, and work-life balance). Descriptive statistics and correlations were evaluated and responses were compared between junior (postgraduate year [PGY]1–3) and senior residents (PGY4–5).

Results: A total of 110 residents (53% male) provided responses to the survey, including 71 (64.5%) junior residents and 39 (35.5%) senior residents. Most senior residents were married (62%) compared with about half of junior residents (47%). More senior residents had children compared with junior residents (33% vs 11%, $P = .005$). The most common bracket of student debt for junior and senior residents was \$100,000 to \$250,000 at 37% and 36%, respectively. There was a significant difference in the distribution of practice environments that junior and senior residents expected to work in after training ($P = .01$). The most common anticipated practice settings reported by junior residents were academic (35%), mixed hospital and private practice (27%), and unknown (23%).

Senior residents expected to work in academic (33%), group private (28%), or nonacademic hospital employment settings (15%) most commonly. For all residency years, academic careers were thought to have the least work–life balance and autonomy but most mastery. Group private practices were thought to have the best work–life balance, while solo practices were thought to have the most autonomy.

Conclusion: Otolaryngology career preferences change over the course of training and may be due to evolving perspectives on different practice settings and personal factors.

COVID-19 Pandemic Effect on Otolaryngology Resident Surgical Case Numbers

James Duffy, MD (Presenter); Cristina Cabrera-Muffly, MD; Scott Mann, MD

Introduction: We recognize the impact of the COVID-19 pandemic on ear, nose, and throat (ENT) resident case volume; identify Accreditation Council for Graduate Medical Education (ACGME) key indicator cases most and least affected by the COVID-19 pandemic; and compare how reduction in surgical volume varied at different hospital training sites. We are comparing surgical case numbers from the year prior to the beginning of the COVID-19 pandemic to the year following the onset of the pandemic. This comparison required data gathering through February 2021.

Methods: Retrospective analysis of ACGME surgical case logs for all residents at a large otolaryngology resident program for the time periods of March 2019 to February 2020 and March 2020 to February 2021 was performed. Case log numbers from the 2 time periods were compared and stratified for level of training, training site, and ACGME key indicator procedures.

Results: The total decrease in surgical case numbers from March 2019–February 2020 to March 2020–February 2021 was 46%. Junior residents (postgraduate year [PGY]2/3) had a 28% decrease, while senior residents (PGY4/5) had a 54% decrease. Surgical case numbers decreased at all training sites. The Veteran Affairs Medical Center had the greatest decrease in case volume (69%), while the Children’s Hospital had the smallest decrease (23%). The ACGME key indicator procedures with the largest decrease in case volume were oral cavity resection (62%), stapedectomy/ossiculoplasty (60%), and neck dissection (57%). The key indicator procedures with smallest decrease in case volume were parotidectomy (25%), flaps and grafts (27%), and bronchoscopy (27%).

Conclusion: There was a substantial decrease in ENT resident surgical case volume following the onset of the COVID-19 pandemic, affecting all training sites at our institution.

Female and Low- and Middle-Income Authorship in High-Impact Otolaryngology Journals

Farizeh Ahmed, BMBS (Presenter); Davina Dauduc; Baveena Heerc; Hawa Ali; Joshua P.Wiedermann, MD; Amina Seguya, MBChB, MMed ENT

Introduction: Globally, there is increased advocacy for female and low- and middle-income country (LMIC) representation in medical academia and published medical literature. We set out to examine the prevalence and trends in female first and senior authorship as well as LMIC representation in 3 high-impact otolaryngology journals over the past 10 years.

Method: We reviewed original research articles and reviews from the *Laryngoscope*, *Rhinology*, and *JAMA Otolaryngology–Head and Neck Surgery*. We selected 4 issues per journal for each year between 2010 and 2020 and for all eligible articles recorded: sex of first author, sex of senior author, and first author country of institutional affiliation. Trends in female first and senior authorship as well as changes in LMIC representation were examined and compared both over time and between the journals.

Results: Preliminary analysis of 1444 articles across the 3 journals show 38% of first authors and 23% of senior authors were female. There were small variations in the percentages of female first authorship over the years, ranging from 35% to 42%. This was similar across the journals. Percentages of female senior authorship increased from 20% in 2016 to 32% in 2019. Both first and last female authorship fell below average in 2020 to 35% and 19%, respectively. Of all first authors, 6% were based in LMICs representing 13 countries. Of these, 26% were female. We observed minimal increase in LMIC representation over the years.

Conclusion: The trends observed in this study display significant gender and geographical inequity in high-impact otolaryngological publishing. Despite rising numbers of female otolaryngologists and the explosion of global surgery during the last decade, there remains significant underrepresentation of both these groups. A concerted effort, with a greater focus on diversity and inclusivity, should be made at all levels to address these disparities.

Gender Analysis of the Top Classic Papers in Otolaryngology

Beatrice C. Go (Presenter); Camille C. Go; Natasha Mirza, MD; Eri R. Thaler, MD; Karthik Rajasekaran, MD

Introduction: The aim of this study is to identify and analyze the gender breakdown of first authorship contributing to the most cited papers in the field of otolaryngology, with a goal toward identifying a gender gap in otolaryngology publishing.

Method: The top 50 most-cited papers were identified using Science Citation Index of the Institute for Scientific Information. Institution, journal, date of publication, research nature, and subspecialty were extracted for each article. Among the first authors, gender; h-index; percentage of first, last, and corresponding authorship positions; total publications; and citations were analyzed.

Results: Most papers were in the English language, from the United States, of a clinical nature, and on otologic topics. Some 84% of papers had men who were first authors, although there was no difference in h-index score, authorship position, and number of publications between men and women first

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authors. Women first authors had significantly more citations ($P = .02$) and average citations/year ($P = .04$) compared with their colleagues. There was a higher percentage of women first authors in articles published after 2005 compared with before 2005, but difference was not ultimately significant (10.3% vs 36.4%, $P = .06$).

Conclusion: Women otolaryngologists continue to be underrepresented in first authorship roles of high-powered articles, and future initiatives to promote academic productivity and inclusivity should be considered.

Mentorship and Research for Medical Students Within the Private Practice

Vincent Honrubia, MD (Presenter); Arianna V. Ramirez; Maulay Ojeaga; Victor Espinoza; Alexis Garza; Blake Hensler, PA-C

Introduction: Traditionally, medical students pursuing otolaryngology are encouraged to seek mentorship within their home institution. This notion, however, does not account for those without a home program. Such issues have only been amplified with the COVID-19 pandemic greatly limiting the opportunity to conduct away rotations. Private clinics may serve as a potential solution. By acting as mentors and primary investigators, private practice physicians may help medical students increase their research and clinical experiences while simultaneously getting assistance to conduct and publish research.

Method: In 2015 our private practice recruited undergraduate and medical students interested in pursuing a career in otolaryngology, in which some students came from institutions without an established otolaryngology department. Students actively participated in the research process from collecting data to helping publish projects. In addition, students were able to shadow regularly and gain clinical experience. The students' research experiences were compared with that of students accepted to otolaryngology residencies.

Results: Over the span of 6 years, students have been able to publish 2 journal manuscripts, 10 posters, and 3 oral presentations at national meetings within our practice. The current students average 12.7 publications, presentations, or abstracts and 8 research experiences. This is comparable to the 2020 Charting Outcomes in the Match data, with students matching into otolaryngology residency averaging 6.1 research experiences and 13 publications, posters, or presentations. An average of 67% of the students' publications was conducted in the private practice setting.

Conclusion: For students with limited access to an academic center, private clinics may serve as a hub for research and mentorship. In the same vein, clinicians who oversee such students may gain added help from students that are not often found in private practices. This mutualistic relationship may serve in advancing evidence-based clinical practice while amplifying the diverse voices of students otherwise seldom heard.

National Examination of Experiences With Pregnancy During Otolaryngology Residency

Eve P. Champaloux, MD, PhD (Presenter); Anne Starks Acosta; Tanya K. Meyer, MD; Regan Bergmark

Introduction: Little literature exists about the rigors of childbearing during otolaryngology residency. Woman otolaryngologists have the unfortunate distinction of the highest infertility rate (29%) among all surgical specialties, almost triple the national average. In addition, they delay having their first child until after residency training more than any other surgical specialty. Pregnancy is a normal part of many physician life cycles but has often been met with challenges, some of which are unique to the field of otolaryngology and significantly more pronounced during residency training. In an attempt to further promote childbearing physicians in academic medicine, this study was designed to better understand how childbearing residents can be supported during this important life event while enduring surgical training. Understanding and accounting for these challenges is an important first step to encouraging childbearing otolaryngology residents to stay in the field of academic medicine, increasing the diversity at the highest levels of the field.

Method: This qualitative research was Institutional Review Board exempt. Fifteen current and former otolaryngology residents who have experienced pregnancy and childbirth during residency in the past 10 years were recruited to participate in individual structured qualitative interviews using networking to identify participants from a variety of geographically disparate training programs.

Results: Multiple recurring themes were identified among the participants. The findings were categorized into issues relating to program culture, pregnancy itself, parental leave, transition back to clinic work, and policies and scheduling.

Conclusion: Overall childbearing otolaryngology residents experienced healthy pregnancies and postpartum periods with minimal perceived disruption to clinic productivity and minimal disruption to their peers. Issues surrounding childcare and breast-feeding were sometimes very challenging to manage as a resident. There are multiple areas that programs can proactively address to make childbearing during residency more accessible.

Predictive Value of Pre-residency Research Activity on Resident Academic Potential

Linda X. Yin, MD (Presenter); Dominic J. Catalano, MD; Susan E. Bisco; Christine M. Lohse, MS; Matthew L. Carlson, MD; Janalee K. Stokken, MD

Introduction: Otolaryngology residency is highly competitive in the United States, and the applicant publication record is often used by program directors to estimate academic potential after match. However, the predictive value of pre-residency research activity on an applicant's future research productivity and career aspirations remains largely unknown.

Method: This was a retrospective review of otolaryngology applications submitted to the authors' residency program in 2014. Publication potential during residency was investigated by searching for all PubMed indexed publications between July 1, 2015, and June 30, 2020. Post-residency career paths were examined by 2 investigators (L.X.Y., D.J.C.) using Google searches with an emphasis on program websites, Doximity, and LinkedIn profiles. Associations with publication potential and post-residency positions were evaluated with Spearman rank correlation coefficients and Kruskal-Wallis, Wilcoxon rank-sum, and chi-square tests.

Results: Of 321 applicants, 226 (70%) matched, and 205 (64%) had completed residency by 2020. Matched residents published a median of 4 (range: 0–41) manuscripts during residency. The number of pre-residency publications did not significantly correlate with publication potential during residency. Asian race ($P = .002$) and residency programs in the northeast and west coast ($P < .001$) had the strongest associations with publication potential. Similarly, the numbers of pre-residency publications and presentations were not predictive of fellowship training after residency. Of the 205 graduates, 118 (58%) pursued fellowship, 71 (35%) pursued private practice, and 16 (8%) held academic general otolaryngology positions. Female sex was significantly associated with pursuing fellowship training ($P = .002$).

Conclusion: Pre-residency research activity is not predictive of publication potential during residency or propensity for post-residency fellowship training. The research activity of applicants should not be used during the selection process to predict publication potential during residency or likelihood to pursue fellowship training.

Pregnancy and Fertility Trends Among Female Otolaryngologists

Debbie A. Aizenberg, MD (Presenter); Makenzie Huguette; Angela M. Beliveau, MPH, CCRP; Sandra Taylor, PhD



Introduction: As the number of women entering the field of otolaryngology grows, so should discussions and awareness of the unique challenges that these women face with pregnancy, fertility, and juggling their career and familial aspirations. We sought to determine childbearing patterns and decision making among female otolaryngologists and compare them with the general population.

Method: A survey was sent out in 2020 to female otolaryngologists identified through their membership with the American Academy of Otolaryngology–Head and Neck Surgery. Data concerning fertility and childbearing history, reflections regarding decision making, perceptions of workplace support, and estimations of objective childbearing potential were analyzed.

Results: There were 398 responses. Most respondents were parents ($n = 288$, 72.4%) and had biologic children ($n = 284$, 71.4%), with an average of 1.96 children. Average age at medical school graduation was 27.0 years and 32.8 years at

completion of training. The mean age at first pregnancy was 32.3. Almost one-third of respondents who attempted to conceive ($n = 100$, 30.4%) were diagnosed with infertility. Among those with infertility, more than half ($n = 55$, 55.0%) were “very much” or “quite a bit” surprised by their diagnosis. Of the women with infertility, when asked what they would do differently in retrospect, most respondents ($n = 65$, 65.0%) would have attempted conception earlier, 41 respondents (41.0%) would have used cryopreservation to extend fertility, and 14 (14.0%) would have gone into a different specialty. Of those whose had their first pregnancy during training, 52.6% reported having substantial workplace support compared with 69.1% of those whose first pregnancies followed completion of training.

Conclusion: Women otolaryngologists have children later in life, and a substantial proportion have faced infertility or have regrets about family-planning decisions and career decision making. Balancing an otolaryngology career with motherhood poses unique challenges. Increased awareness, further investigation, and targeted programs are needed to support the growing number of female otolaryngologists who desire both a career and a family.

Recent Trends in Residency Applicants Among OTO-HNS and Peer Specialities

Parsa P. Salehi, MD (Presenter); Alexandra T. Bourdillon; Pauniz Salehi; Benjamin L. Judson, MD; Babak Azzizadeh, MD; Yan Lee, MD

Introduction: The COVID-19 pandemic has affected all areas of medicine, including the residency application and selection process. Highly “competitive” and smaller specialties may be more sensitive to small shifts in application patterns. Hence, we explore the recent trends in residency application to otolaryngology–head and neck surgery (OTO-HNS) and peers specialties, to illustrate what effect, if any, the COVID epidemic has had on the field.

Method: Applicant and residency statistics from Electronic Residency Application Service (ERAS) and National Residency Matching Program (NRMP) were extracted from the 2016 to 2021 residency matches. Trends in OTO-HNS were compared with peer specialties, including integrated plastic surgery, neurosurgery, orthopedic surgery, general surgery, dermatology, and integrated interventional radiology.

Results: Compared with peer specialties, OTO-HNS had the greatest increase in number of US MD applicants from 2016 to 2021 (46% vs 4%–38% increase). Over the course of this time, the number of spots across the disciplines increased from 6.3% to 19.8%, with OTO-HNS at 15.1%. From 2020 to 2021, OTO-HNS and plastic surgery saw 12.7% and 12.5% increases in applicants, respectively, while neurosurgery applicants decreased 1.8% and other specialties ranged from 3.9% to 10.0%. From 2020 to 2021, the average number of applications per applicant increased from 73.7 to 77.7 (5%), while the average number of applications received per program increased from 295 to 345 (17%).

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Conclusion: Despite the COVID-19 pandemic, trends in residency application data illustrate continued increasing demand for OTO-HNS spots among students. Our findings parallel the trend observed in recent years of increasing total applicants, applications per program, and applications per applicant among medical students applying to OTO-HNS and peer specialties. Understanding these trends may be helpful in improving the residency selection and application process.

Resident Burnout in Otolaryngology and Surgical Specialties: Strategies for Change

Parsa P. Salehi, MD (Presenter); Hemali Shah; Sina Torabi; Benjamin L. Judson, MD; Babak Azizzadeh, MD; Yan Lee, MD

Introduction: Among otolaryngology—head and neck surgery (OTO-HNS) residents, we examine the prevalence of burnout, highlight factors that impact burnout and well-being (WB), and identify initiatives to address burnout and WB. We compare results with other surgical subspecialties (orthopedics, plastics, neurosurgery, and urology).

Method: A systematic literature review from 2003 to 2020 on burnout, distress, wellness, WB, and quality of life was performed using Ovid Medline and Embase. Of the 750 manuscripts screened, 81 articles met inclusion criteria.

Results: Moderate to high burnout was found in 35% to 86% of OTO-HNS residents. Among other subspecialties, burnout ranged between 29% and 66% in plastics, 30% and 67% in neurosurgery, 39% and 68% in urology, and 34% and 56% in orthopedics. Highest burnout rates were seen in postgraduate year 2s. Factors significantly associated with burnout included hours worked (>80 h/wk), lack of schedule flexibility, level of autonomy, exercise, and program support. Resident work hours have steadily increased: 8% of OTO-HNS residents in 2005 vs 26% in 2019 reported averaging >80 h/wk. Practical implications of burnout include decreased empathy, professional distress, poor health, sleep deprivation, decreased quality of life, increased attrition, decreased desire to pursue academic medicine, and increased likelihood to commit medical errors. Structured mentorship programs, initiatives promoting physical activity, and mindfulness didactics have been associated with lower burnout rates and improvements in WB across subspecialties.

Conclusion: Addressing burnout, prevalent in OTO-HNS residents, is critical to improving patient care and physician WB. Surgical subspecialties may learn from each other how to effectively address burnout through institutional interventions to promote WB.

Supporting the Mission: Research Resources and Productivity in Academic Otolaryngology

Nina W. Zhao, MD (Presenter); Fatma Genc; Christopher D. Dwyer; Steven Stockton; VyVy N. Young, MD; Clark A. Rosen, MD

Introduction: Research is a key mission for many academic otolaryngology—head and neck surgery (OHNS) departments, but how departments can best foster scholarly productivity

remains uncertain. We aimed to investigate the patterns and perceptions of research resources among OHNS faculty and to correlate these to research productivity via h-indices.

Method: We conducted a national cross-sectional survey of academic OHNS faculty from April to May 2020. Chairs and program directors of 132 OHNS departments were contacted to distribute the survey to their faculty. Survey questions focused on individuals' access to research resources (eg, amount of dedicated research time, statistical support, conference funding), followed by attitudes and barriers surrounding research activities. H-indices were calculated using Web of Science. Statistical analysis included Pearson correlations to examine relationships between variables.

Results: A total of 71 OHNS faculty (27 assistant, 21 associate, and 23 full professors) from 32 institutions responded. The mean h-index was 11.2 ± 9.3 (range 0–44). The average percentage of protected research and clinical time per week was $7.2\% \pm 9.6\%$ (range 0–40) and $69.3\% \pm 6.4\%$ (range 20–90), respectively. While there was a positive correlation between increasing h-index and research time ($r = 0.32$, $P < .01$), there was a negative correlation with clinical time ($r = -0.41$, $P < .01$). The most cited research obstacles were a high clinical burden (70.4%), lack of time (66.2%), and lack of resources (39.4%). The most common departmental resources were conference funding (75%), research coordinators (52%), and statistical support (32%). Only 19 (26.8%) respondents were very or extremely satisfied with their academic support.

Conclusion: Time remains a significant barrier in scholarly productivity. In the setting of busy clinical practices, there is an apparent gap between what academic otolaryngologists cite as obstacles to research productivity and the nature of their departmental support. Departments may need to emphasize academic time or consider novel methods to help faculty to be academically productive.

Rhinology/Allergy

Cellular Reactions in Allergic Provocation—Testing Visualized by Confocal Laser Endomicroscopy

Nina K. Wenda, MD (Presenter); Christop Striedter; Ralf Kiesslich; Jan Gosepath

Introduction: Reactions occurring in allergic rhinitis have been intensively studied, especially on an immunological level. We used endonasal probe-based confocal laser endomicroscopy to visualize acute effects of allergic nasal provocation testing and to evaluate a potential value of this methodology in quantifying the clinical response.

Method: We examined 20 patients with known inhalant allergies against housedust mite or grass pollen. After mapping and documenting the normal mucosa of the inferior turbinate, nasal provocation was performed and effects were observed using probe-based confocal laser endomicroscopy under endoscopic vision. With intravenous fluorescein used as contrast agent, the occurring reactions were observed over a period of 10 minutes. We established criteria of cellular events



in correlation to clinical symptoms over time to develop a morphological grading of the occurring provocation induced response.

Results: Visualization of endonasal mucosa as well as its alterations occurring after allergen challenge in acute allergic rhinitis was well feasible using confocal laser endomicroscopy. Reactions included vascular dilation as well as widespread loss of cellular junctions and loss of cellular integrity. The onset of detectable changes as well as number and extent of cellular alterations reproducibly correlated with the severity of symptoms and allowed for establishing a grading system for the allergic response over time.

Conclusion: Endonasal confocal laser endomicroscopy is a promising method for real-time in vivo investigation of mucosal allergic patterns on a cellular level. The results of this study suggest that it might be useful to clinicians to add a visual grading of the individual intensity of clinical response in nasal provocation testing and highlight interindividual variations within this well-established diagnostic tool.

Comparison of Steroid Regimens in Management of CRSsNP

Hector A. Perez, MD (Presenter); Ethan Miles; Christopher Vuong; Christopher Church; Kristin Seiberling

Introduction: Topical nasal steroids and oral antibiotics are a mainstay in treatment of patients with chronic rhinosinusitis without nasal polyps (CRSsNP) and chronic rhinosinusitis with nasal polyps (CRSwNP). Oral steroids are commonly given for both of these variants; however, their role in CRSsNP is less well delineated. The purpose of this research study is to determine if there is a role for oral steroids in patients who have CRSsNP and compare their impact in patients who receive only antibiotic therapy.

Method: This is a prospective randomized trial with patients divided into 3 different arms. The treatment arms consisted of amoxicillin clavulanate with steroid nasal spray (group 1); amoxicillin clavulanate, steroid nasal spray, with a 6-day prednisone course (group 2); and amoxicillin clavulanate, steroid nasal spray, with a 20-day prednisone course (group 3). Patients presenting to an outpatient rhinology clinic with history of CRS with Lund-Mackay scores of 6 or greater and no evidence of polyps on nasal endoscopy were enrolled in the study and randomized. Sinonasal Outcome Test-22 (SNOT-22) questionnaires were administered on the day of enrollment. SNOT-22 questionnaires, computed tomography scans, and nasal endoscopy were repeated at the 4-week follow-up visit.

Results: A total of 33 patients were enrolled as part of the study. SNOT-22, Lund-Mackay, and Lund-Kennedy groups were not significantly different in the pretreatment analysis of the 3 groups (P value .62, .72, .57). After the 4 weeks of treatment, SNOT-22 score averages among the 3 groups decreased from 46.6, 49.8, and 41.3 to 40.3, 32.2, and 29.4, respectively, for groups 1, 2, and 3; however, no changes were considered statistically significant between groups (P value .52). Lund-Mackay scores were significantly decreased in group 2, with a mean decrease of 1.7 points (P value .07). There was no

significant difference in the posttreatment Lund-Mackay score (P value .98) or in the percentage of patients requiring sinus surgery within 1 year of study enrollment (P value .82).

Conclusion: In adults with CRSsNP, the cohorts of patients who had the addition of oral steroids had the greatest reported symptomatic improvement, with no appreciated difference between a 6-day and a 20-day steroid course.

Effect of p16 Status on Survival Outcomes in Sinonasal Squamous Cell Carcinoma

Aarti Agarwal, MD (Presenter); Gurston Nyquist, MD; Ramez Philips, MD; Chandala Chitguppi, MD; Marc R. Rosen, MD; Mindy R. Rabinowitz, MD

Introduction: We analyze the effect of p16 positivity on recurrence patterns, disease-free survival (DFS), and overall survival (OS) in sinonasal mass (SNM); elucidate the role of p16 status on survival for sinonasal squamous cell carcinoma (SCC); and examine the role of p16 in treatment for sinonasal malignancy. This is an analysis on the effect of p16 positivity on recurrence patterns, disease-free survival (DFS), and overall survival (OS) in SNM.

Methods: Retrospective chart review was conducted at a tertiary care center. Patients with sinonasal SCC treated with curative intent from 2012 to 2018 were identified. The independent variable of interest was p16 status, which was assessed using immunohistochemistry with a 70% staining cutoff for positivity. Kaplan-Meier survival curve was plotted to assess correlation between p16 status and DFS and OS. The association between recurrence patterns and p16 status was conducted using chi-square and Fisher exact tests. Multivariable Cox proportional hazard analysis was conducted to assess the association between independent variables and DFS.

Results: A total of 55 patients with sinonasal SCC met inclusion criteria. Patients were p16 positive in 32 of 55 (58%) of cases. Kaplan-Meier survival curve revealed no statistically significant association between p16 status and DFS or OS survival ($P = .402$, $P = .416$). There was no difference in recurrence patterns in patients with p16-positive vs -negative tumors.

Conclusion: p16 status did not have prognostic value on DFS and OS in our cohort of patients with sinonasal SCC undergoing treatment with curative intent. There was no difference in recurrence patterns between the 2 populations. Based on the results of this study, p16 status should not affect counseling of patients as it relates to their prognosis from SNM.

The Impact of Biologics on Sinonasal Outcomes in Patients Treated for AERD

Glen D'Souza, MD (Presenter); Elina Toskala, MD; Mindy R. Rabinowitz, MD; Gurston Nyquist, MD; Marc Rosen, MD; Jessica Most, MD

Introduction: We recognize demographic factors predictive of treatment failure in aspirin-exacerbated respiratory disease (AERD); analyze the impact of sinonasal and asthma variables

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on treatment failure in AERD; and demonstrate the complexity of managing patients with AERD. As biologics have only recently been approved for use in polyps, the study needed more follow-up data to be robust.

Methods: This is a retrospective chart review conducted at a tertiary care hospital between 2011 to 2021 by performing a search through the electronic medical record for patients with an ICD code diagnosis of 2 out of 3 AERD criteria: asthma, aspirin, and nonsteroidal anti-inflammatory drug sensitivity and sinonasal polyposis. This was followed by a manual chart review to include patients with all 3 criteria. They were grouped into patients whose symptoms were adequately managed by single treatment modality (group A) or needed change in treatment modality (group B). Demographic data were analyzed.

Results: Of the 72 (N) patients in the study, 36% (26) required change in treatment modality. The mean age and body mass index were 44.48 years (SD 15.11, range 18.9 to 73.24 [group A vs group B, 46.82 vs 41.17 years, $P = .16$] and 29.83 (SD 7.99, range 18.9 to 56.29 [group A vs group B, 58 vs 30.29, $P = .72$]), respectively. Overall, 65% were women, with no significant gender differences between the groups (group A vs group B = 68% vs 58%, $P = .26$). While 58% of the population was Caucasian, a significantly higher number of African Americans required change in treatment modality (group A vs group B [24% vs 50%, $P = .043$]), 61.5% (16) changed from AD to B, of which 44% (7) had their symptoms controlled by a single biologic agent while 56% required more than 1 change in biologic agent.

Conclusion: Racial factors may play a role in predicting adequate management of AERD as shown by our study, while the role played by other demographic factors may not be statistically significant. The role of sinonasal and asthma variables in predicting response to therapy is being studied.

Inflammatory Cytokine Signature in Allergic Fungal Sinusitis

William C. Scott, MD (Presenter); Katherine Hill, MD; Rakesh Chandra, MD; Naweed Chowdhury, MD; Justin H. Turner, MD, PhD

Introduction: Allergic fungal sinusitis (AFS) is a clinically challenging subtype of chronic rhinosinusitis with nasal polyps (CRSwNP). Although most CRSwNP is associated with primarily type 2 inflammation, the inflammatory signature of AFS specifically has not been well characterized.

Method: During endoscopic sinus surgery, mucus was collected from 109 patients with CRSwNP, 25 patients with AFS, and 63 non-CRS controls. Seventeen inflammatory mediators and cytokines were measured from these samples. The patterns of inflammatory marker expression were compared between groups. Markers of disease severity including preoperative Sinonasal Outcome Test–22 (SNOT-22) scores, number of prior surgeries, and radiographic Lund-McKay scores were also collected for both groups.

Results: Both AFS and CRSwNP were distinguished from non-CRS controls by significantly elevated levels of interleukin (IL)–5, IL-6, IL-7, IL-8, IL-13, and tumor necrosis

factor- α . AFS could be distinguished from CRSwNP by elevated levels of IL-5 ($P = .002$), IL-6 ($P = .01$), IL-9 ($P = .01$), and IL-13 ($P < .001$). When compared with CRSwNP, patients with AFS had higher Lund-McKay scores ($P < .001$) and a higher average number of prior surgeries ($P = .005$) but had lower preoperative SNOT-22 scores, although this result was not statistically significant.

Conclusion: AFS and CRSwNP were found to have a predominantly type 2 inflammatory signature, consistent with their eosinophilic presentation. AFS was characterized by an even more marked elevation in type 2 cytokines when compared with CRSwNP. Better defining the inflammatory signature of AFS will help us better understand its pathophysiology and may help elucidate the role for biologic medications in managing this disease.

Sleep Medicine

Adult OSA Patients With Skeletal Hypoplasia: Expansion Followed by Advancement

Mohamed Abdelwahab (Presenter); Audrey Yoon; Allen Huang; Courtney Chou; Sasikarn Poomkonsarn; Stanley Liu

Introduction: While maxillomandibular advancement (MMA) has been proposed for patients with OSA and facial skeletal deficiency, no distinguishment was previously made between those with transverse vs anteroposterior (AP) hypoplasia. Subjects who present with both dimensions of deficiency will require both maxillary expansion and MMA. In particular, adults with narrow and high-arched maxilla undergo distraction osteogenesis for maxillary expansion (DOME) in the updated Stanford Sleep Surgery protocol. Some of these subjects will then need MMA.

Method: This is a retrospective study of subjects with maxillary transverse deficiency and retrusive facial skeleton with moderate to severe OSA presenting to a tertiary referral center from 2015 to 2019. This is the first description of subjects undergoing sequential management of transverse and anteroposterior deficiency by DOME followed by MMA. The outcome measures were Nasal Obstruction Symptom Evaluation (NOSE) scores, apnea-hypopnea indices (AHI), and the Epworth Sleepiness Scale (ESS).

Results: A total of 26 subjects completed DOME followed by MMA, with 5 females, mean age of 33 years old, and body mass index of 28.5. Mean ESS reduced significantly from 10.29 to 6.21 ($P = .003$), mean AHI reduced significantly from 35.2 to 11.2 ($P = .01$), and the NOSE scores reduced significantly from 12.47 to 4.14 ($P = .001$).

Conclusion: In this cohort, we describe the results of patients with OSA who present with maxillary hypoplasia, in both the transverse and AP dimensions. Objective and subjective outcomes improved significantly. The exact protocol will be described in detail.

Antibiotic Prescription in Multilevel Sleep Surgery

Mohamed Abdelwahab (Presenter); Sandro Marques; Isolde Previdelli; Robson Passo, MD

Introduction: Multilevel anatomical obstruction is prevalent among subjects with obstructive sleep apnea (OSA), reported in 90% of the cases. Therefore, multilevel surgery was proposed in the early 1990s as a concept for addressing multiple sites simultaneously; however, complication rates were reported to be higher. In an effort to minimize these rates, we evaluate the effect of antibiotic prescription and other variables on various complications.

Method: This is a retrospective study of a national database (Truven MarketSn) of subjects with health insurance from January 2007 to December 2015. Subjects with a diagnosis of OSA and uvulopalatopharyngoplasty (UPPP) codes were included. Subjects were stratified to single vs different multilevel surgeries. Other variables included were smoking, age, sex, antibiotic prescription, other comorbidities as based on the Elixhauser Index. Outcomes were postoperative bleeding, intubation, pneumonia, superficial surgical site infection (SSI), tracheostomy, and hospital readmission. A multivariate regression model was created for each complication.

Results: A total of 5,798,530 subjects had a diagnosis of OSA, 39,916 had a UPPP >18 years either alone or with additional procedures. Mean age was 43 years, with 73.4% males. Antibiotic prescription was associated with less bleeding in UPPP alone, UPPP with nasal surgery, and UPPP with nasal/tongue surgery and less SSI, pneumonia, tracheostomy, intubation, and hospital readmission. On the multivariate model, antibiotic prescription was associated with fewer complications significantly.

Conclusion: Although former studies recommended against antibiotics after tonsillectomy, there is not much with regard to UPPP. Our results showed that antibiotic prescription after UPPP for OSA was associated with less bleeding, SSI, pneumonia, intubation, tracheostomy, and hospital readmission rates in the 30-day postoperative period. Other variables affecting each complication were also reported.

Bilateral vs Unilateral Hypoglossal Nerve Stimulation in OSA Patients

Clemens Heiser, MD, PhD (Presenter); Daniel Jira, MD; Ulrich Sommer, MD; Madeline Ravesloot, MD, PhD; Nico de Vries, MD, PhD; Olivier Vanderveken, MD



Introduction: Bilateral hypoglossal nerve stimulation (biHNS) is a novel therapy for patients with obstructive sleep apnea (OSA). The aim of this study was to analyze the clinical outcome of the first 10 biHNS patients vs the first 10 unilateral HNS patients with moderate to severe OSA.

Method: The first 10 patients in 2020 who received a biHNS device (Genio System, Nyxoah, Belgium) and the first 10 patients in 2014 who received a uniHNS (Inspire II, Inspire Medical Systems, Minneapolis, Minnesota, USA) were included. Treatment outcome was evaluated at 3 months after

surgery. Data collection included demographics, body mass index (BMI), apnea hypopnea index (AHI), oxygen saturation and desaturation index, Epworth Sleepiness Score (ESS), adverse events, and adherence to therapy. Sher criteria were used to evaluate treatment response.

Results: The mean age was 51.3 ± 9.74 years (biHNS) and 61.3 ± 13.2 years (uniHNS), with all patients being male. The mean BMI was 28.5 ± 2.3 kg/m² (biHNS) and 26.7 ± 3.4 kg/m² (uniHNS). The mean preimplantation AHI in both groups (biHNS: 34.5 ± 13.4 /h, uniHNS: 31.5 ± 12.3 /h) could be reduced (biHNS: 14.9 ± 5.1 /h; uniHNS: 17.1 ± 18.9 /h) after 3 months ($P < .001$). The mean preimplantation ESS (biHNS: 16.5 ± 5.2 , uniHNS: 13.0 ± 5.7 /h) could be reduced to (biHNS: 7.1 ± 2.2 ; uniHNS: 5.5 ± 3.2) after 3 months ($P < .001$). Serious adverse events during the surgical procedure or postoperative course did not occur in both groups. Therapy adherence was a usage of 6.2 h/night in biHNS and 6.6 h/night in uniHNS after 6 months.

Conclusion: Bilateral hypoglossal nerve stimulation seems to be as safe and effective as unilateral hypoglossal nerve stimulation. Furthermore, it could be successfully implemented in the routine clinical management of OSA patients.

Distinct Phenotypes of Oropharyngeal Obstruction on Adult DISE

Lee Porterfield (Presenter); Bartholomew J. Bak, MD, PhD; Martha Luitje, MD; Sveta Karelsky, MD

Introduction: Current interpretations of drug-induced sleep endoscopy (DISE) in obstructive sleep apnea (OSA) do not differentiate between obstruction by palatine tonsil tissue (2T) and the muscular lateral pharyngeal wall (2LPW) at the level of the oropharynx. We aim to examine whether these obstruction patterns represent distinct patient groups and airway phenotypes.

Method: A retrospective chart review was conducted of adult patients who underwent DISE with dexmedetomidine between 2016 and 2020 at our institution. Video recordings were retrospectively and blindly scored by a single attending otolaryngologist. The velum, oropharynx, tongue base, epiglottis (VOTE) classification system was used with 2T and 2LPW modifiers to describe the pattern of oropharyngeal obstruction. Demographics, comorbidities, surgical history, and polysomnogram results were collected from the electronic medical record.

Results: Subjects with 2T (n = 34) vs 2LPW (n = 49) obstruction were younger (34.7 ± 10.9 vs 52.2 ± 12.6 years, $P < .001$) and had a smaller neck circumferences (15.9 ± 1.5 vs 16.8 ± 1.3 in., $P = .022$). Mean body mass index was comparable between the 2T and 2LPW groups (29.0 ± 3.3 vs 29.8 ± 3.3 , $P = .266$). Mean apnea hypopnea index was lower in 2T subjects but failed to demonstrate significance (25.4 ± 23.3 vs 33.7 ± 22.8 , $P = .109$). However, 2T subjects had a lower obstructive hypopnea index (12.0 ± 11.6 vs 20.1 ± 14.3 , $P = .012$). The presence of complete circumferential velum collapse positively correlated with 2LPW ($P < .001$), and its

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absence correlated with 2T ($P < .001$). Absence of tongue base and epiglottic obstruction positively correlated with 2T and 2LPW obstruction ($P < .001$).

Conclusion: Adult OSA patients with 2T and 2LPW DISE findings may represent anatomically and demographically distinct groups among those with significant oropharyngeal obstruction. Those with 2T trend toward less severe OSA than their counterparts with true lateral pharyngeal wall obstruction. Further classification into 2T and 2LPW phenotypes on grading systems such as VOTE may be warranted. Implications for treatment, such as with tonsillectomy, should also be examined.

Evaluation of Persistent Pediatric OSA: Sleep Endoscopy and Cine MRI

Carol Li (Presenter); Yann-Fuu Kou; Michael DeMarntonio; Christine Heubi; David Smith, MD, PhD; Stacey Ishman, MD, MPH

Introduction: Cine magnetic resonance imaging (MRI) and drug-induced sleep endoscopy (DISE) are performed to identify sites of obstruction in children with refractory obstructive sleep apnea (OSA). This study describes and compares findings of same-day cine MRI and DISE in children with OSA following adenotonsillectomy.

Method: Procedure and polysomnography reports were reviewed for consecutive children who underwent cine MRI and DISE between 2015 and 2020. Cohen's kappa coefficients were calculated to evaluate the agreement between cine MRI and DISE for obstruction at the level of the adenoids, lingual tonsils, and tongue base.

Results: We included 135 patients, mean age 10.5 years, 36% female, 55% with Down syndrome. The median apnea-hypopnea index was 12.3 events/h. The most common obstructive sites on DISE were the tongue base (86.7%), velum (78.4%), inferior turbinates (68.2%), lingual tonsils (60.7%), and adenoids (32.6%). The most common obstructive sites on cine MRI were the hypopharynx (54.9%), tongue base (45.5%), adenoids (29.3%), and lingual tonsils (21.5%). DISE and cine MRI identified >1 site of obstruction in 95% and 48% of children, respectively. There was moderate agreement between cine MRI and DISE in the evaluation of adenoid obstruction ($k = 0.51$; 95% CI, 0.34–0.68) and poor agreement in the evaluation of lingual tonsil hypertrophy ($k = 0.14$; 95% CI, 0.02–0.26) and tongue base obstruction ($k = 0.09$; 95% CI, –0.02 to 0.20).

Conclusion: DISE and cine MRI had moderate agreement for adenoid obstruction but not for tongue base or lingual tonsil obstruction. DISE reported higher rates of obstruction at the tongue base and lingual tonsils compared with MRI. Additional investigation of the accuracy, advantages, and pitfalls of both diagnostic modalities is under way.

Hypoglossal Nerve Stimulator Usage Patterns

Elliot C. Morse, MD (Presenter); Maria Suurna

Introduction: Hypoglossal nerve stimulators (HGNS) are increasingly popular and have been shown to be effective for

obstructive sleep apnea (OSA), but little is about the details of patient HGNS usage, including number of nights used, hours per night, and therapy pauses per night. In addition, there are no data correlating patient-related factors with these usage parameters.

Method: Patients with OSA with HGNS implanted at a single center by a single surgeon August 2016 to December 2018 were included. Patients with data in the Inspire Cloud were included. Patient data were obtained from a prospective database maintained by the surgeon. Usage data were obtained from HGNS cloud download, including nights used, hours per night, and pauses per night. Patient and usage data were summarized as means with standard deviations. Age, preoperative apnea hypopnea index (AHI), preoperative Epworth Sleepiness Scale (ESS), and voltage settings were associated with usage parameters via analysis of variance (ANOVA).

Results: Overall, 30 patients were included in analysis. All patients were males. Mean age was 56 years (standard deviation [SD] = 12). Mean preimplant AHI was 41.3 (SD = 17.5). Overall, the mean usage was 474 (SD = 333)/548 (SD = 339) of nights (82%, SD = 17%), and of nights used, the mean hours per night were 5.5 (SD = 1.7). Mean therapy pauses per night was 1.0 (SD = 1.7). There was no association of age, AHI, ESS, and voltage settings with usage parameters on ANOVA analysis.

Conclusion: In this study, we describe HGNS usage patterns with more granular detail than previously reported. We found an overall high rate of HGNS usage in this sample in terms of nights used, hours per night, and pauses per night. We found that age, preoperative AHI, preoperative ESS, and voltage settings were not associated with any usage parameters. Unlike as seen in continuous positive airway pressure users, higher symptom burden measured by ESS was not associated with increased HGNS usage. This may be due to the overall high rates of usage seen in this study population. Interventions targeting populations with inferior usage patterns would help to further improve usage and improve HGNS efficacy.

Identifying Patient Characteristics That Predict Drug-Induced Sleep Endoscopy (DISE) Anatomy

Thomas Z. Gao (Presenter); Xueliang Pan, PhD; Eugene Chio, MD

Introduction: We examined whether the patient characteristics of age, sex, body mass index (BMI), neck circumference, or apnea-hypopnea index can predict if a patient will or will not demonstrate velopharyngeal complete circumferential collapse (VCCC) on drug-induced sleep endoscopy (DISE). Our predictive model may provide preliminary insight into therapy options for patients and physicians and challenge the qualification criteria for CN XII stimulation therapy.

Method: We conducted a single-center retrospective review at The Ohio State University Wexner Medical Center of 289 DISE patients between March 2014 and June 2020. Patient characteristics and DISE information were summarized: mean and standard deviation for continuous variables and count and percentage for categorical. CCC and patient characteristic associations were explored: 2-sample t test for continuous

variables and chi-square test for categorical. Classification and regression tree (RT) analysis with 3-fold cross-validation was used to search for the best predictor of the CCC.

Results: BMI and neck circumference were correlated to VCCC, with BMI more strongly correlated. The area under the curve (AUC) for BMI was about 0.7 for males and females (AUC >0.7 is acceptable). RT analysis for males showed a BMI ≤ 34.8 kg/m² was associated with an 89.4% chance of not demonstrating VCCC vs 48% for a BMI >34.8 (AUC = 0.705). For females, the RT analysis showed that a BMI ≤ 36.4 was associated with a 98.4% of not demonstrating VCCC vs 30.8% for BMI >36.4 (AUC = 0.73). For females, a neck circumference ≤ 38.05 cm was associated with a 100% chance of not demonstrating VCCC vs 18.4% for >38.05 cm (AUC = 0.72).

Conclusion: The BMI values for males and females and female neck circumference values established by the RT model may indicate the need to reassess qualification criteria of CNXII stimulator therapy for obstructive sleep apnea.

Impact of Surgeries Directed by DISE on Sleep Architecture

Joselina Antunes (Presenter); João Órfão; João Rito; Cristina Adonis; Filipe Freire

Introduction: Obstructive sleep apnea syndrome (OSAS) is associated with sleep architecture abnormalities, which have an impact on metabolic and hormonal control. Among OSAS patients, continuous positive airway pressure is associated with improvement of respiratory events but also with sleep architecture. There are surgical options for OSAS in which success is usually assessed through apnea-hypopnea index (AHI) variation, but can these surgeries improve other important variables measured by polysomnography?

Method: Retrospective analysis of polysomnographic data of adults diagnosed with OSAS, submitted to surgeries directed by drug-induced sleep endoscopy (DISE). Patients were submitted to 2 polysomnographies (before and after surgeries) between 2016 and 2020. Data are presented as mean (standard deviation). Data were available for 76 adults, 55 men and 21 women, mean age 50.8 (± 11.6) years, and mean body mass index of 27.7 (± 3.7). Mean AHI before surgeries was 19.4 (± 13.9).

Results: We found statistically significant differences between before-surgery polysomnographic data and normality: a lower mean sleep latency 14.2 (± 15.9 ; $P < .001$), higher mean N1 phase 13.6 (± 10.6 ; $P < .001$), a lower mean N3 phase 16.9 (± 7.8 ; $P = .001$), and a higher mean arousal index 42.7 (± 24.4 ; $P < .001$). After surgical treatment, we found an increase in mean N3 phase from 16.9% (± 7.8) to 20.5% (± 7.1 ; $P = .002$). Meanwhile, we did not find any statistically significant differences between polysomnographic data and normality: mean sleep latency 15.2 (± 30.3 ; $P = .178$) and mean N3 phase 20.5 (± 7.1 ; $P = .575$). No correlation was found between AHI and sleep phase distribution.

Conclusion: Surgeries directed by DISE have been shown to be effective in sleep architecture improvement. There is a

tendency for normalization of polysomnographic data, with changes on time spent in sleep phases: a decrease of superficial phases and increase of profound ones.

LASER Epiglottectomy as a Surgical Adjuvant Procedure in OSA Patients

João Órfão (Presenter); Joselina Antunes; Liliana Carvalho; Cristina Adonis; Leonel Barbosa; Filipe Freire

Introduction: Obstructive sleep apnea syndrome (OSAS) is a multifactorial disease, and the advent of drug-induced sleep endoscopy (DISE) has shown that the epiglottis might play a greater role in OSAS physiopathology than previously expected. The aim of this study is to evaluate the surgical benefit of LASER epiglottectomy in OSAS patients submitted to multilevel surgery.

Method: This is a retrospective study with chart review of adult patients (>18 years old) submitted to LASER epiglottectomy between January 2016 and December 2019. All patients performed a polysomnographic study before and after surgery. Exclusion criteria: preoperative apnea/hypopnea index (AHI) 30 events/h, body mass index (BMI) >35 kg/m², and other epiglottic procedures. Demographic data, DISE findings, surgical procedures, and polysomnographic results were collected. The continuous variables are described as median (percentile 25–75) and were considered statistically significant when $P < .05$.

Results: Thirteen patients were included, and most of them were male (92%), with a medium age of 55.8 (± 13.4) years and a body mass index of 27.1 (23.9–34.3) kg/m². All patients presented with >75% obstruction of epiglottis on DISE: most of them with anteroposterior configuration. All patients were submitted to multilevel surgery when performing epiglottectomy, according to DISE findings. The preoperative AHI was 17 (8.6–28.3) events/h: 38.5% with mild and 61.5% with moderate OSAS. A reduction in AHI was seen in 85% of the patients. The postsurgical AHI was 9.3 (2.0–24.3) events/h, meaning a reduction of 44.6% of this index ($p < .05$) and AHI <20 events/h) was verified in 46% of the patients. No major complications were associated with epiglottectomy.

Conclusion: Surgery represents an important therapeutic alternative in OSAS, and LASER epiglottectomy is an adjuvant technique that might be considered for patients presenting with multilevel obstruction with epiglottic collapse.

Persistent OSA in Down Syndrome: Does Body Position Matter?

Taylor G. Lackey, MD (Presenter); Kaitlyn Tholen; Norman M. Friedman, MD

Introduction: For children with Down syndrome (DS), persistent obstructive sleep apnea (OSA) is present in 50% to 80% following an adenotonsillectomy (AT). Our objective is to determine the prevalence of positional OSA (POSA) in children with DS following AT. We hypothesize that these children are more likely to have OSA in the supine position.

Method: A retrospective review of children with DS who underwent tonsillectomy with or without adenoidectomy

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between 2009 and 2015 was performed. Children were included if they had a postoperative polysomnogram (PSG) and ≥ 60 minutes of total sleep time. Subjects were categorized as mixed sleep (presence of ≥ 30 minutes of both nonsupine and supine sleep), nonsupine sleep, and supine sleep. POSA was defined as an overall obstructive apnea-hypopnea index (OAH) ≥ 5 events/h and a supine OAH to nonsupine OAH ratio of ≥ 2 . Group differences are tested via Kruskal-Wallis test for continuous variables and Fisher exact tests for categorical.

Results: There were 195 children with DS who met inclusion criteria, of whom 151 individuals had mixed sleep. Subjects who predominately slept supine had a greater OAH than mixed and nonsupine sleep ($P = .002$), and nonsupine subjects more often had an OAH < 5 ($P = .008$). Some 29 (19%) of the mixed-sleep individuals had POSA. POSA subjects had a higher BMI percentile ($P = .033$) and greater severity of OSA ($P < .001$) compared with non-POSA subjects.

Conclusion: Sleep physicians and otolaryngologists should be cognizant that the OAH may be an underestimate if it does not include supine sleep. Positional therapy is a potential treatment option for children with DS and persistent OSA following an adenotonsillectomy and warrants further investigation.

Postoperative Pain After Surgery for Adult Obstructive Sleep Apnea

Ghedak Ansari, MD (Presenter); Joan Lo; Jeanne Darbinian; Megan Durr, MD

Introduction: We examine outcomes, including postoperative pain medication and glucocorticoid usage, complications, hospital length of stay, postoperative presentation to the emergency department (ED), and hospital readmissions for adult patients with OSA who undergo sleep surgery.

Method: This study examines adults (2009–2017) who underwent sleep surgery for OSA at an integrated health system. Data obtained from electronic sources included demographics, surgery type, presentation to the emergency department (ED), hospital readmission, and postoperative narcotic pain medication usage.

Results: A total of 2479 adult patients were identified. Average age at surgery was 40 ± 13 years. Surgeries performed included (n, %) uvulopalatopharyngoplasty (UPPP; 1361, 54.9) tonsillectomy (681, 27.5), genioglossus muscle advancement (GGMA) combined with maxillomandibular advancement (MMA; 112, 4.5, MMA alone [185, 7.5]), adenoidectomy (76, 3.1), tongue and palate surgery (54, 2.2), tongue reduction (7, 0.3%), and hypoglossal nerve stimulator implantation (HGNS; 3, 0.1%). A total of 568 patients had a return to the ED or hospital readmission: 201 (35.4%) pain related and 153 (26.9%) bleeding related. UPPP had a significantly higher proportion of return to ED/readmission for bleeding (35.4%), while tongue and palate surgery patients had a higher proportion of return to ED for pain (54.6%). Of our cohort, 91.3% was prescribed outpatient opioids. There was a significant difference between surgery type and opioid being dispensed as an outpatient, with tongue and palate

patients with the highest proportion of opioids dispensed (96.3%) followed by UPPP (94.9%).

Conclusion: Our study identified a statistically significant difference between the surgery type and hospital readmission, with the highest percentages of readmission among GGMA+MMA patients while UPPP patients were the most likely to return to the ED for bleeding. Finally, our study highlights important comorbidities that sleep surgery patients have that put them at higher risks for opioid dependence, including high preoperative opioid use (40.6%).

Prognostic Indicators for Hypoglossal Nerve Stimulation Therapy: A Systematic Review

Avrahan Boroosan (Presenter); Anna M. Salapatias; Amanda Beneat; Michael Friedman

Introduction: Despite guidelines for patient selection for hypoglossal nerve stimulation, the success rate is about 70%. The objective of this study is to conduct a systematic review of studies that attempted to identify positive and negative prognostic factors to improve success rates.

Method: We searched PubMed, Embase, and Cochrane databases to identify studies that evaluated prognostic indicators for hypoglossal nerve stimulation. Articles were screened by 2 authors using the Joanna Briggs critical appraisal tools. A spreadsheet was made with extracted data for qualitative analysis.

Results: A total of 461 papers were reviewed, and 31 studies were included in our final review. A total of 28 indicators were assessed by ≤ 2 studies and therefore not appropriate to be included in a systematic review. Age: 5 studies with 1155 patients found age does not adversely affect outcome. Body mass index (BMI): 5 studies with 1121 patients were included. In most studies, increasing BMI decreased the odds of surgical success. Baseline apnea-hypopnea index (AHI): 5 studies with 1113 patients found increasing AHI does not adversely affect outcome. Sex: 4 studies including 1093 patients were included. In the largest cohort ($n = 640$), female sex was a positive predictor of outcome. No other studies found a significant relationship. Prior airway surgery: 6 studies including 608 patients were included. Prior surgery had no association with outcome in most studies. Velum, oropharynx, tongue base, epiglottis (VOTE) classification: 7 studies including 366 patients were included. VOTE findings on drug-induced sleep endoscopy (excluding complete concentric collapse) were not related to outcome. Tongue motion with stimulation: 6 studies including 760 patients found the direction of tongue motion was not a significant predictor of outcome.

Conclusion: Lower BMI is associated with increased improvement in AHI. Female sex may be a positive predictor for treatment success. Increasing age and baseline AHI do not adversely affect outcome and may be associated with greater improvement in AHI. Prior airway surgery, collapse pattern, and tongue motion were not associated with outcome. Complete concentric collapse is a contraindication for hypoglossal nerve stimulation.

A Protocol for Propofol-Infusion Drug-Induced Sleep Endoscopy

Taylor G. Lackey, MD (Presenter); Katherine K. Green, MD, MS; James R. Duffy

Introduction: The objective of this study is to outline a protocol using propofol infusion without an initial bolus during drug-induced sleep endoscopy (DISE). We define normative values for final propofol infusion rate (P_{final}) during DISE. We describe normative sedation depth values at P_{final}, associated with loss of consciousness defined as patient nonresponsive to verbal stimuli. This study is novel as it reports normative values for propofol infusion during DISE and should not be delayed in publication. Data collection was slower than anticipated due to the nature of multidisciplinary collaboration in obtaining sedation depth measurements.

Methods: A retrospective review of patients who underwent DISE between 2016 and 2020 was performed. Patient demographics, DISE procedure details including P_{final} at which sleep endoscopy was initiated, time to P_{final}, depth of sedation as measured by BiSpectral (BIS) or SedLine values, hemodynamics, as well as polysomnography details including apnea-hypopnea index severity and minimum oxygen saturation were recorded. A mixed linear model adjusted for age and body mass index was performed for the analysis of P_{final}. Pearson correlation coefficients were calculated to determine the strength of the association between depth of sedation measured between BIS and SedLine values, as well as pattern of collapse on DISE and P_{final}.

Results: There were 246 patients who met inclusion criteria. P_{final} resembled a normal distribution (mean 156.44 ± 26.69 µg/min, median 150 µg/min). The mixed linear model demonstrated P_{final} was influenced by male gender, current smoker status, time to P_{final}, and number of propofol dose changes during DISE ($P < .05$). Depth of sedation categories measured differently between BIS and Sedline (55–65 vs 45–55, $P < .001$). The pattern including severity of collapse on DISE was not associated with P_{final} ($P > .05$). No patients required intra- or postoperative respiratory support beyond oxygen via nasal cannula.

Conclusion: We describe a propofol-infusion protocol without initial bolus for DISE that demonstrates safe and reproducible outcomes.

Robo-Cob Technique; Transoral Endoscopic Coblation Tongue Base Resection in OSA

Yassin Bahgat (Presenter); Ahmed Y. Bahgat, MD, EBE-ORL

Introduction: Another transoral tongue base surgical procedure for obstructive sleep apnea (OSA) is described. The procedure was named as the “Robo-Cob” technique because it is similar to transoral robotic surgery (TORS) but using a coblation technology to manage tongue base hypertrophy in patients with OSA, especially in countries where TORS is not an available option for such benign conditions.

Method: The technique is described step by step. The new surgical technique was carried out in 25 adult OSA patients

with mean age of 41.36 ± 8.72 years (average 23–56) with confirmed tongue base hypertrophy by preoperative drug-induced sleep endoscopy (DISE). Coblation was used to resect, not ablate, the tongue base with similar technique as described in TORS.

Results: The Robo-Cob technique is proved to be feasible and effective in all cases either alone or when combined with other procedures in multilevel surgery settings. There were no significant intraoperative or postoperative complications. No tracheostomy was done in any patient. Objective clinical improvement was confirmed by polysomnography 3 months postoperatively with significant decrease in mean apnea-hypopnea index from 33.84 ± 10.54 to 11.52 ± 5.42 ($P < .005$). Moreover, this technique provided a tongue base tissue specimen that allowed measurement of its volume that ranged from 10 to 22 mL (mean 14.96 ± 3.62 mL) to monitor the extent of tissue resection.

Conclusion: The added value of using coblation in resection, not ablation, is being quicker and being able to provide tissue specimen to measure its volume to judge resection limits.

Severe Pediatric Sleep Apnea: DISE Based Surgery

Nuno O’neill Mendes (Presenter); Joselina Antunes; Ana Guimarães; Cristina Adonis; Filipe Freire

Introduction: Although adenotonsillectomy is the recommended treatment of obstructive sleep apnea (OSA) in children, some patients with preoperative severe OSA (apnea-hypopnea index [AHI] >10) remain symptomatic after surgery and may need further workup. This study aims to (1) analyze preoperative factors and its relation with surgical failure/persistent OSA (AHI >5 after adenotonsillectomy) in severe pediatric OSA, (2) determine the levels of airway collapse during drug-induced sleep endoscopy (DISE) in cases of surgical failure, and (3) evaluate the efficacy of targeted surgery based on DISE findings.

Method: This retrospective study was conducted between August and September 2020. Across 9 years (from 2011 to 2020), all children diagnosed with severe OSA in our hospital underwent adenotonsillectomy and repeated type 1 polysomnography (PSG) 3 months after surgery. Cases of surgical failure underwent DISE for planning eventual directed surgery. Chi-square test was used to assess the relationship between persistent OSA and patients’ preoperative characteristics.

Results: A total of 80 cases of severe pediatric OSA were diagnosed (68.8% males; mean age: 4.3 years, standard deviation: 2.49 years; mean AHI: 16.3, standard deviation 7.14) in the aforementioned period. We found a significant association between surgical failure (11.3% of cases; mean AHI: 6.9, SD 0.91) and obesity ($P = .002$; confidence level of 95%). Neither preoperative AHI nor other PSG parameters were associated with surgical failure. In cases of surgical failure, epiglottis collapse was present in every DISEs and adenoid tissue was present in 66% of children. All cases of surgical failure had directed surgery and surgical cure (AHI ≤5) was obtained in 100% of cases.

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Conclusion: This study suggests that obesity is the strongest predictor of surgical failure in children with severe OSA who undergo adenotonsillectomy. Epiglottis collapse and presence of adenoid tissue are the most common findings in postoperative DISEs of children with persistent OSA after primary surgery. DISE-based surgery seems a safe and effective tool to manage persistent OSA after adenotonsillectomy.

Snoring Index Variation With Surgeries Directed by DISE

Joselina Antunes (Presenter); Liliana Carvalho; Joselina Antunes; Cristina Adonis; Filipe Freire

Introduction: Snoring is the most common symptom of obstructive sleep apnea syndrome (OSAS). Positive airway pressure is the treatment of choice among obstructive sleep apnea syndrome patients. Among surgical options, a multi-level approach is a good option in patients with involvement of various structures of upper airway, but can it also be a good option for treatment of snoring?

Method: This is a retrospective analysis of polysomnographic data in adults diagnosed with OSAS, submitted to surgeries directed by drug-induced sleep endoscopy (DISE). Patients were submitted to 2 polysomnographies (before and after surgeries) between the years of 2016 and 2020. Snoring index represents the number of snore events per hour. Data are presented as mean (standard deviation). Data were available for 42 patients, 28 men and 14 women, with a mean age of 52.3 years (± 11.9), mean body mass index 27.9 (± 3.4), and mean before-surgery apnea-hypopnea index of 17.2 (± 12.6). Every patient was submitted to palatoplasty (72.6% barbed technique), and 76.2% were submitted to multilevel surgeries, more often the association between palatoplasty with nasal surgeries.

Results: We found a reduction in snoring index from 466.2 (± 270.1) to 298.1 (± 225.9 ; $P = .005$). Multiple regression was used to evaluate the contribution of body mass index, sex, percentage of sleep in the supine position, type of surgeries done, sleep architecture, and snoring index. We found 2 variables that relate to snoring index: body mass index ($\beta = .275$, $P = .045$) and rapid eye movement (REM) phase ($\beta = -.673$, $P < .001$).

Conclusion: This study showed a statistically significant reduction of snoring with surgical treatment of patients with OSAS. Snoring index correlates directly with body mass index and inversely with REM phase. Otherwise, it does not correlate with type of surgery used or other polysomnographic data. Surgeries directed by DISE are effective in reduction of snoring, as they improve time spend on REM phase.

Tongue Morphology Predict Responses in Patency to Selective Hypoglossal Stimulation

Thomaz Antonio A. Fleury Curado, MD, PhD (Presenter); Luu Pham, MD; Carla Freire, MD; Vsevolod Polotsky, MD, PhD; David Eisele, MD; Alan Schwartz, MD

Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder characterized by recurrent upper airway (UA) obstruction used by a loss of UA muscle tone during sleep. Reductions in genioglossus (GG) muscle tone, the main UA dilator, during sleep are thought to play a critical role in the pathogenesis of UA obstruction. Nevertheless, recent evidence suggests that several lingual muscles work in concert to stabilize tongue shape and position and maintain UA patency during sleep, leading us to hypothesize that responses in tongue morphology to lingual muscle stimulation will predict changes in UA patency during sleep.

Method: Twelve apneic patients implanted with a multichannel targeted hypoglossal nerve stimulating system underwent mid-sagittal ultrasound tongue imaging during wakefulness. Changes in tongue shape and position were characterized by measuring its vertical height and the polar dimensions between the tongue surface and genioglossi origin in the mandible. Changes in airway patency were characterized by comparing airflow responses between stimulated and adjacent unstimulated breaths during non-rapid eye movement sleep.

Results: Two distinct morphologic responses to stimulation were observed. Anterior tongue base and hyoid bone movement (5.4 [0.4] to 4.1 [1.0] cm [median, IQR]) with concomitant increases in tongue height (5.0 [0.9] to 5.6 [0.7] cm) were associated with decreases in airflow during stimulation. In contrast, a similar degree of anterior hyoid movement (tongue protrusion from 5.8 [0.5] to 4.5 [0.9] cm) without significant decreases in height (5.2 [1.6] to 4.6 [0.8] cm) was associated with marked increases in in airflow during sleep.

Conclusion: Tongue protrusion with preservation of tongue shape predicted increases in pharyngeal patency, whereas anterior movement with concomitant increases in height were associated with decreased pharyngeal patency during sleep. These findings suggest that pharyngeal patency can be best stabilized by stimulating lingual muscles that maintain the shape and position position of the tongue, thereby preventing it from prolapsing posteriorly during sleep.

Upper Airway Stimulation in Patient Populations With Barriers to Compliance

Ayan Kumar, MD (Presenter); Tory McKnight; Clemens Heiser, MD, PhD; Maurits Boon, MD; Colin T. Huntley, MD

Introduction: Complex patients with developmental delay or psychiatric conditions tend to have greater difficulty with medication compliance. Continuous positive airway pressure (CPAP) is a highly effective yet often poorly tolerated treatment modality for obstructive sleep apnea (OSA), and patients with these comorbidities have an increased susceptibility to CPAP noncompliance. Upper airway stimulation (UAS) may be considered as a favorable treatment option for these patient populations.

Method: This is a 2-center, retrospective cohort study assessing the use of UAS in OSA patients with developmental delay or psychiatric comorbidities per ICD-9 or 10 guidelines. The UAS device records total hours used and mean hours of usage per week since the last interrogation. Descriptive statistics were conducted using SPSS with a P value of $< .05$.

Results: Eighteen patients with UAS implantation as well as a diagnosis of developmental delay or a psychiatric comorbidity were included in this study. The mean weekly usage 12 months after device implantation was 35.88 ± 13.93 hours, with a range of 13 to 67 hours. Of the cohort, 89% used the device longer than 20 hours per week. These patients had a mean apnea-hypopnea index (AHI) percentage decrease of $60.42 \pm 27.98\%$, with a range of 0% to 100% AHI resolution.

Conclusion: Avoidance of inconsistent usage or abandonment of therapy is particularly challenging in OSA patients with developmental delay or psychiatric conditions. UAS is a well-tolerated and highly successful treatment modality for patients with these comorbidities and should be considered as an important therapeutic option.

Who Needs Both Hypoglossal Nerve Stimulation and Maxillomandibular Advancement?

Mohamed Abdelwahab (Presenter); Sasikarn Poomkonsarn; Corissa Chang; Ying-Chieh Hsu; Courtney Chou; Stanley Liu

Introduction: Both maxillomandibular advancement (MMA) and hypoglossal nerve stimulation (HNS) can be highly effective interventions for patients with obstructive sleep apnea (OSA). We describe the efficacy and safety profile of subjects who benefit from both MMA and HNS. We describe this both

for patients with relapse and those for whom HNS is initially excluded because of excessively high apnea-hypopnea index (AHI).

Method: This is a retrospective study from 2016 to 2020 examining subjects with severe OSA who had incomplete resolution after MMA or had severe OSA that could not be managed exclusively with HNS. Outcomes include the Epworth Sleepiness Scale, AHI, and Nasal Obstruction Symptom Evaluation scores. Complications and/or technical challenges were also reported.

Results: A total of 7 subjects met inclusion criteria. The mean age was 59.4 ± 9 years, with 2 females. The mean body mass index was 29.2 ± 5 kg/m². Four subjects previously achieved cure from MMA and then relapsed based on symptoms and AHI. Three were planned for MMA followed by HNS due to severity based on AHI. Of the post-MMA relapse subjects, mean AHI was reduced from 16.5 ± 6 to 3.2 ± 2 events per hour after upper airway stimulation (UAS; mean voltage of 2 ± 0.4 V). Of the planned combination MMA and UAS subjects, the mean AHI was reduced from 100 ± 45 events per hour to 2.5 ± 0.6 events per hour after MMA and UAS (mean voltage of 2.05 ± 0.05 V).

Conclusion: For patients with post-MMA relapse or those for whom HNS is initially excluded due to excessively high AHI, the combination of MMA and HNS can be predictably effective.



POSTER PRESENTATIONS

Business of Medicine/Practice Management

Analysis of Industry Payments in Otolaryngology by Gender From 2014 to 2017

Rema Shah (Presenter); Sidharth Tyagi, MS;
Saral Mehra, MD

Introduction: This study aims to provide the first longitudinal analysis of disparities in industry payments by gender for practicing, compensated otolaryngologists between 2014 and 2017, specifically investigating differences by industry payment subcategories and geographical distribution.

Method: This retrospective, cross-sectional study used publicly available data from the US Centers for Medicare & Medicaid Services Open Payments Database to collect industry payment records and location of practice. Provider webpages were used to classify all compensated, practicing otolaryngologists between 2014 and 2017 by gender. Mean and median payment amounts received were stratified by gender, region, and type of payment, and then were compared using Kruskal-Wallis and independent samples median tests.

Results: The proportion of male otolaryngologists who received industry payments was significantly higher than that of females otolaryngologists in 2014, 2015, and 2017. Male physicians also received higher overall mean industry payment amounts than females physicians did (\$168.23 vs \$150.41, $P < .001$). By subcategory, mean industry payment amounts were higher for male compared with female otolaryngologists in education (\$514.53 vs \$189.03, $P < .001$) and consulting fees (\$2423.38 vs \$1651.19, $P < .001$). Regionally, mean industry payment amounts for male otolaryngologists were higher than that for female otolaryngologists in the South (\$156.37 vs \$85.36, $P < .01$) and in the West (\$232.52 vs \$138.76, $P < .001$). In the Northeast, mean payment amounts to female providers were higher than those for males providers (\$308.44 vs \$138.13, $P < .001$). In addition, 90% or more of industry payments in categories such as investment interests and grants were given to male otolaryngologists. These categories accounted for some of the highest mean payment amounts provided.

Conclusion: There were significant gender differences in industry payments to male vs female otolaryngologists between

2014 and 2017. These data can help keep industry and the medical community accountable in an effort to reduce the institutionalized and industry-induced causes of the disparity.

Design of Hearing Care Delivery Models Using the Telemedicine Canvas

Samuel Weinreb, MSE (Presenter); Neha Verma;
Izabella Samuel; Mackenzie Hall; Kai Zhang;
Soumyadipta Acharya

Introduction: Only 15% of adults with age-related hearing loss use a hearing aid, and while teleaudiology has proven to be an effective alternative to in-person care, current embodiments mainly bridge the access gap for those whose primary barriers are convenience or mobility. Several critical issues around the social determinants of health such as stigma, cultural competence, behavior change, and socioeconomic status remain unaddressed. Thus, we used the Telemedicine Program Design Canvas (TDPC) to propose 4 care delivery models to expand hearing aid access and usage in medically underserved communities.

Method: We conducted 32 interviews (8 audiologists, 5 geriatricians, 5 industry experts, 10 community leaders, 3 public health experts, and 1 neurologist) to understand the problem landscape along with a scoping literature review. We then organized these insights into the TDPC, a visual framework for rapid prototyping and iteration of telemedicine programs. The TDPC includes 16 domains that all telemedicine ventures must consider to successfully improve health care access and quality while delivering services that meet patients' attitudes and expectations. Among these are problems, environments, patients, providers, workflows, training, technology, costs, revenues, desired outcomes, and key indicators.

Results: Considering poor technology access and literacy, functional limitations, and culture-specific stigma within the target population, we included community health workers (CHWs) as key providers in all 4 models. Two of these involve task shifting the entire cycle of care to CHWs to deliver over-the-counter hearing devices, whereas the others would integrate CHWs into the current care model alongside audiologists to provide traditional hearing aids. Within each of these categories, one program was designed to deliver pre-hearing aid care such as screening and education, while the other focuses on follow-up and aural rehabilitation.

Conclusion: Through a holistic design process, we have outlined 4 CHW-based telemedicine programs to address disparities in hearing aid access and uptake.

Evaluation of 1-Star Reviews of ENT Surgeons on Yelp.com

Dane J. Markham, MD (Presenter); Michael J. Marino, MD; Brian A. Walker, MD; Taylor R. Fish, MD; Matthew T. Smith, MD; Jacob F. Smith, MD

Introduction: Analyze negative Yelp reviews of otolaryngology practices and classify them into categories that influence patient satisfaction. Compare the categories quantitatively to assess which categories have the greatest impact on patient satisfaction. Qualitatively interpret different themes from the Yelp reviews that are specific to primary symptoms within ENT (eg, ear-, nose-, throat-related issues; esthetics; head and neck). Data extraction from online platforms was held until April 2021 to gauge the potential impact of COVID-19 pandemic-related issues on patient reviews of otolaryngology practices.

Methods: Using Yelp.com, 1-star reviews of otolaryngology providers and practices in the 8 most populous US cities were extracted. Reviews were categorized into clinical vs nonclinical complaints using a 2-independent-reviewer system. Reviews were also categorized into surgical encounters vs nonsurgical encounters and according to the area of primary symptom.

Results: The total number of reviews was 343 and covered 956 distinct complaints. Of all complaints, 193 (20.2%) were clinically related, while 763 (79.8%) were nonclinical in nature. Physician bedside manner (17.1%) and financial issues (15.7%) were the most cited nonclinical complaints. For reviews involving surgical patients, there were 172 (18.0%) complaints. A total of 194 (20.3%) complaints identified a primary symptom, with nasal symptoms being most frequently reported (79 complaints). The COVID-19 pandemic was cited in only 15 complaints (1.6%).

Conclusion: Most 1-star reviews of otolaryngology providers and practices were nonclinical in nature and more frequently involved nonsurgical patients. Patient reporting of satisfaction and consumption of reviews on popular online platforms may have important differences with traditional health care quality metrics.

Geographic Trends Over Five Cycles in the Otolaryngology Match, 2015-2020

Jeffrey D. Bernstein, MD (Presenter); Shane Shahrestani, PhD, MS; Bitu Shahrivini; Bridget V. MacDonald, MD; Deborah Watson, MD

Introduction: The geographic characteristics of the otolaryngology-head and neck surgery (OHNS) residency match remain understudied and anecdotal. We present an in-depth view of matching trends over 5 application cycles (2015-2020), based on regional differences within the United

States. This information may serve as a context for regional trend shifts that might become evident in the current match cycle due to the COVID-19 pandemic.

Method: We present a retrospective study of OHNS residency match outcomes of applicants to our single-institution from 2015 to 2020. National Resident Matching Program-provided data included medical school, match status, match program, and match year. Matches were characterized as home-program, home-region, or out-of-region. Statistics were done using Pearson chi-square testing.

Results: From 2015 to 2020, 1252 US MD seniors applied to our institution, comprising 72.2% of all match participants. A total of 84.9% matched into OHNS: 18.9% to home-programs, 35.7% to other programs in home-region, and 45.3% out-of-region. Match rates were similar for all regions (range, 83.8%-87.4%). Students from Western schools matched to home programs significantly more than students from southern or Midwest schools (27.5% vs 16.0% and 16.0%; $P < .01$, $P < .01$, respectively). The rate of home-program matching in the West increased, on average, by +6.0% per year, which was greater than any other region (range, -0.8% to 6.0%). Students from Southern schools had the most within-region matches (45.2% vs 22.6%, 32.8%, and 37.3%). Western programs matched significantly more out-of-region applicants compared with other regions (58.0%, $P < .05$), while Southern programs were filled by the smallest proportion of applicants from outside regions (36.9%).

Conclusion: In the OHNS residency match cycles 2015-2020, home-matching occurred in 1 in 5 cases and was more common for applicants from the Western states, while regional matching was more common among the Southern states. These trends may become more pronounced in the 2020-2021 cycle due to the rotation restrictions imposed by COVID-19.

Impact of a Master of Business Administration in Academic Otolaryngology

Jack Birkenbeuel (Presenter); Lana Boladian; Ashley R. Lonergan, MD; Edward C. Kuan, MD; Sunil P. Verma, MD

Introduction: The purpose of this study is to determine the number, geographic distribution, and leadership roles of academic otolaryngologists who have obtained a master of business administration (MBA) degree in academic otolaryngology-head and neck surgery (OHNS).

Method: In January 2021, all Accreditation Council for Graduate Medical Education-accredited OHNS training programs were identified. The website for each program was used to identify physician faculty associated with each department. Demographic information on each faculty member was obtained, including gender, program region, subspecialty, advanced degrees, and departmental and nondepartmental leadership roles.

Results: In 115 academic programs, 2342 academic faculty were identified. In total 359 faculty (15.2%) held additional advanced degrees, with an MBA ($n = 32$; 1.4%) as the fourth most common degree. Of the 32 physicians with MBAs, 25

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(78.1%) were men. Eight (25%) practiced in the Midwest, 10 (31.3%) in the Northeast, 9 (28.1%) in the South, and 5 (15.6%) in the West. Five of 115 (4.3%) department chairs were MBAs, and 1 of 115 (0.87%) of program directors (PD) held MBAs. MBAs were as likely to become chairs ($P = .566$) or PDs ($P = .120$) compared with all other degrees. There were no differences in professorship titles (assistant professor, associate professor, professor) among MBAs ($P = .423$). MBAs ($n = 10$; 31.3%) were significantly more likely than all other faculty ($n = 322$; 13.9%) to hold a nondepartmental leadership role ($P = .005$).

Conclusion: Academic otolaryngology faculty with MBAs are more likely than other faculty to hold a nondepartmental leadership role. These findings highlight new understanding of the career outcomes of OHNS MBAs.

Implementing a Virtual Sub-internship Experience in Otolaryngology

Jeffrey D. Bernstein, MD (Presenter); Zachary Nardone, MD; Deborah Watson, MD

Introduction: Suspension of away rotations during the COVID-19 pandemic has disrupted key connections between residency programs and prospective applicants. We present data-driven guidelines to develop a virtual sub-internship (VSI) curriculum for implementation by otolaryngology—head and neck surgery (OHNS) programs around the country.

Method: A VSI was developed and implemented by our OHNS program for fourth-year medical students from outside institutions to participate in one of the 2-week rotations. Participation involved a series of daily interactive online sessions on Zoom with faculty and residents. The interactions were a combination of small group meetings, didactic/conference sessions, and live teaching in the operating room. A variety of OHNS-related topics were covered, and casual conversations were common. At the end of the VSI, a 15-question anonymous online survey was distributed to participants. Totals and averages were calculated.

Results: Over 12 weeks, 21 students were enrolled (33% female) in the VSI sessions. The median course size was 4, and 20 students were able to complete the full duration of the VSI. Fifteen students subsequently completed the exit survey. All US regions were well represented (South 33.3%, Midwest 33.3%, Northeast 20.0%, and West 13.3%). Twelve of the 15 participants' home institutions featured an OHNS residency but none of those offered a VSI experience. The 2-week duration of the VSI was found to be "just right" by 73.3% of participants. All were satisfied with the schedule and organization of the VSI, with 73.3% stating they were "highly satisfied." All applicants reported continued interest in our residency program, with 86.7% reporting an increased level of interest subsequent to their VSI experience.

Conclusion: We present a novel, validated VSI curriculum to serve as a guide for all OHNS residency programs. VSIs offer a safe, flexible, cost-effective means to increase program

familiarity and interest for potential applicants. We anticipate these courses will remain a fixture of residency programs after the resolution of the COVID-19 pandemic.

Improving Otolaryngology Access Through Telehealth: Cutting No-Show Rates in Half

Claudia I. Cabrera, MD, MS (Presenter); Brian D. D'Anza, MD

Introduction: The use of telehealth visits was a necessary adjustment in 2020 due to the COVID-19 pandemic. Even after clinics were either shut down or restricted, synchronous telehealth became an alternative for maintaining essential patient care. As we emerge from the pandemic, further benefits of telehealth services are being discovered, including the reduction in missed—or no-show—visits when compared with in-person visits. The primary aim of this study was to compare the rates of missed visits between telehealth and in-person visits and comment on potential benefits of telehealth.

Method: The study was conducted at an otolaryngology department from a quaternary academic medical center. Telehealth visits were rendered as primarily audio and video or audio only. Data were obtained from the institutional electronic financial data system. Overall visits were analyzed from April 2020 to December 2020 for the otolaryngology service by type of visit. The rates were calculated individually from the total number of in-person and telehealth visits. Statistical analysis for the difference in the proportion of encounters between groups was calculated using the prop.test function in R.

Results: During the intervention period from April 2020 to December 2020, 25,854 otolaryngologic encounters were seen by the Department of Otolaryngology. The "no-show" rate for telehealth visits was found to be significantly lower at 9.9% when compared with 18% for in-person visits ($P < .001$). From those telehealth visits, 57% were rescheduled for another day.

Conclusion: The benefits of telehealth in a postpandemic world extend beyond providing an alternative to in-person visits, providing a significant reduction in no-show rates. Reducing missed appointments has multiple benefits, including improved resource utilization in clinics, better access for patients, and productivity for providers. It should be considered as one of the primary benefits when adding telehealth visits to a practice both during and post-pandemic.

Patient Satisfaction With Telemedicine in Otolaryngology and Associated Factors

Janet S. Choi, MD, MPH (Presenter); James Kim, MD; Courtney C.J. Voelker, MD, PhD

Introduction: Implementation of telemedicine has rapidly expanded in otolaryngology during COVID-19. Patient satisfaction is a primary quality metric in health care that will assist in better understanding of the utility of telemedicine. This study aims to examine patient satisfaction with telemedicine in

an otolaryngology outpatient clinic during COVID-19 and identify associated factors.

Method: Patient satisfaction was rated by adult patients (≥ 18 years) who had encounters in a tertiary care center otolaryngology clinic from May 2020 to July 2020 (269 via telemedicine, 290 via in-person encounters). Patient satisfaction was measured using a standardized Press-Ganey questionnaire and a validated 14-item Telemedicine Satisfaction Questionnaire (TSQ). Mean Press-Ganey satisfaction scores of telemedicine encounters during COVID-19 were compared with the pre-COVID Press-Ganey scores from in-person encounters ($n = 3059$) using a noninferiority study design. Two-sample t test and multivariate regression models were used for data analysis.

Results: Mean Press-Ganey patient satisfaction scores for telemedicine encounters were 95 ± 8.6 (range, 20–100), superior to the scores for telemedicine encounters prior to COVID-19 at 93.7 ± 15.5 ($\Delta = 1.3$; 95% CI, 0.07–2.52). Patient satisfaction measured by the TSQ remained high at 4.2 ± 0.7 (range, 1–5), with the highest mean score for domain “perception of the interaction.” Encounters with videoconferencing (vs telephone), younger age, and higher income were associated with higher patient satisfaction.

Conclusion: Patient satisfaction with telemedicine encounters in otolaryngology clinic during COVID-19 pandemic remained high, superior to in-person encounters prior to pandemic. Telemedicine is a feasible alternative format in otolaryngology outpatient center during COVID-19.

Positive Provider Experience With Telehealth During COVID-19 Pandemic

Jenna C. Berg, MD (Presenter); Sarah Richards, MD; Kristy Carlson, MD

Introduction: There has been a rapid increase in the usage of telehealth since the onset of COVID. We examine providers' perceptions of their ability to perform clinical assessments, physical exams, and connect with patients over a digital platform and identify which types of patients may be best suited to telehealth. Since the onset of the COVID-19 pandemic, there has been rapid expansion in the use of telehealth, but very few studies examining provider experience and perceptions of this technology. This research was conceptualized and conducted after the onset of COVID-19. Discussing the results of the survey at the 2021 meeting will be both relevant and timely to private groups and hospital systems that seek to better understand providers' perceptions of their ability to perform clinical assessments, physical exams, and connect with patients over a digital platform, along with discerning what type of patients may be best suited to telehealth.

Methods: Survey invitations were sent via email to 944 physicians and advanced practice providers at a large midwestern academic system over a 2-week period in October 2020. The survey included demographics questions and a combination of open- and closed-ended questions. Data were collected using REDCAP. Descriptive statistics were conducted using SPSS.

Results: A total of 178 surveys were completed and analyzed. In most telehealth visits, 86.8% of providers felt they adequately addressed the chief complaint, 86.6% felt confident in their clinical assessment, and 86.1% felt they formed an adequate personal connection with the patient. Of the providers, 58.5% felt telehealth was not effective for new patients, but 83% of providers felt it was effective for providing care to established patients.

Conclusion: This survey demonstrates that providers had positive experiences with telehealth, and they wish to continue using telehealth in a postpandemic setting. While this method may not be appropriate for some new patients, providers did feel that telehealth was an effective means of providing care for established patients.

Risk Factors for OR No-show in an Academic Otolaryngology Practice

Skylar H. Trott, MD (Presenter); Rory Young; Christopher Hayden; Olivia Yessin; Matthew L. Bush, MD, PhD, MBA; Nikita Gupta, MD

Introduction: A no-show for an operating room date negatively affects a hospital and can lead to increased costs for an institution in terms of time, materials, and manpower. Our objectives are to identify the factors associated with operating room no-shows to increase clinical efficiency, reduce hospital costs, and increase patient access to care.

Method: A retrospective review was performed of all no-shows to surgery at a single tertiary academic center between 2006 and 2019. Demographic and surgical data were collected from the charts. Descriptive and multivariate statistics were performed on the data.

Results: A total of 1752 no-shows to surgery occurred in our study time period. Of the patients, 55.4% were male and 90.6% were White. In terms of subspecialty, head and neck had the highest predilection for no-show at 39.8% and pediatrics followed this at 29.8%. Of no-shows, 58.4% occurred at our outpatient surgical center and 35.0% occurred at our main hospital operating room. Mean distance from patient home to the hospital was 60.9 miles. The average number of days between clinic date and surgery date was 36.7 days, and the average number of days between the surgery date and nearest holiday was 13.5 days. No-show patients missed an average of 1.6 clinic appointments. Of these patients, 48.9% had Medicare, 25.1% had Medicaid, and 25.3% had private insurance.

Conclusion: Numerous factors may play a role on whether or not a patient attends a scheduled surgical date. Some of these factors may be preventable or modifiable to mitigate increased hospital costs associated with no-show patients to surgery.

Satisfaction and Reimbursement of Telemedicine in Head and Neck Surgery

Sarah R. Yeakel, MHA, MBA (Presenter); Linda X. Yin, MD; Katherine Z. Xie; Luis A. Antezana; Eric J. Moore, MD

Introduction: The COVID-19 pandemic accelerated telemedicine efforts throughout otolaryngology. This study examines

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the impact of telemedicine visits on surgical yield, financial reimbursement, and patient satisfaction within the head and neck division at a tertiary referral center.

Method: This is a retrospective review of new head and neck patients seen via telemedicine between January 2020 and December 2020. Chart review was conducted to identify the reason for the visit and surgical yield. Patient satisfaction was assessed using Press-Ganey surveys. Chi-squared tests were used to compare satisfaction scores, and Wilcoxon rank-sum tests and *t* tests were used to compare reimbursements.

Results: In 2020 the head and neck division saw 1157 new patients in-person and 123 new patients via telemedicine. Telemedicine visits led to 52 (42%) surgeries, and 58 (47%) of patients seen were requesting a second opinion. Financial reimbursement data were available for 42 telemedicine and 202 in-person visits. Average reimbursement for telemedicine visits was 86%. No differences were seen between government and commercial payers in the charges ($P = .22$) and reimbursements ($P = .42$) for in-person visits. For the telemedicine visits, charges ($P < .01$) and reimbursements ($P = .03$) were significantly less for government payers. Of the telemedicine visits, 91% were rated as “very good” in patients’ likeliness to recommend, compared with 94% of in-person visits ($P = .30$). Some 91% of telemedicine patients felt that the ability of the care team to explain the condition was “very good,” compared with 92% of in-person patients ($P = .83$). For 77% and 78% of patients, a “very good” rating was given on the ease of contacting and scheduling telemedicine visits, which was not significantly different than the 79% and 83% of patients rating in-person visits ($P = .90$, $P = .55$).

Conclusion: Definitive decisions about surgical planning can be made effectively by patients and providers in a virtual setting. Patient satisfaction rates are generally high for telemedicine visits and similar to those for in-person visits, but reimbursement for telemedicine visits was notably lower in government payers.

Social Media Platforms in Otolaryngology: Does Twitter Affect Academic Impact?

Nima Vahidi, MD (Presenter); Vatsal Lal; Mathew Carli;
Adam Sima, PhD; Daniel H. Coelho, MD

Introduction: The aim of this study is to better understand the impact of social media platforms (eg, Twitter) in the field of otolaryngology-head and neck surgery.

Method: Articles published January 2015 in the top otolaryngology journals were analyzed. Electronic databases were searched including Google Scholar and Web of Science. Total accumulated Twitter mentions as well as article citations numbers were recorded in 2019. Correlations between tweets and citations were examined, as well as citation differences between tweeted and nontweeted articles.

Results: A total of 257 articles were published in the top 11 otolaryngology journals and included for analysis. The average Twitter mentions per article was 1.9, with a low to moderate correlation to number of citations. There was, however, a

significant difference in citations for tweeted vs not tweeted articles.

Conclusion: These data suggest a moderate correlation between tweets and article citations but a clear difference in the number of citations in articles tweeted vs those with no tweets. These data suggest the dissemination of knowledge may be affected by social medial platforms such as Twitter, although the relationship can only be described as associative rather than causative.

Zoom Into the Future: Constructing Head and Neck Treatment Plans via Telemedicine

Katherine Z. Xie (Presenter); Luis A. Antezana;
Sarah R. Yeakel, MHA, MBA; Eric J. Moore, MD

Introduction: COVID-19 has accelerated the need for virtual visits within health care. We examine whether otolaryngologists can make definitive treatment plans for new head and neck patients through a virtual video platform using existing chart information.

Method: An institutional review board exempt retrospective chart review was conducted of new patients presenting for treatment or second opinion via virtual video visits between January 2020 and December 2020 at our tertiary care institution. Treatment plan, visit outcomes, and information available in the chart at time of visit (biopsy, ultrasound, computed tomography [CT], magnetic resonance imaging [MRI], and positron emission tomography [PET]) was collected. Treatment plan was designated as the following: yes, a definitive plan was made or no, an additional in-person visit was required. Outcome measures included whether a follow-up was recommended (eg, clinic visits or surgery) and if a follow-up occurred.

Results: A total of 447 head and neck virtual visits were found, 124 of which were video visits for new patients. A treatment plan could be prescribed 88.7% of the time ($n = 110$). Fourteen patients required additional imaging, biopsy, or consultation with other departments to formulate a plan. A higher proportion of patients with tonsillar neoplasms (42.8%, $n = 3$) and thyroid nodules (57.1%, $n = 4$) needed in-person follow-up in comparison with other concerns. Of all patients, 89.5% were instructed to follow up ($n = 111$), 57.7% of which were for surgery ($n = 64$), 26.1% for clinic visits ($n = 29$), and 16.2% for miscellaneous other reasons (eg, fine-needle aspiration, radiation therapy, staging workup, consult; $n = 18$). CT scans were the most commonly available information in the chart for 54% of patients ($n = 67$), followed by biopsy report (30.6%, $n = 38$), MRI (27.4%, $n = 34$), PET (20.9%, $n = 26$), and ultrasound (18.5%, $n = 23$). For new patients with parotid-specific concerns ($n = 38$), a definitive treatment plan could be made for 97.3% ($n = 37$) and involved surgery 72.2% of the time ($n = 26$).

Conclusion: A high ability exists to make definitive treatment decisions about a new head and neck patient’s care through a virtual video visit platform, especially for parotid-related concerns. This study supports the feasibility of transitioning in-person head and neck visits to virtual.

Comprehensive Otolaryngology

Attitudes and Perceptions of Cauliflower Ear Among Jiu Jitsu Grapplers

Nicholas A. Rossi, MD (Presenter); Derek Spath, MD; Dayton L. Young, MD; Harold S. Pine, MD

Introduction: Cauliflower ear is an auricular deformity that results from untreated auricular hematoma, which leads to cartilaginous necrosis and subsequent neocartilage formation. Despite both cosmetic deformity and possible hearing loss in severe cases, cauliflower ear may be viewed as a badge of honor among grappling circles. This study aims to investigate the perception of cauliflower ear among jiu jitsu grapplers and to clarify their likelihood to seek consultation with an otolaryngologist.

Method: This survey study used an online survey consisting of 9 questions that were sent to all members of the Gracie Barra Brotherhood Facebook group, an online jiu jitsu community.

Results: A total of 82 responses were recorded, with 76.8% (63 of 82) of respondents having experienced auricular hematoma during their time training in jiu jitsu. Of those respondents, 31.7% (20 of 63) sought treatment for their auricular hematoma; however, only 7.1% (4 of 56) of respondents with cauliflower ear deformity planned to seek treatment in the future. No respondents reported regular use of ear protection, with only 8.5% (7 of 82) reporting occasional use. In addition, 26.8% (22 of 82) of respondents viewed cauliflower ear as cosmetically appealing, 24.4% (20 of 82) viewed it as unappealing, and 48.8% (40 of 82) viewed it neutrally.

Conclusion: Although many grapplers experience auricular hematomas and develop cauliflower ear deformity during their training, this study suggests that most do not seek treatment. Although this may be due to a positive perception of the appearance of cauliflower ear in grappling communities, most respondents did not find it cosmetically appealing. These findings can be useful for otolaryngologists to better understand the motivations and expectations of patients with auricular hematoma and cauliflower ear.

An Atypical Case of Atypical Mycobacteria: Lessons Learned

Vyas M. Prasad, FRCS (Presenter); Rebecca L. Heywood, FRCS

Introduction: Atypical mycobacterial disease in otolaryngology is well described and relatively common in the pediatric setting. Adult disease, especially in an otherwise healthy patient with no obvious soil- or water-borne source, is rare. We present an interesting case and discuss the lessons learned in her management.

Method: A 45-year-old woman underwent bimaxillary advancement surgery for obstructive sleep apnea in June 2020. She developed a 1-cm tender lump just right of her greater cornu of the hyoid bone 1 month thereafter, and a swelling on her right mandible over a fixation plate and was treated with oral co-amoxiclav and nonsteroidal anti-inflammatories.

Results: Her blood tests confirmed a raised C-reactive protein level (5.5 mg/mL) and antinuclear antibodies (ANA DS DNA). The ultrasound scan demonstrated a subcutaneous 1.2 × 1.0 × 1.2-cm lesion with heterogeneous internal echoes. A contrast-enhanced computed tomography scan taken prior to surgical excision demonstrated a rim-enhancing walled-off lesion reported as a reactive lymph node. A limited anterior neck dissection of the area of involvement was performed. Pus was sent and cultures were requested, including those for tuberculosis, atypical mycobacteria, and histology. A preliminary report of atypical mycobacterial disease was made from an acid-fast smear. A definitive diagnosis of *Mycobacterium chelonae* was isolated and confirmed several weeks thereafter.

Conclusion: Atypical cases of atypical mycobacterial disease are perhaps not as rare as we imagine. Our patient who had metal work in her jaw with swelling and a separate lump in her neck was not deemed unexplainable, and the clinical correlation with infection from the surgical site seemed most likely. The delay in deciding to operate and excise the lesion was partly because we did not consider other pathogenic causes. We hypothesize that the infection may have come from a water-borne source unrelated to her primary surgery. In summary, it is worth reminding ourselves that, even in adults, atypical mycobacterial diseases can be the reason for unexplained swellings in the head and neck, and a higher degree of suspicion and investigation are worth considering.

Chronic Cough Etiology Within a Tertiary Care Center: Retrospective Review

Amanda S. Siegel, MS (Presenter); Krittin J. Supapannachart, MPH; Sandeep Shelly, MPH; Adam M. Klein, MD

Introduction: Chronic cough occurs in 12% of the general population and is associated with significant morbidity. While etiologies of chronic cough are well described in primary care settings, less is known about patients requiring referral to subspecialty providers. Our aim was to report demographic and clinical characteristics of patients with chronic cough treated at a tertiary care facility.

Method: This is a retrospective chart review of patients with chronic cough seen by at least 1 cough specialist in the Emory Healthcare system between 2009 and 2020. Data on cough etiology, sociodemographic variables, and health behaviors were abstracted from provider notes in the electronic medical record. Analysis of variance and χ^2 tests were run to determine differences in sociodemographic variables between patients with varying primary cough etiologies.

Results: A total of 1152 patients were included in the study. Common etiologies of chronic cough were neurogenic (n = 196, 17%), gastroesophageal reflux disease (n = 114, 9.9%), asthma (n = 93, 8.1%), and chronic obstructive pulmonary disease (n = 80, 6.9%). In total 213 (18.5%) patients were deemed to have a multifactorial cough, and 99 (8.6%) patients were still undergoing further workup. Significant differences in age, sex, race, smoking status, and chronic cough duration

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were noted when comparing patients with different etiologies of chronic cough.

Conclusion: The most common etiology of chronic cough was neurogenic cough, typically a diagnosis of exclusion that goes undiagnosed in primary care settings. Many patients had a multifactorial cough, and others were still undergoing workup to determine a primary etiology. Such findings emphasize the importance of timely and multidisciplinary care of patients with chronic cough.

Defining the Microbiome of the Head and Neck

Ruwaa Samarrai, MD (Presenter); Samantha Frank, MD; Avery Lum; Kristina Woodis; Daniel S. Roberts, MD

Introduction: The purpose of this poster is to review the literature and define the microbiome of the head and neck.

Method: PubMed and Google Scholar were queried using combined keywords, such as “microbiome,” “head and neck,” and “otolaryngology.” Additional searches were made with particular subspecialty phrases, such as “sinonasal microbiome” or “tonsil microbiome” to maximize the yield of relevant titles. Relevant articles were selected for abstract review. Applicable abstracts were then selected for a review of the full text.

Results: Upon review of the literature, a number of species were repeatedly identified within the various studied head and neck subsites. Within the ear, *Corynebacterium* and *Staphylococcus* species were most dominant in the external ear and *Alloiococcus* was most commonly identified within the middle ear. *Fusobacterium* species were most frequently cited as colonizers of the larynx. Within the tonsils, the most common species identified were *Fusobacterium*, *Streptococcus*, and *Haemophilus influenzae*. Within the sinuses, the most commonly identified species were *Staphylococcus aureus* and *Streptococcus*, with anaerobic species such as *Fusobacterium* most commonly cited within subjects of dysbiosis or disease states.

Conclusion: The oropharyngeal subsites are locations prone to common diseases including otitis media, acute and recurrent tonsillitis, and chronic rhinosinusitis. Novel 16S ribosomal RNA sequencing techniques are now being used to better categorize and characterize the microbiomes of these regions, but the amount of attention received varies by subsite. Certain species have been identified as abundant in each of the aforementioned subsites. Future research of each of these subsites will lead to improved prevention, detection, and treatment of disease given our understanding of these core microbiomes and dysbiosis.

Ergonomics in Otolaryngologic Surgery: A State-of-the-Art Review

Zoe A. Walters, MD (Presenter); Katie Chang; Brian Cervenka, MD; Ryan Collar, MD, MBA; Tsung-yen Hsieh, MD

Introduction: Otolaryngology is a surgical field with a high degree of ergonomic risk. The use of head-mounted lighting, loupe magnification, endoscopes, and microscopes coupled

with repetitive, fine motor movements in a constrained anatomic field and static, ergonomically unfavorable postures are inherent to the field. We seek to review the otolaryngologic literature on ergonomics, including prevalence, severity, and interventions in decreasing work-related musculoskeletal pain experienced by surgeons.

Method: A systematic review was performed by 3 independent reviewers using electronic database literature searches through PubMed, Embase, and Cochrane Library. Search terms included combinations/variations of the following concepts: ergonomics, surgery, otolaryngology, work-related musculoskeletal disorders, chronic cervical pain, musculoskeletal, posture, surveys, microsurgery, and endoscopic surgery. The study was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines.

Results: The systematic review yielded 31 articles on ergonomics in otolaryngologic surgeries. Thirteen studies included data addressing surgeon-reported musculoskeletal pain with a mean prevalence of 77% (56.5%–97%). Eleven studies included objective measures of surgeon posture and ergonomic risk using the validated Rapid Upper Limb Assessment (RULA). The RULA score in these studies ranged from 3 (potential risk of injury) to 6+ (threatening immediate risk). Twelve studies discussed interventions to decrease ergonomic risk in otolaryngologic procedures with overall positive improvement, but there was significant variety in outcome measurements.

Conclusion: Chronic musculoskeletal pain is prevalent among otolaryngologic surgeons, with many of the otolaryngology procedures producing high ergonomic risk. Most studies evaluating interventions to decrease ergonomic risks demonstrate promising results, but standardization in methods and outcome reporting are needed for future studies.

Gender Inequality in Otolaryngology: A Case Series Reflecting Global Perspectives

Hawa Ali (Presenter); Farizeh Ahmed, MBBS; Thomas Hampton, MBBS; Joshua P. Wiedermann, MD; Filmawit Gebremeske

Introduction: Gender inequality continues to prevail in otolaryngology and impacts the experiences of women at all levels. The literature thus far has focused mainly on the experiences of women practicing in high-income countries. Little effort has been dedicated to the experiences and challenges of female trainees or surgeons in low- or middle-income countries. Similarly, there is a lack of perspectives from female patients while they interact with otolaryngology. The objective of this case series is to explore the impact of female gender on the experiences of patients, trainees, and surgeons in otolaryngology from low- and middle-income countries, as well as high-income countries.

Method: Participants were recruited from a global otolaryngology–head and neck surgery initiative. Interviews were conducted using open-ended questions relating to

several domains, such as personal experiences, career progression, work-life balance, and career decision making.

Results: A total of 6 cases are explored in this case report, 3 from low- and middle-income countries and 3 from high-income countries. One patient, 1 trainee, and 1 surgeon were interviewed from each region and their perspectives on gender explored. These cases illustrate some shared challenges of women involved in otolaryngology worldwide. In addition, there is an illustration of how gender inequality varies because of location or role.

Conclusion: Gender disparities are present at all levels in otolaryngology but can present differently depending on context. Identifying these and illustrating their impact through the experiences of our colleagues and patients will help address their needs. These cases serve as an opportunity to explore which resources and support systems are currently in place enabling our female counterparts to thrive and identify where opportunities for improvement, innovation, and future research are required.

High Speed Photographic Analysis of Aerosol Generating Procedures: Surgical Site Evacuation Effects

Kody G. Bolk, MD (Presenter); Michael E. Dunham, MD; Rohan R. Walvekar, MD; Kevin F. Hoffseth, MD; Beatriz Garcia, MD

Introduction: We aim to understand aerosolization of particles during simulated aerosol generating procedure and examine the effectiveness of evacuation systems designed to clear bio-aerosols and smoke from the surgical field. We analyze the evacuation of bioaerosols and smoke from the surgical field using high-speed photographic visualization of simulated surgical fields. This study is a response to the increased risk to health care workers in the operating room induced by COVID-19. It was completed in April 2021. We examined the effectiveness of surgical site evacuators to clear particles and protect operating room personnel during aerosol-generating procedures.

Methods: Surgical site aerosol clearance was evaluated using a model of the anterior neck and prototypes for surgical site evacuator ports created using 3-dimensional printing. A commercially available electrocautery handpiece fitted with an evacuator was tested on animal tissue for smoke clearance. Both systems were connected to a commercial vacuum-powered evacuation system. High-speed photography was used to record videos of the aerosols and plumes. Fields were recorded with and without evacuation. Outcomes were measured by visual inspection of the aerosol distribution in the recordings.

Results: Efficient aerosol clearance from an open surgical field using an evacuator port was dependent upon the port design, air-flow velocity, and placement relative to the aerosol generating site. The size and surface geometry of the surgical field were also important. Surgical smoke generated with electrocautery appeared to be cleared from the field by evacuation enclosures around the handpiece, even at high cautery power settings.

Conclusion: Bioaerosol and smoke generated during surgery are potential sources of respiratory pathogens and pose a threat to operating room personnel. Surgical site evacuation

can significantly reduce the volume of airborne particles in the field but requires careful design and deployment.

Inhalative Therapy of Sicca Symptoms in Patients With Sjögren's Syndrome

Benedikt Hofauer (Presenter); Simone Graf; Lara Kirschstein; Andreas Knopf

Introduction: Sjögren's syndrome (SjS) is the most common autoimmune disorder of the head and neck. The most common complaints of keratoconjunctivitis sicca and xerostomia are usually treated symptomatically, for example with saliva replacement therapy. As the hyposalivation in SjS also affects the laryngeal functions, the aim of this study was to evaluate the effect of an inhalative therapy on the general oropharyngeal sicca symptoms.

Method: Patients with primary SjS were included in this study. At baseline xerostomia, difficulties swallowing and hoarseness were evaluated with visual analogue scales, and the unstimulated salivary flow was measured. The European League Against Rheumatism (EULAR) Sjögren's Syndrome Patient Reported Index (ESSPRI) was used, and the quality of life was evaluated. Patients were treated with an inhalative therapy containing liposomes for a period of 2 months.

Results: A total of 48 patients with SjS were included in this study. There were no side effects to the inhalative therapy. Although the baseline xerostomia of 31.7 ± 14.9 improved to 26.2 ± 14.7 ($P < .001$), the reported difficulties swallowing and hoarseness did not change. The unstimulated salivary flow improved from 0.67 ± 0.54 mL/5 min to 0.85 ± 0.65 mL/5 min ($P = .038$). The ESSPRI, a validated endpoint containing the parameters of fatigue, pain, and dryness, improved from a baseline value of 5.07 ± 2.00 to 3.90 ± 2.11 ($P < .001$).

Conclusion: The inhalative therapy was able to improve validated subjective and objective outcome parameters in patients with SjS. These results enable us to estimate the effect of inhalation on sicca symptoms to set up a comparison with regular saliva replacement using sprays or rinses.

Lemierre's Syndrome With Cavernous Sinus Thrombosis: A Therapeutic Dilemma

Stefan Rozycki, MD (Presenter); Chandler M. Bennett, MD; Ryan A. Crane, MD

Introduction: Internal jugular vein septic thrombophlebitis, known as Lemierre's syndrome, is an uncommon complication of deep-space head and neck infections. Cavernous sinus thrombosis is another potential complication of head and neck infections. A clinical picture of these in combination is exceedingly rare. Here is a case of Lemierre's syndrome with complicating cavernous sinus thrombosis caused by a deep-space neck infection.

Method: A 21-year-old, previously healthy man presented to the emergency department for right facial swelling and bilateral pleuritic chest pain. A SARS-CoV-2 polymerase chain reaction nasopharyngeal swab, taken in the setting of upper respiratory infection symptoms, was negative 5 days prior. He was admitted to the intensive care unit (ICU) for medical management of facial cellulitis complicated by

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internal jugular vein thrombosis, mediastinitis, septic pulmonary emboli, and cavernous sinus thrombosis.

Results: Therapeutic anticoagulation and culture-directed therapy to *Fusobacterium necrophorum* were started. He developed pleural effusions attributed to pulmonary septic emboli requiring chest tubes and he developed a large subcapsular hepatic hematoma necessitating embolization. Throughout his course, he did not develop cranial nerve palsies consistent with cavernous sinus thrombosis syndrome, despite progressive imaging findings. After 2 weeks in the ICU, he was stabilized and then managed with long-term therapy.

Conclusion: This case demonstrates the challenges of treating 2 rare complications of deep-space neck infections in a patient with no identifiable site for surgical source control. The role of anticoagulation in Lemierre's syndrome and cavernous sinus thrombosis is controversial and not without great risk. The complications that can arise from both the disease process and treatment must be weighed in each case.

NSQIP Analysis of Postoperative Course for Patients Undergoing Lingual Tonsillectomy

Adrian Williamson, MD (Presenter);
Francesca Viola; Mattie R. Rosi-Schumacher, MD;
Steven W. Coutras, MD, FRACS;
Michele M. Carr, MD, DDS, MEd, PhD

Introduction: Lingual tonsillectomy is an uncommon procedure with little previous work done on its complications. Our goal was to describe contributors to prolonged length of stay (LOS).

Method: A retrospective analysis of patients who underwent lingual tonsillectomy with Current Procedural Terminology code 42870 was performed using the American College of Surgeons National Surgery Quality Improvement Program database (2014-2019). Clinical variables analyzed included demographics, comorbidities, complications, LOS, readmission, and reoperation.

Results: A total of 162 patients (70 [43.2%] males and 92 [56.3%] females) were included. Of those, 132 (81.5%) were White, 15 (9.3%) were Black, and the remainder were other races or their race was not indicated. In total, 33 (20.4%) were smokers; this was significantly more common among males (33% of males vs 11% of females, $P = .001$). Some 22 (13.6%) were diabetic, and 56 (34.6%) had hypertension treated with medications. The mean age was 52.1 years (95% CI, 49.8–54.3 years), and the mean body mass index was 31.4 kg/m² (95% CI, 30.4–32.5). Some 39 (24.1%) had a diagnosis of malignancy. Complications were rare: pneumonia in 3 (1.9%), reintubation in 2 (1.2%), ventilation >48 hours in 2 (1.2%), and cardiopulmonary resuscitation, sepsis, and urinary tract infection in 1 (0.6%) each. No bleeding was recorded. The median American Society of Anesthesiologists class was 2. Two patients (1.2%) returned to the operating room for related reasons, and 1 (0.6%) was readmitted for related reasons. The mean LOS was 1 day (95% CI, 0.7–1.4 days; range, 0–19). Linear regression showed that contributors to prolonged LOS included postoperative pneumonia ($\beta = 5.3$, $P < .001$), diabetes ($\beta = 1.2$,

$P = .03$), smoking history ($\beta = 0.8$, $P = .04$), and operative time ($\beta = .011$, $P < .001$).

Conclusion: This small, multi-institutional study shows that patients with diabetes or a smoking history are most at risk of prolonged LOS after lingual tonsillectomy.

Otolaryngology Journal Data-Sharing Policies: Adherence to the FAIR Principles

Austin L. Johnson (Presenter); Craig Cooper;
Trevor Torgerson; Lacy Brame; Michael Anderson;
Matt Vassar

Introduction: Sharing data plays an essential role in advancing scientific understanding. Here, we aim to identify commonalities or differences in data-sharing policies endorsed by otolaryngology journals and to assess adherence to the FAIR (findable, accessible, interoperable, reusable) principles.

Method: Data-sharing policies were searched among the top 10 otolaryngology journals, based on the Google h5-index. Preliminary data extraction followed the gold standard for data management: the FAIR principles for scientific data management and stewardship. Data were extracted in a duplicate, masked, and independent fashion.

Results: Of the 10 sampled journal data-sharing policies, *The Laryngoscope* adhered most to the FAIR principles (6/10; 60%). *The Laryngoscope* and *International Forum of Allergy & Rhinology* adhered to all “Findability” items of the FAIR principles. Eight of 10 policies (80%) designated that meta-data should have globally unique and persistent identifiers and 5 (5/10; 50%) policies outline that data should be described with rich metadata. Seven (7/10; 70%) and 9 (9/10; 90%) policies, respectively, specified that meta-data should clearly include the identifier of the data they describe and that meta-data should be indexed in a searchable resource. Zero policies outlined that meta-data should be retrievable by a standardized communication protocol and remain accessible even when the data is no longer available. All policies stated that meta-data should be presented in broadly applicable language for knowledge representation, but only 1 policy (1/10; 10%) specified use of vocabularies that follow the FAIR principles. Five policies (5/10; 50%) stated that meta-data should include qualified references to other meta-data, and 4 policies (4/10; 40%) outlined that meta-data should be richly described with a plurality of accurate and relevant attributes.

Conclusion: Otolaryngology journals have varying data-sharing policies, and adherence to the FAIR principles appears to be low. Further advancement in otolaryngology research requires transparency to allow results to be reproduced, confirmed, and debated.

Otorhinolaryngological Symptoms in COVID-19-Positive Health Care Workers

Erika Celis-Aguilar, MD (Presenter); Alejandra Isabel Espinoza-Valdez; Francelia Torres-Gerardo;
Natalia de Jesus Cantù-Cavazos

Introduction: COVID-19 is an emerging disease that affects health care workers because of their greater exposure to the

virus. There are few studies that describe the whole range of otolaryngologic manifestations in this population. The objective was to determine the prevalence of otorhinolaryngological symptoms in COVID-19–positive health care workers.

Method: A multicenter, symptoms survey was applied to health care workers with positive COVID-19 reverse transcriptase–polymerase chain reaction results from September 2020 to October 2020. An informed consent form was digitally signed. Google Forms software was used for the survey. Data was transferred to Microsoft Excel and IBM SPSS statistics, version 21.

Results: We included 209 health care workers: 55.5% were women, 44.5% were men, and 53% were 20 to 30 years old. One comorbidity was present in 56.4% of the population, 2 comorbidities in 12.9%, and 3 or more comorbidities in 3.8%; among those comorbidities, obesity (23.9%) and arterial hypertension (14.3%) were the most frequent. The main general symptoms were asthenia (81.3%), headache (76.1%), and fever (67.5%). Otolgic symptoms were otalgia (13.4%), vertigo (11.5%), tinnitus (8.1%), dizziness (8.1%), and 1 case of facial paralysis. Olfactory symptoms were anosmia (45%) and hyposmia (21.1%), and the main oral symptoms were xerostomia (44.4%), ageusia (33%), and hypogeusia in 25.4%. Neck symptoms were submandibular lymphadenopathy (11%) and 4 cases of thyroiditis (1.9%). A positive chest computed tomography scan for COVID-19 ($n = 92$) was significantly associated with olfactory symptoms ($P = .001$) and taste dysfunction ($P = .037$).

Conclusion: COVID-19–positive health care workers had a wide range of otorhinolaryngological manifestations, with the olfactory symptoms being the most common.

Presentation of COVID-19 Among the VA Greater Los Angeles Population

Tara J. Wu, MD (Presenter); Alice C. Yu;
Greg Orshansky, MD; Jivianne T. Lee, MD

Introduction: Few studies have examined the presentation and survival of veterans affected by COVID-19. This is the largest cohort study to investigate the presenting manifestations of COVID-19 and their implications on outcomes for this unique population.

Method: A retrospective review of 99 COVID-19 patients admitted to the Veterans Affairs Greater Los Angeles Healthcare System, encompassing 3 campuses and serving 1.4 million veterans, from March 2020 to October 2020 was performed. Clinical data including age, race, comorbidities, presenting symptoms, and hospital course were collected. Outcome measures included the need for intubation or tracheotomy and overall survival. Statistical analyses were performed using Kaplan-Meier survival curves, Cox proportional hazard ratios, and χ^2 tests.

Results: The mean age was 75.1 years ($SD \pm 10.2$ years). The most common presenting symptoms were cough (34.6%), dyspnea (33.7%), and fever (32.7%). Seventeen patients (16.8%) were intubated, and 6 patients (6.1%) underwent tracheotomy. A total of 33 patients (33.3%) died from COVID-19. Dyspnea

as a presenting symptom was significantly correlated with worse overall survival ($P = .009$), even after controlling for comorbidities such as diabetes and chronic lung disease. Dyspneic patients were most likely to require intubation ($P < .001$) or tracheotomy ($P = .001$) as compared with other symptoms. In addition, greater disease severity on presentation and use of supplemental oxygen, both associated with dyspnea, were significantly associated with decreased overall survival ($P < .001$; $P < .001$). Interestingly, 3 patients who presented for a ground-level fall secondary to dizziness passed away from complications of COVID-19 pneumonia. This presenting complaint was not seen in patients who survived.

Conclusion: This is the largest study of COVID-19 presentation and survival among veterans. Dyspnea was the presenting symptom most predictive of need for intubation, tracheotomy, and overall survival. Dizziness predicted poorer outcomes, possibly due to bedbound status predisposing patients to pulmonary complications.

Provider Satisfaction With Telemedicine in Otolaryngology During COVID-19

James Kim, MD (Presenter); Janet S. Choi, MD, MPH;
Soyun Park; Matthew Lin; Faiz Abdur-Rahman;
Courtney C. J. Voelker, MD, PhD

Introduction: Telemedicine has rapidly expanded in otolaryngology during the COVID-19 pandemic, with studies reporting high levels of patient satisfaction with telemedicine encounters. However, few studies have investigated provider satisfaction with telemedicine. This study aims to examine provider satisfaction with telemedicine in an outpatient otolaryngology clinic during the COVID-19 pandemic.

Method: Physicians who provided 1 or more encounters via telemedicine at a tertiary care center outpatient clinic from May 2020 to June 2020 were included in this study. Provider satisfaction was assessed using the Provider Satisfaction Questionnaire (range, 0–100), which is a previously designed instrument that assesses a provider's satisfaction with the quality of the patient–physician encounter. Participants completed a unique questionnaire for each telemedicine visit provided during the study period. As a comparative measure, participants also completed questionnaires for in-person encounters provided during the study period. Satisfaction between telemedicine and in-person encounters was compared using a 2-sample t test. Relationships between patient factors and provider satisfaction were analyzed with multivariate linear regression analysis.

Results: Physician satisfaction was high at 86.4 ± 15.4 among telemedicine encounters but relatively lower compared with in-person encounters $\Delta = -3.86$; 95% CI, -5.83 to -1.90). Telephone encounters (vs videoconference; $\beta = -3.72$; 95% CI, -6.26 to -1.17), patients reporting non-English as a preferred language ($\beta = -5.49$; 95% CI, -10.65 to -1.33), and new patient encounters (vs follow-up visits; $\beta = -2.53$; 95% CI, -4.56 to -0.51) were associated with lower physician satisfaction.

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Conclusion: Provider satisfaction was relatively lower for telemedicine encounters compared with in-person encounters during the COVID-19 pandemic. Telephone visits, non-English speaking patients, and new patient encounters were associated with lower physician satisfaction.

The Quality of Otolaryngology Literature Over the Last Decade

Michael J. Coulter, MD (Presenter); Tanner Miller, MD; Rebecca G. Brady, MD; Chandler M. Bennett, MD; Christopher M. Johnson, MD

Introduction: We seek to describe the changes in the otolaryngology literature over the last decade and to compare it with that of other surgical specialties.

Method: Based on impact factors, the top 8 clinical US otolaryngology journals were selected, and articles were analyzed from 2010 (Oto 2010) and 2020 (Oto 2020). This was also done for select neurosurgery, orthopedic, ophthalmology, and general surgery journals in 2020 (non-Oto 2020) for comparison. A power analysis indicated that a sample of 80 articles from each group would be necessary to detect compiled differences in evidence levels. To limit bias, each journal/year was sampled in the same month. Study type, levels of evidence, use of confidence intervals, and funding sources were collected.

Results: A total of 240 articles were analyzed for Oto 2010, Oto 2020, and non-Oto 2020. Compared with Oto 2020, levels 1 and 2 evidence were seen more frequently in Oto 2010 (15.0% vs 5.0%, $P = .035$) and in non-Oto 2020 (23.75% vs 5.0%, $P < .001$). Confidence intervals were reported more commonly in Oto 2020 than in Oto 2010 (40.0% vs 12.5%, $P < .001$), and no difference was identified between Oto 2020 and non-Oto 2020 (40.0% vs 23.75%, $P = .113$). There was no difference in the number of funded studies between Oto 2020 and Oto 2010 (33.75% vs 31.25%, $P = .736$); however, the non-Oto 2020 sample had significantly more funded studies than Oto 2020 (55.0% vs 33.75%, $P = .007$).

Conclusion: Based on this analysis, levels 1 and 2 evidence actually decreased in the otolaryngology literature over the last 10 years, and current levels lag behind other surgical specialties. Efforts should be undertaken by the otolaryngology community to remedy this apparent decrease in research quality to maintain a strong evidence base on which to support treatment decisions.

Quantifying Tracheal Graft Function In Vivo With Computational Fluid Dynamics

Barak Spector (Presenter); Lumei Liu; Kai Zhao; Tandy Chiang, MD

Introduction: Long-segment tracheal defects can be lethal; decellularized tracheal grafts (DTGs) are a potential solution for tracheal replacement. In this study, we aim to assess the feasibility of using computational fluid dynamics (CFD) to characterize the functional outcomes of DTG collapse, focusing on critical airflow dynamic properties.

Method: Sodium dodecyl sulfate–DTG and syngeneic tracheal grafts (STGs) were implanted to C57BJ/6L mice ($n = 6$ and 4, respectively). All STG-implanted mice survived, but 3 DTG mice were euthanized early due to respiratory distress. Micro computed tomography (micro-CT) was performed on animals on postoperative days 0, 3, 7, and 28 (endpoint) or when humane endpoints were met. Three-dimensional models were created from micro-CT using Amira for CFD analysis. The geometry was segmented to separate the inlet, outlet, and main tracheal airway. The mesh generated by ICEM was transferred to Ansys Fluent, in which the outlet was assigned a target mass flow rate dependent on a tidal volume of 15 mL/kg and a respiratory frequency of 200 breaths/minute. A simulation was run under these conditions, calculating inspiratory turbulent airflow. Static measurements of minimum cross-sectional area and airflow dynamic properties (resistance, flow rate, and velocity) were calculated.

Results: CFD analysis revealed that although the minimum cross-sectional area in each group dropped on day 3 compared with day 0, early euthanized DTG models showed a more dramatic decrease in minimum cross-sectional area, dropping 67.9% from the starting point, compared with STG and DTG models that survived to day 28, which dropped 48.6% and 40.8%, respectively. Airflow dynamic properties on day 3 revealed DTG of early euthanized mice had a higher resistance, lower average velocity, and lower flow rate than that of the STG model. Conversely, DTG models that survived to day 28 exhibited similar values on these airflow dynamic properties compared with that of STG models.

Conclusion: CFD can be a valuable tool to model graft function in models of tracheal replacement. The obtained metrics can provide an early prediction of DTG collapse and outcome in our animal model.

Survey on the Perceptions of Cannabidiol for Post-tonsillectomy Pain

Megan Swonke, MD (Presenter); Luis Neve, MD; Shiva Daram, MD

Introduction: Tonsillectomy is repeatedly cited as being associated with postoperative pain and functional limitations routinely lasting more than 7 days. Surgeons have been compelled to seek a means of controlling postoperative pain using non-narcotic medication to combat the current opioid crisis. Cannabidiol (CBD) is gaining interest as a potential adjuvant to nonnarcotic pain medication because of evidence of anti-inflammatory and analgesic properties. Herein, we present a survey study that presents data on the current prescription practices to address posttonsillectomy pain, the familiarity of CBD products, and the perception about prescribing CBD as an adjunct therapy to nonnarcotic pain medication.

Method: This is a cross-sectional survey study of the perceptions and understanding of the use of CBD for post-tonsillectomy pain.

Results: A survey was distributed to members of the Texas Academy of Otolaryngology from November 10, 2020, to

December 8, 2020. Of the 15 total respondents, 67% reported working in private practice; the remainder reported working at an academic institution. There were 7 respondents (47%) who reported routine administration of narcotic pain medication after tonsillectomy. If found to be beneficial in the treatment of postoperative pain, 87% and 67% of respondents reported considering the use of CBD to treat posttonsillectomy pain in adults and children, respectively. Most respondents (53%) envisioned using a combination of CBD and over-the-counter analgesics as part of their posttonsillectomy pain regimen; however, 33% report likely continued use of narcotic pain medication even if CBD became an accepted adjunct to control postoperative pain.

Conclusion: Our study showed that practicing otolaryngologists are amenable to the use of CBD as an adjunct for the treatment of posttonsillectomy pain. Although our generalizability is limited, this study highlights the need to explore adjuncts to help control postoperative pain. We aim to expand this study on a national scale to better understand current knowledge and perceptions in investigating CBD as an adjunct to posttonsillectomy pain control.

Titanium Tubes Prevent Post-op Otorrhea

Nathan Cheng (Presenter);
Jessie Zhang; David Cheng, MD

Introduction: Myringotomy, the surgical perforation of the eardrum to ventilate the middle ear space for the drainage and prevention of otitis media, can result in postoperative otorrhea in 1% to 18% of surgeries. Often, antibiotic ear drops are placed at the site of incision to help prevent bacterial infection.

Method: This study analyzes, in a retrospective manner, the results of 500 unique myringotomy procedures to correlate various variables with postsurgical otorrhea.

Results: The results find that 7% of surgeries that used titanium reuter bobbin tubes and 10.3% of surgeries that used fluoroplastic tubes resulted in otorrhea. Of the cases, 94.9% did not use antibiotics nor did they result in otorrhea. Of those that did use antibiotics, 67.5% resulted in otorrhea.

Conclusion: Titanium reuter bobbin tubes were found to be more effective than fluoroplastic tubes at preventing ear drainage. Moreover, the usage of antibiotic drops during the surgery appeared to have an insignificant effect in preventing otorrhea in patients.

Trigeminal Trophic Syndrome: A State-of-the-Art Review

Sarah Finucane, MD (Presenter); Poonam Dalwadi;
Kumaran Mudaliar, MD; Agnes Hurtuk, MD

Introduction: Trigeminal trophic syndrome (TTS) occurs because of damage to the trigeminal nerve or its sensory components. This comprehensive review, the first in the published literature, aims to report and document TTS and characterize the clinical presentation, diagnostic tests performed, and management strategies.

Method: The PubMed/MEDLINE, Scopus, and Cochrane databases were systematically reviewed according to the Preferred Reporting Systems for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to identify all cases of TTS published with an English translation from inception to December 2020.

Results: In total, 116 articles met inclusion criteria for analysis. A total of 183 patients with TTS were identified. There was a female predominance (77.8%), median age of 56.0 (range, 1–93) years. A trigeminal neurological insult was identified in 172 cases (95.6%). The most common etiologies were treatment for trigeminal neuralgia (33.9%) and cerebrovascular accident (21.9%). Cutaneous facial ulceration most commonly affected the maxillary (V2) division of the trigeminal nerve (90.2%). The nasal ala was affected in 144 (78.7%) patients. The left and right sides were affected with relatively equal frequency (43.2% vs 49.2%) with rare bilateral involvement (4.4%). Self-inflicted trauma, either self-reported or witnessed, occurred in 122 (66.7%) patients. Biopsy of the cutaneous ulceration was done in 105 (57.3%) patients to rule out other diagnoses. Patient education and medication were the most common treatment strategies. Surgery was performed in 32 (17.5%) patients with varying success.

Conclusion: TTS is a rare condition with a poorly understood pathogenesis. It should be suspected in a patient with nonhealing facial ulceration and associated paresthesias or anesthesia within the trigeminal nerve distribution. Biopsy of the ulcer is important to confirm the diagnosis and exclude malignancy. Treatment options include conservative and pharmacologic measures and, less commonly, surgery.

The Use of Systematic Reviews to Justify Otolaryngology Clinical Trials

Austin L. Johnson (Presenter); Craig Cooper; Andrew Ross;
Cole Wayant; Mason Skinner; Matt Vassar

Introduction: Current medical research is burdened with research waste from redundant studies. One such source of research waste derives from failing to perform a thorough examination of current literature to indicate whether conducting a new randomized controlled trial (RCT) is indeed warranted. The purpose of our study is to explore the extent to which systematic reviews (SRs) were used as justification for conducting RCTs in otolaryngology.

Method: The authors performed a meta-epidemiological, cross-sectional study of RCTs published in top peer-reviewed otorhinolaryngological journals according to Google Scholar Metrics. Authors were anonymized and data were extracted from the included studies using a pilot-tested Google Form. Data points extracted included the name of the study, the year and journal in which the study was published, and whether or not a study cited an SR in the introduction, methods, and discussion. If a study did cite an SR, the authors recorded whether or not that study used that SR as justification for the trial.

Results: Our PubMed search was performed on October 16th, 2018, and returned 304 results. Of the 304 articles retrieved, 151 were included. Overall, 41.7% (63/151) of

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studies did not reference an SR. Of the studies that did cite at least 1 SR, 27% (24/88) mentioned it as justification for conducting the trial. Of the 88 studies that did include an SR in their research, 55.6% (49/88) did not use an SR to justify conducting the trial.

Conclusion: SRs are frequently cited in otolaryngology RCTs, but only a small proportion of RCTs documented the use of SRs as justification for conducting the trial. Trialists should use evidence from existing SRs or discuss lack of SRs when developing a new trial to demonstrate that it is indeed warranted.

Virtual Implementations to Aways Rotations in Otolaryngology During COVID-19

Brandon R. Perez (Presenter); Nicholas R. Curran; Jeffrey Yu, MD

Introduction: The coronavirus pandemic suspended visiting student electives, which are an integral part of how residency applicants and residency programs determine fit prior to interviews and the match. As a result, many institutions were in need of developing ways of implementing remote learning tools, such as virtual clinical experiences. We discuss the many innovations utilized by residency programs to connect with interested students.

Method: This study used a systematic review and summary of the clinical literature that described the innovative virtual solutions programs designed to confer the benefits of traditional away rotations in the absence of in-person activity.

Results: We analyzed the literature and came up with 7 different innovations used by residency programs to connect with interested students. Those include live-stream surgeries, involvement in telehealth, virtual observation of rounds, involvement in research, invitations to join departmental educational activities, virtual small-group teaching sessions, and virtual residency meeting forums.

Conclusion: We believe that postandemic virtual interactions with students will continue and will complement in-person activities. In competitive matches, virtual interaction may lead to earlier mentorship to help students prepare to match into otolaryngology. This, in combination with excellent clinical performance of an in-person visiting student elective, may help applicants find the appropriate fit to a program. Continuing these efforts may allow for earlier connection of students with mentors and an increased awareness of applicants. This will help students of certain backgrounds, including those in medical schools without an academic otolaryngology department and those underrepresented in medicine. This pandemic has highlighted the importance of residency programs to make an effort that ensures a competitive match is more equitable. Ongoing virtual interactions with students for mentorship, recruitment for research, and educational preparation for in-person rotations will help students engage with the field of otolaryngology in the future.

Endocrine Surgery

Clinical and Economic Outcomes for Open vs Endoscopic Parathyroidectomy

Amy Zhu (Presenter); Manish Patel; Josette Kamel; Brandon R. Perez; Richard Chiu; Elliot Koo

Introduction: Endoscopic techniques have emerged in the past 2 decades as an alternative to the standard bilateral exploration and parathyroidectomy. This study compares patient demographics and the clinical and economic outcomes between these two approaches. We hypothesized no significant difference between endoscopic and open parathyroidectomies with respect to postoperative complications, mortality, length of stay, and total costs.

Method: A retrospective cohort analysis of the National Inpatient Sample queried from 2015 to 2017 used ICD-10 codes for all patients undergoing parathyroidectomy. Outcomes of open vs endoscopic parathyroidectomy were compared. Patients who underwent endoscopic to open conversion were excluded. The groups were then compared, with 1:1 propensity score matching to control for baseline presentation, with respect to postoperative complications, mortality rates, discharge disposition, length of stay, and total cost.

Results: Patients meeting inclusion criteria included 2751 open and 60 endoscopic parathyroidectomy. Patients who underwent endoscopic parathyroidectomy were significantly younger (49.78 ± 19.42 vs 55.41 ± 16.20 ; $P = .008$) with lower mortality risk ($P = .01$) than those who underwent open parathyroidectomy. Primary diagnosis differed significantly between groups ($P = .009$), with more endoscopic patients having primary hyperparathyroidism (55.0% vs 38.2%). Total hospital charges were 25.3% (~\$15,000) greater per patient in the endoscopic group, without statistical significance ($P = .105$). Postoperative complications, mortality, length of stay, and discharge disposition did not differ significantly between groups.

Conclusion: Endoscopic parathyroidectomy was not associated with significant differences in hypocalcemia, mortality, discharge disposition, length of stay, or cost.

Complications in the Surgical Management of Micropapillary Thyroid Carcinoma

Tyler J. Light, MD (Presenter); Michael Tao; Mary Hitchcock; Natalia Arroyo; David O. Francis, MD

Introduction: Recent guidelines endorse a de-escalated approach to the treatment of micropapillary thyroid cancer (<1 cm), with a recommendation to perform lobectomy rather than total thyroidectomy. However, uptake of these recommendations has been modest, at best, partly because clinicians lack adequate evidence to understand the differential risk profiles. The goal of this systematic review/meta-analysis was to compare complications between lobectomy and total thyroidectomy for treatment of micropapillary thyroid cancer.

Method: A systematic review of the PubMed databases was queried with a search strategy implemented by reference librarians between years 1990 and 2018. Two investigators independently reviewed abstracts and full texts based on inclusion criteria. Risk of bias and strength of evidence were assessed for each included article. Surgical complications including vocal fold paralysis, hypocalcemia and hypoparathyroidism, and need for thyroid replacement were quantified and meta-analyzed.

Results: A total of 1441 abstracts were reviewed, and 8 articles were included; 5 provided data on lobectomy (LOB; n = 900), and 6 provided data on total thyroidectomy (TT; n = 1825). Temporary vocal fold paralysis for LOB and TT were 2.0% and 3.9%, respectively. Permanent vocal fold paralysis occurred in 0% vs 0.7%, respectively. There was a 2-fold increased odds of vocal fold paralysis for TT vs LOB. Hypocalcemia and hypoparathyroidism (HYPO) were combined for analysis. Rate of temporary HYPO was 1.6% vs 23.1%, and permanent HYPO was 0% vs 1.8%, for LOB and TT, respectively. Of articles reporting thyroid replacement, supplementation was required in 36% vs 95% of LOB and TT patients.

Conclusion: Complications in the surgical management of micropapillary thyroid carcinoma increase with the extent of surgery performed. The body of literature lacks randomized clinical trials and relies on observational case-control studies and case series. A better understanding of the differential complication risks is needed for patient counseling.

Diagnostic Value of Machine Learning Approach to Thyroid Cancer Patients

Valeria Dell'Era (Presenter); Massimiliano Garzaro; Melissa Raia; Michele Starnini; Alan Perotti; Paolo Aluffi Valenti

Introduction: Thyroid nodules are very common, 5% to 15% of which are malignant. Despite the low mortality rate of well-differentiated thyroid cancer, some variants may behave aggressively, making nodule differentiation mandatory. Ultrasound and fine-needle aspiration biopsy are simple, safe, cost-effective, and accurate diagnostic tools but could have some limits. Recently, machine learning (ML) approaches have been successfully applied to health care data sets to predict the outcome of surgical procedures. The aim of this work is to use the application of ML to predict tumor histology (HIS), aggressiveness, and postsurgical complications of thyroid patients.

Method: This retrospective study was conducted at the ENT Division of Eastern Piedmont University, Novara, Italy, and reported data about 1216 patients who underwent surgery between January 2006 and December 2018. For each patient, general information, HIS, and outcomes were reported. For each prediction task, we trained ML models on presurgery features as well as on both pre- and postsurgery data. The ML pipeline included data cleaning, oversampling to deal with unbalanced data sets, exploration of hyperparameters space

for random forest models, testing their stability, and ranking feature importance.

Results: The main results were (1) the construction of a rich, hand-curated, open data set including pre- and postsurgery features and (2) the development of accurate yet explainable ML models. Results highlight prescreening as the most important feature to predict HIS and aggressiveness and also identify which variables are related to a higher complications rate and longer hospital stay.

Conclusion: Our work suggests how ML models can find patterns in thyroid patient data and could support clinicians to refine diagnostic tools and improve their accuracy.

Four-Dimensional Computed Tomography for Parathyroid Adenoma Localization

Julie A. Highland, MD (Presenter); Hilary C. McCrary, MD, MPH; Vanessa F. Torrecillas, MD; Brody King; Lauren Slattery; Jason P. Hunt, MD

Introduction: There is currently no consensus on the ideal preoperative imaging study for localizing parathyroid adenomas. Limited data have shown that 4-dimensional computed tomography (4D CT) is superior to sestamibi in lateralizing lesions, but the objective localization ability and clinical utility of 4D CT has not been well established.

Method: We developed a prospectively maintained database of adult patients who underwent parathyroidectomy at our tertiary referral institution between 2014 and 2019. We evaluated differences in diagnostic imaging modalities and how their utility differed based on intraoperative findings. Patients who underwent 4D CT were included. When conducted, ultrasound (US) was performed by 1 experienced endocrinologist. Secondary and tertiary hyperparathyroidism cases were excluded. Descriptive statistics and sensitivity and specificity analyses were performed.

Results: In total, 63 patients met inclusion criteria, of which 35% were male. The mean age was 61.6 years. Accuracy of location match was as follows: sestamibi = 43.75%, US = 54.5%, and 4D CT = 66.6%. Some 48 patients (76%) underwent 4D CT after other nonlocalizing imaging; of these patients, 4D CT imaging localized adenoma in 54.2%. There were 7 cases of revision parathyroidectomy, and 4D CT was localizing in 6 of those cases (86%), whereas ultrasound was localizing in 1 (14%). In detecting multigland disease, the sensitivity of 4D CT imaging was 85%, with true-positives defined as those that CT correctly called lesions at multiple locations; specificity was 60%, with true-negatives as those that CT correctly called not multigland. There was a higher rate of false positives (17.5%; incorrectly identifying a single gland when multigland disease existed) than false negatives (8%; incorrectly identifying multigland when there was single gland disease).

Conclusion: Our data support 4D CT as a superior imaging modality for localizing parathyroid adenoma, particularly when other imaging modalities are nonlocalizing or in revision cases.

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Impact of Income Disparity on Patients Undergoing Thyroidectomy

Smriti Nair (Presenter); Sudeepti Vedula; Alexandra Gomez; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Thyroidectomy is a common treatment modality for benign and malignant thyroid neoplasms. In this study, we aim to examine the association between income status and outcomes following thyroidectomy. This relationship has not yet been examined among existing literature.

Method: The Nationwide Inpatient Sample dataset from 2012 to 2017 was used to identify patients between the ages of 0 and 90 who underwent thyroidectomy. Patients were stratified based on incomes, with lower income defined as less than \$51,000 and higher income defined as greater than or equal to \$51,000. Univariate and multivariate analyses were then conducted to compare outcomes between the two cohorts.

Results: A total of 32,863 cases of thyroidectomy were identified. Most of these patients were 51 to 60 years old (22.2%), White race (60.9%), and female (73.9%). After accounting for age, race, and gender, patients with a higher income status were less likely to be admitted to urban teaching hospitals (odds ratio [OR], 0.920 [95% CI, 0.895–0.945]; $P < .001$). Furthermore, patients with higher income status were more likely to have a shorter hospital stay (OR, 0.996 [95% CI, 0.994–0.997]; $P < .001$).

Conclusion: Patients who underwent thyroidectomy with higher income were less likely to be admitted to urban teaching hospitals and had shorter lengths of stay. These findings reflect the importance of considering income status as a significant contributing variable in surgical procedures.

Impact of Insurer on Papillary Thyroid Carcinoma Outcomes, Stage, and Treatment Modalities

Nathan J. Wallace (Presenter); J. Pieter Noordzij, MD; Taha Mur, MD

Introduction: We aimed to appreciate the upward trend of thyroid cancer diagnoses in the United States, and explain the impact of insurer on papillary thyroid cancer outcomes. We recognize the need for further study of social determinants of health. Data acquisition was still underway during the initial submission deadline. Once analyzed, the data warrants “late-breaking” status given the compelling nature of the findings, which further advances the discussion regarding health care access in the United States.

Methods: Those patients with primary site thyroid tumors from 2007 to 2016 and papillary consistent histology were extracted from the SEER database. These parameters yielded 103,219 participants for demographic, extent of disease, and treatment parameter study and 103,025 for outcome studies.

Results: Approximately 89.6% were insured by either private insurance or Medicare, whereas the remaining were covered by Medicaid. Compared with their counterparts, those with Medicaid were more likely to have stage T3 or greater

disease at presentation (27.1% vs 21.4%) and lymph node involvement (3.7% vs 1.01%). Similarly, those with Medicaid exhibited poorer overall (98.0%, 90.9%, 81.6% vs 98.9%, 95.0%, 90.0%; $P < .0001$) and cause-specific (99.3%, 98.0%, 95.8% vs 99.7%, 99.1%, 98.4%; $P < .0001$) survival after 1, 5, and 9 years, respectively. No significant differences of treatment modalities were appreciated between the 2 groups.

Conclusion: While papillary thyroid carcinoma boasts excellent survival, this study seems to demonstrate that the insurer has a significant impact on the mortality and stage at presentation while having little effect on treatment modalities. Given that all of these patients are insured, it is likely that factors other than health care coverage are playing a role.

The Impact of Medicaid Expansion on Papillary Thyroid Cancer Outcomes

Yeshwant Chillakuru (Presenter); Timothy Shim, MD; Christina Darwish; Daniel Benito, MD; Ashkan Monfared, MD

Introduction: The relationship between Medicaid expansion and thyroid cancer outcomes has not been well established. We use papillary thyroid carcinoma (PTC) to demonstrate the impact of the 2014 Medicaid expansion on treatment access and outcomes.

Method: Using the National Cancer Database, we constructed a longitudinal panel model with facility level aggregate data to evaluate the impact of Medicaid expansion on treatment access between participating and nonparticipating states. The pseudorandom process of Medicaid expansion and construction of facility-level panel data allowed for an isolated analysis of Medicaid expansion on treatment modalities with minimal confounders. Similarly, Kaplan-Meier was used to examine survival differences between pre- and postexpansion cohorts.

Results: A total of 442 facilities with data aggregated from 5979 PTC patients with no insurance or Medicaid were followed from 2011 to 2016. Medicaid expansion resulted in a 1.51 ± 0.26 percentage point decrease in uninsured rate ($P < .001$). However, longitudinal panel models showed that Medicaid expansion had no impact on likelihood of receiving treatment or time to treatment. In stage 3 and 4 PTC, no difference in overall 3-year survival was observed between participating and nonparticipating states in the pre-expansion period (log-rank $P = .703$) and post-expansion period (log-rank $P = .568$).

Conclusion: Despite increasing coverage, Medicaid expansion did not significantly affect treatment modality, time to treatment, or short-term survival in PTC.

Independent Predictors of Poor Prognosis in Well-Differentiated Thyroid Cancer

Khawla Karra (Presenter); William Guertin; Louis Guertin, MD, FRCSC

Introduction: With the widespread use of ultrasound-guided fine-needle aspiration biopsy, more indolent forms of thyroid cancer (TC) and early tumor stages are found, which can lead

to overdiagnosis and overtreatment. The aim of this study is to identify the clinical and paraclinical indicators that would allow us to identify differentiated TC at low risk from those at intermediate and high risk to offer them an appropriate initial treatment.

Method: A retrospective chart review was conducted. Demographic, clinical, imaging, and histological features were gathered from patients who underwent thyroid surgery from 2010 to 2017. The cohort was divided into 2 study groups based on the presence or absence of malignancy. A subgroup analysis was done among patients with well-differentiated thyroid cancer (WDTC). The histologic subtypes were recorded as a binary result: positive for high-risk tumors (follicular thyroid cancer and intermediate and high-risk papillary thyroid cancer [PTC]) and negative for low-risk tumors (low-risk PTC). Logistic regression models were used to assess the correlation between the demographic, clinical and imaging variables, and histopathology result.

Results: A total of 756 patients were included. 42.3% had a WDTC and 12.5% had a high-risk tumor. Malignancy was associated with younger age, absence of tracheal deviation, preoperative serum thyrotropin (TSH) levels, hypoechogenicity, microcalcifications and irregular margins ($P < .05$). Male sex, radiation history, preoperative serum calcitonin levels, substernal extension, tracheal compression, solid nodule, absence of halo, and central vascularization were not statistically significant. Younger age (odds ratio [OR]: 2.504, $P = .046$), preoperative serum TSH levels (OR: 1.412, $P = .025$), and microcalcifications (OR: 3.465, $P = .002$) were independent predictors of malignancy. Only microcalcifications (OR: 2.287, $P = .025$) were associated with an increased risk of diagnosing a high-risk tumor.

Conclusion: Younger age, higher preoperative serum TSH levels, and microcalcifications were independent predictors of high-risk TC, enabling the ability to identify high-risk tumors that could benefit from total thyroidectomy. Clinical factors of poor prognosis, such as male sex and history of radiation, were not predictors of high-risk TC.

An Intraoperative Surprise: An Occult Case of Parathyroid Carcinoma

Peter Eskander (Presenter); Brette C. Harding, MD, MS; Tabitha L. Galloway, MD

Introduction: Parathyroid carcinoma is a rare cause of hyperparathyroidism that typically presents with mean serum parathyroid hormone (PTH) concentrations 5- to 10-fold higher than the upper limit of normal with a mean serum calcium concentration between 14.6 and 15.9 mg/dL. Nonfunctioning parathyroid carcinomas, less than 2% of parathyroid carcinomas, are exceedingly rare and can more closely resemble parathyroid adenoma/hyperplasia on preoperative workup. This disease represents a unique subset of parathyroid carcinomas that are rarely addressed in the literature.

Method: A retrospective chart review of a single case at a tertiary care institution with literature review was performed with institutional review board acknowledgment.

Results: A 57-year-old man presented for surgical evaluation with progressive fatigue, back/hip pain, trouble with memory and concentration, and a history of nephrolithiasis. Lab work revealed hypercalcemia (10.4 mg/dL), hypercalciuria (>965 mg/24 hours), and hyperparathyroidism (87.3 pg/mL). Imaging suggested a left, inferior parathyroid adenoma. Surgical resection occurred with appropriate intraoperative PTH regression. Further dissection revealed a paratracheal mass invading the esophagus noted to be a lymph node with parathyroid tissue within it, diagnosing parathyroid carcinoma. Esophageal muscle resection, left thyroid lobectomy, and left central dissection occurred. Genetic testing was negative, and the patient underwent adjuvant radiation with no evidence of recurrence at 1-year posttreatment. Surveillance has proven more arduous when compared with classic parathyroid carcinomas, and in a malignancy where the recurrence rates are high, this challenge is important to recognize.

Conclusion: Parathyroid carcinomas are the rarest endocrine malignancy, and distinguishing them from parathyroid adenoma/hyperplasia can be challenging in the seldom encountered setting of mildly elevated lab abnormalities and absent neck masses. This medical predicament is poorly represented in modern literature, and this case description will contribute to the available knowledge about this rare cancer.

Operative Time and Complications Following Thyroidectomy for Thyroid Cancer

Vivienne Au (Presenter); Ariel Omiunu; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: The impact of operative time (OT) on patient outcomes following thyroidectomy is not well understood. Our study aims to investigate the association between longer OT and postoperative complications in patients undergoing thyroidectomy for thyroid cancer.

Method: The National Surgical Quality Improvement Program was used to analyze patients undergoing thyroidectomy for malignancy between 2005 and 2018. Chi-squared analysis, independent-sample t test, and logistic regression were used to assess the effects of variables on postoperative complications.

Results: A total of 34,286 patients who underwent thyroidectomy for thyroid cancer were included. The median OT (133 minutes) was used to categorize patients into 2 cohorts: ≤ 133 and > 133 minutes. Male sex, younger age, higher American Society of Anesthesiologists physical status classification (III and IV), and races other than White and Black were associated with prolonged OT (48 hours), sepsis, pneumonia, reintubation, prolonged hospital stay (> 2 days), and unplanned admission.

Conclusion: This study found that certain demographic parameters and comorbidities are associated with longer OT in patients who underwent thyroidectomy for malignancy. Prolonged OT was also associated with the increased incidence of postoperative complications.

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Reconsidering “Taller Than Wide”: Predicting Thyroid Malignancy via Ratio Continuum

Aviva S. Mattingly (Presenter); Julia E. Noel, MD;
Lisa A. Orloff, MD

Introduction: The Thyroid Imaging Reporting and Data Systems (ACR TI-RADS) assigns 3 points for taller than wide shape as a predictor of thyroid malignancy guiding fine-needle aspiration biopsy (FNAB). We aim to investigate aspect ratio of nodules as a continuous rather than binary variable predicting malignancy.

Method: This retrospective study included adult patients with thyroid nodules who underwent FNAB and thyroid surgery from 2010 to 2020. Independent variables included nodule height, width, length, and aspect ratio (height:width). The primary outcome of interest was histologic diagnosis. We determined association with malignancy through logistic regression and evaluated the discriminatory value of aspect ratio in predicting malignancy using a receiver-operating curve (ROC).

Results: Of 412 adult patients, most were female (75%), White (55%), with a mean age of 50 years (range, 18–85). Of the nodules, 42% were solid, 49% were hypoechoic, and 38% had punctate echogenic foci. Mean nodule height was 1.71 cm (range, 0.31–6.60 cm), width 2.08 cm (range, 0.34–9.93 cm), and length 2.67 cm (range, 0.38–10.40 cm). Mean height:width ratio was 0.86 (range, 0.29–1.68), and height:length 0.69 (range, 0.26–1.71). On pathology, 40% of nodules were benign while 60% of nodules were malignant, of which 90% were papillary carcinomas. The height:width ratio was positively associated with malignancy (odds ratio [OR] 7.93, 95% CI, 3.06–20.52; $P < .0001$) as was the height:length ratio (OR 25.49, 95% CI, 7.34–88.48; $P < .0001$). The optimal height:width cutoff point was 0.98 (specificity 85%, sensitivity 36%) and the height:length cutoff point was 0.69 (specificity 74%, sensitivity 54%). When evaluating the ROC, there was a progressive increase in specificity and decrease in sensitivity as ratio increased.

Conclusion: While this analysis supports the height:width ratio of >1 as a specific predictor of malignancy, the presence of malignancy in nodules with a height:width ratio of <1 suggests that thyroid nodule aspect ratio is better considered as a continuum. It remains important to interpret nodular dimensions in the context of other suspicious findings.

Substernal Thyroidectomy Outcomes Analysis Based on Preoperative Imaging

Amanda I. Atkins, MD (Presenter); Natalie Derise, MD;
Christopher Gentile, MD; Erin P. Buczek, MD

Introduction: Although most substernal goiters can be removed through a transcervical approach, sternotomy is sometimes necessary. This study aims to evaluate which patients are at highest risk of requiring thoracic surgery (TS)

involvement based on preoperative imaging. Prior studies have focused on using limited imaging findings for prediction but not a comprehensive evaluation.

Method: This is a retrospective chart review with outcomes analysis of 254 substernal thyroid operations from March 2010 to July 2020 at a tertiary medical center. The study evaluated patients with substernal thyroid disease undergoing transcervical approach to resection. Independent variables were patient demographics and several categories of cross sectional imaging findings. The dependent variables included intraoperative TS involvement (including sternotomy) and outcomes. Results were determined using standard statistical analysis.

Results: In total, 173 cases had preoperative imaging that met the inclusion criteria. Fifteen cases required a TS intraoperative consult and 9 of those required a sternotomy. Between this group and the cases that did not require TS, there were significant differences in the imaging categories of extension of goiter below the aortic arch (73% vs 12%, $P = .0001$), extension to the carina (73% vs 8.2%, $P = .00001$), and involvement of multiple mediastinal compartments (73% vs 12%, $P = .000182$). Conversely, 61 of 63 patients with goiter extension to the level of the aortic arch did not require TS involvement. There were 3 patients with imaging showing true retroesophageal goiter extension, and all 3 required a sternotomy. Tracheal deviation and compression were common imaging findings (92% and 64%, respectively) overall and were similar in both groups.

Conclusion: Most substernal goiters can be removed through a transcervical approach including many that extend well below the thoracic inlet. Goiter extension below the aortic arch, to the carina, and into multiple mediastinal compartments was far more common in the group requiring TS and should prompt preoperative thoracic surgery involvement.

Facial Plastic and Reconstructive Surgery

Analysis of Patients Undergoing Cosmetic Surgery in an Academic Practice

Cameron Todd, MD (Presenter); Lauren Himes;
Brian Downs, MD

Introduction: Facial cosmetic surgery is largely performed in the private practice setting, and the demographics of patients undergoing cosmetic surgery in the academic setting have not been well characterized.

Method: A retrospective chart review was performed of patients undergoing cosmetic surgery in the operating room by fellowship-trained facial plastic surgeons at a single academic institution from 2015 to 2019. Combination cases with functional components covered by insurance were included.

Results: Over the course of a 5-year period, 152 cosmetic surgical procedures were performed by all surgeons. This represented 13% of all operative procedures performed. Of the

152 cosmetic procedures, 33% were combination procedures with other functional procedures covered by insurance and 20% of patients were male. In total, 88% of patients undergoing cosmetic procedures were White, 6% other, 4% Asian, and 1% American Indian or Alaska Native.

Conclusion: One-third of facial cosmetic surgery procedures in our academic practice are performed in combination with functional components included. The patient population in this study was composed of more males and more Whites as compared with larger national demographic data.

Auricular “Hematomas” Amid COVID-19: Is This a Different Pathophysiology?

Mohammad Abraham Kazemizadeh-Gol, MD (Presenter);
Ziad Rohayem

Introduction: An increase in auricular fluid collections with and without a history of trauma was noticed in our clinical practice during the COVID-19 pandemic. We sought to describe these cases and suggest that masks might be exerting pressure on the helical root or folding the ear in a way that makes the pinna more susceptible to fluid buildup.

Method: A retrospective review was conducted of patients who presented to a private practice ambulatory otolaryngology clinic during the COVID-19 pandemic from January 2020 to January 2021 with auricular fluid collections. The investigated variables included history of trauma, character of the fluid collection, and involved anatomic location.

Results: Twelve auricular fluid collections in 10 patients, aged 17 to 81 years, were identified. Five of 12 did not have a history of trauma. Anatomically, nontraumatic fluid collections and traumatic fluid collections, respectively, involved the helical root, concha cymba, and/or triangular fossa region 40% and 28% of the time and the scapha 60% and 72% of the time. Of the nontraumatic fluid collections, 40% were serous effusions and 60% were serosanguinous, whereas none of the traumatic hematomas were serous effusions.

Conclusion: The anatomic location and serous or serosanguinous nature of the nontraumatic hematomas could represent a different underlying pathophysiology of auricular fluid collections in the COVID-19 era.

Brief Workforce Analysis of Facial Plastic and Reconstructive Surgeons

Kyle Singerman (Presenter); Adam McCann, MD;
Firas Houssein; Ryan Collar, MD, MBA; Tsung-yen Hsieh, MD

Introduction: Facial plastic and reconstructive surgery (FPRS) is a growing discipline that incorporates an expanding variety of reconstructive and cosmetic procedures in both academic and private practice settings. This project addresses the paucity of literature regarding practice patterns in FPRS, which is vital information for both current and future practitioners as the field continues to grow.

Method: This case-control study featured an academic cohort (AFPRS) based on employment at an academic teaching hospital, as well as a private practice cohort (PFPRS).

Cohorts were case matched along geographic lines. Online data derived through public records as well as both institution and self-reported information were collected for providers with American Academy of Facial Plastic and Reconstructive Surgery-credentialed training. Demographic data, industry payments, social media presence, and practice type were tabulated. Statistical analysis was performed using chi-squared, *t* tests, and Mann-Whitney *U* tests.

Results: AFPRS (*n* = 190) have been in practice for a median 9 years vs 15 years for PFPRS (*n* = 190; *P* < .001) and work with a mean 2.5 other FPRS vs 1.2 in PFPRS (*P* < .001). The AFPRS cohort is 74% male, as well as 66% White, 25% Asian, and <10% Black/Hispanic/Middle Eastern. Some 65 AFPRS have active Instagram accounts (median 896 followers) as compared with 158 PFPRS (median 1487 followers; *P* < .001). AFPRS received a mean \$3173 in any 1 year from industry vs \$9347 for PFPRS (*P* < .01). We found that 98% of AFPRS reported regularly performing reconstructive procedures vs 63% of PFPRS (*P* < .001). There was also a significantly higher proportion of reported facial reanimation, cleft lip/palate, and free tissue transfer as major parts of AFPRS practices versus PFPRS (*P* < .001).

Conclusion: Broad differences appear to exist between FPRS surgeons depending on their practice setting. These discrepancies may reflect both employment patterns as well as physician-industry and physician-patient interaction in the field of FPRS.

Clinical Outcome Study After External Approach Septoplasty

Ji-Yun Choi, MD (Presenter)

Introduction: This study aims to investigate the indications of external approach septoplasty and improvement in subjective symptoms and objective parameters in patients who underwent external approach septoplasty to correct septal deviation with various types of deformities.

Method: A total of 31 patients who underwent external approach septoplasty from October 2014 to January 2019 were classified by direction, location, and degree of nasal septal deviation, septal shape, and surgical techniques. Through acoustic rhinometry, the minimum cross-sectional area and nasal volume were measured before and after surgery. To evaluate the improvement in symptoms, the Nasal Obstruction Symptom Evaluation (NOSE) survey and nasal congestion visual analogue scale (VAS) were also measured.

Results: We found significant correlations between the following: the direction and degree of nasal septal deviation, the location and degree of nasal septal deviation, septal shape and location of the nasal septal deviation, septal shape and surgical techniques, and the degree of nasal septal deviation and presence of spreader grafts. The NOSE scale following external approach septoplasty improved from 14.7 ± 4.4 to 3.1 ± 3.2 (*P* < .001), while the VAS score improved from 7.2 ± 2.3 to 1.2 ± 1.4 (*P* < .001). Also, acoustic rhinometry showed that the minimum cross-sectional area and nasal volume at the convex side of nasal cavity significantly increased after surgery.

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Conclusion: The external approach septoplasty is a surgical technique that is effective not only in improving subjective symptoms but also in improving objective parameters. External approach septoplasty could be used in case of caudal and/or dorsal nasal septal deviation.

Combined Surgical/Nonsurgical Approaches Improve Oral Symmetry in Facial Synkinesis

Emily Sagalow (Presenter); Kurren Gill, MD; Raphael Banoub, MD; Joel Stanek, MD; Howard Krein, MD, PhD; Ryan Heffelfinger, MD

Introduction: Facial synkinesis and paralysis can cause significant patient distress as it interferes with activities of daily living such as eating, drinking, and communicating using facial expressions. We aim to compare overall oral symmetry (OS) (oral commissure excursion, commissure height deviation, smile angle, upper lip height, and lower lip height) before and after surgical and nonsurgical interventions in facial synkinesis patients.

Method: Patients with facial nerve synkinesis were identified at a single academic institution between January 2008 and June 2020. Patient portrait images were analyzed before and after interventions (preoperative or postoperative botulinum toxin, selective neurolysis, temporalis transfer, or facial rehabilitation) using a facial analysis software, Emotrics (Massachusetts Eye and Ear). Outcome measures included oral commissure excursion and height deviation, smile angle, and upper and lower lip height.

Results: Of 126 patients with facial nerve impairment, 40 (32%) had synkinesis and 112 (89%) had paralysis/paresis. Seven patients had pre- and postintervention photos suitable for smile comparison. Nonsurgical interventions included botulinum toxin (preoperative: 3, postoperative: 3) and facial rehabilitation (1). Surgical intervention included selective neurolysis (5) and temporalis transfer (1). Mean follow-up was 30.4 days (range, 2–83). The greatest improvement in oral commissure excursion and oral commissure height deviation was with temporalis transfer ($P < .0001$ and $P < .0001$, respectively). Overall OS improved after preoperative Botox ($P = .045$), surgery ($P = .036$), and facial nerve rehabilitation ($P = .069$). On average, patients showed a 30% improvement between their first and most recent photos. Combined surgical-nonsurgical intervention demonstrated greater overall OS improvement compared with surgical or nonsurgical intervention alone ($P = .013$).

Conclusion: We advocate for combined surgical-nonsurgical management to achieve the greatest improvement in overall oral symmetry in patients with facial synkinesis.

Comprehensive Reconstruction of the External Nose

Sara Negrello (Presenter); Giacomo Colletti, MD; Sabina Figurelli; Alexandre Anesi; Luigi Chiarini

Introduction: Nasal defects caused by oncological procedures, trauma, substance abuse, and congenital defect produce

very diverse needs for an optimal reconstruction. A varied, complete, and rational approach is needed to obtain satisfying results.

Method: Based on 200 patients' experience, we tried to systematize the reconstruction. A Burget and Menick subunit concept was applied to grafts and local and interpolated flaps.

Results: Simple and composite grafts were very rarely used and mainly in old patients refusing more articulated procedures. Local flaps such as bilobed, Lemmo flap, and nasal septal flaps were used to reconstruct single-layer defects of the outer or inner lining. Interpolated refined nasojugal flaps were used to reconstruct the alae. Forehead flaps were used to reconstruct major full-thickness defects. Contextual mucosal flaps and cartilage graft were used to rebuild the nasal architecture. More complex cases such as those caused by arrhinia and cocaine abuse needed a multistep procedure.

Conclusion: While partial loss of substance of the nose is frequently easy to reconstruct, more extensive ones require a particular commitment to master all the techniques and adopt the best one. Arrhinia and nasal destruction after substance abuse are the most challenging ones. A systematic and methodical approach may grant pleasing results in most cases.

Descriptive Analysis of Physicians Answering Rhinoplasty Questions on Social Media

Jeff Gao (Presenter); Christopher C. Tseng; Guy Talmor, MD; Boris Paskhover, MD

Introduction: Rhinoplasty is one of the most common facial plastics procedures. Patients are increasingly turning to online resources to better inform their decisions. The objective of this study is to investigate the demographics of physicians who respond to patient questions regarding rhinoplasty on social media.

Method: Physician responses to the most viewed patient questions regarding rhinoplasty as of February 2020 on RealSelf.com, a social media website for cosmetic surgeries, were collected. A descriptive analysis of physicians who posted answers to patient questions was performed, including physician specialty, location of practice, and years of experience.

Results: A total of 65,901 physician responses to 2014 patient questions about rhinoplasty were collected. Most responses were from board-certified facial plastic surgeons (48.0%) followed by plastic surgeons (44.4%), physicians with unspecified specialty (4.4%), general otolaryngologists (2.7%), and oculoplastic surgeons (0.4%). Most responses were from physicians located in the major metropolitan areas of Los Angeles (23.1%), New York City (12.4%), Seattle (6.4%), Chicago (5.3%), and Miami (3.5%). These physicians had an average 22.8 years (standard deviation, 11.4 years; range, 1–56 years; median, 22 years) of experience.

Conclusion: Most physicians responding to questions about rhinoplasty on RealSelf.com are either board-certified facial plastic surgeons or plastic surgeons from major metropolitan areas and have an average 22.8 years of experience. Our study

shows that physicians maximizing their social media presence are likely more experienced surgeons currently working in high-demand areas, lending increased credibility to the quality of answers given online about rhinoplasty.

Evolution of Head and Neck Trauma: Iraq and Afghanistan, 2016-2019

John W. Lally, MD (Presenter); Matthew L. Ward, MD; William Smithee, MD; Jon Robitschek, MD; Scott Bevans, MD

Introduction: This study aims to define the number and type of facial and penetrating neck injuries sustained in combat operations in Iraq and Afghanistan from 2016 to 2019 by comparing recent injury patterns to previously published data.

Method: The Department of Defense Trauma Registry (DoDTR) was queried for *International Statistical Classification of Diseases, Ninth Revision (ICD-9)* and *International Statistical Classification of Diseases, Tenth Revision (ICD-10)* diagnostic codes for facial and neck injuries from Iraq and Afghanistan from May 2003 to 1 December 2019. Data from the last 3 years were the focus of this project. Injury patterns, severity, and patient demographics were collected, assessed, and compared to previously published data from combat operations from May 2003 to May 2016.

Results: During this 3-year period, 283 active duty service members sustained a total of 656 discrete head and neck injuries. There were far fewer injuries per year than in previous combat injury studies for active service members. Of these 656 total injuries, 487 (74.2%) were soft-tissue wounds and 169 (25.8%) were fracture injuries. Head/forehead/scalp (24%), eyelid/orbit (19%), and ear/tymanic membrane (14%) were the most common sites of soft-tissue injury. Fractures of the maxilla (23%), mandible (15%), and skull base (15%) were the most commonly skeletal sites of injury. The rate of head and neck injury reported was far less than the rates seen from 2003 to 2011 and 2011 to 2016.

Conclusion: Penetrating neck and facial injuries are still present in modern warfare; however, the overall prevalence of these injuries within our active duty service member population has decreased since 2015. This decrease is consistent with our evolving operational mission. Although these head and neck injuries in an active duty population have decreased, military contractors, foreign nationals, and civilians have still been susceptible to these injury patterns and treated within Role 2/3 treatment facilities. Thus, the downrange surgeon should feel comfortable assessing and managing these injuries. Trending injury characteristics and demographic data is an important exercise for assessing our military medical readiness to support and defend.

Facial Injuries From Professional Mixed Martial Arts Fighting

Alexander J. Jones, MD (Presenter); Alhasan Elghouche; Taha Shipchandler; Dominic Vernon

Introduction: Mixed martial arts (MMA) is a highly popular combative sport involving striking and grappling that imposes

a high risk of incurring facial injuries, many of which require repair by facial plastic surgeons. We therefore sought to identify the facial injuries and associated risk factors of these fights.

Method: A review of the Nevada State Athletic Commission injury reports from all professional Ultimate Fighting Championship bouts from 2010 to 2020 was performed. Data collected included fighter age, sex, weight class, rounds fought, result of the fighter, how the match ended, and facial injuries. Binary logistic regressions were performed to determine predictive factors of facial injuries, presented as (*P* value; odds ratio [95% CI]).

Results: A total of 1462 fighters across 731 contests were included. Most participants were male (91.0%) with a mean age of 29.5 ± 4.1 years. Weight classes ranged from 115 to 265 lb, with most fights taking place between 135 and 185 lb. Most bouts lasted ≥ 3 rounds (59.4%) and resulted in judges' decision (50.5%) or knockout (TKO, 31.2%). The rate of facial injury was 15.8%, which was predominantly lacerations (12.0%). Facial fractures were mostly nasal or orbital and less common (3.6%). Multivariate regression revealed being male ($P = .026$; 2.27 [1.11–4.66]), heavier weight ($P = .028$; 1.00 [1.00–1.01]), rounds fought ($P = .019$; 1.22 [1.03–1.45]), losing ($P < .001$; 2.09 [1.55–2.81]), and nonsubmission outcomes ($P = .017$, 1.79 [1.11–2.86]) predicted incurring any facial injury. Factors predicting facial lacerations included sex ($P = .026$; 2.67 [1.13–6.30]), weight ($P = .059$; 1.00 [1.00–1.01]), rounds fought ($P < .001$; 1.43 [1.18–1.72]), and losing ($P = .006$; 1.57 [1.14–2.17]). Facial fractures were predicted by losing ($P < .001$; 6.83 [3.05–15.27]) and outcome of disqualification ($P = .021$; 6.68 [1.32–33.34]) or TKO ($P < .001$; 3.10 [1.75–5.49]).

Conclusion: MMA fighting imposes a high risk of facial injuries. Patients who engage in this sport should be counseled on these risks.

Impact of COVID-19 on Head and Neck Free Flap Volume

Shannon S. Wu (Presenter); Dane Genter, MD; Peter Ciolek, MD; Brandon Prendes, MD; Brandon Hopkins, MD; Jamie Ku, MD

Introduction: This study aims to demonstrate the utility of a novel electronic medical record (EMR) dashboard by assessing the impact of COVID-19 on surgical volume and short-term postoperative outcomes of head and neck surgical patients undergoing free flap reconstruction.

Method: An EMR dashboard grouped surgical encounters by Current Procedural Terminology codes to view summaries and trends in real time at a tertiary academic institution. Outcomes of head and neck surgical patients undergoing microvascular free flap reconstruction, primarily for cancer diagnoses, were compared between 2019 and 2020 to assess COVID-19 impact. Hospital length of stay was assessed with *t* test, and 30-day return to emergency department (ED), readmission/observation, return to operating room, and postoperative bleeding were assessed with Fisher exact test.

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Results: In 2019 190 free flap procedures were performed compared with 131 procedures in 2020, a 31.1% volume decline. Mean hospital length of stay for free flap procedures was 8.6 ± 6.0 days in 2019 and 9.1 ± 6.6 days in 2020 ($P = .482$). For 2019 vs 2020, return to ED rates were 21.6% vs 27.5% ($P = .369$); observation/readmission rates were 18.4% vs 10.7% ($P = .117$); postoperative hemorrhage rates were 5.8% vs 12.2% ($P = .070$); return to OR rates were 3.2% vs 8.4% ($P = .753$); and mortality rates were 0% vs 1.5% ($P = .169$), respectively. For all complications, there was no statistical difference detected between years.

Conclusion: The novel EMR dashboard provided summaries of changes to surgical volume and postoperative outcomes in real time. Surgical volume for head and neck free flap procedures decreased significantly during the COVID-19 pandemic. Despite selection bias for more complicated cases due to cancellation of both elective and nonelective procedures, complication rates in our cohort remained stable indicating no adverse effects on patient safety.

Impact of Malnutrition on Postoperative Outcomes Following Facial Fracture Repair

Ariel Omiunu (Presenter); Giovanna Mele;
Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: There is currently a limited understanding of the impact of malnutrition on postoperative outcomes. We aim to investigate the role of preoperative albumin levels, as a marker for malnutrition, in postoperative complications in patients undergoing surgical repair of facial fractures.

Method: The National Surgical Quality Improvement Program database was queried for patients who underwent facial fracture repair from 2005 to 2015. Patients were stratified into two cohorts based on their albumin levels: low (<3.5 g/dL) and normal (≥ 3.5 g/dL). Patient characteristics and postoperative outcomes were compared between the 2 patient cohorts. Multivariate analysis was performed to identify risk factors for complications.

Results: A total of 855 patients were identified. Of those, 726 patients (84.9%) had normal albumin levels and 129 (15.1%) had low albumin levels. Patients with low albumin were more likely to be older (53.0 ± 16.9 years vs 44.1 ± 17.6 years, $P < .001$) and have an American Society of Anesthesiologists classification of III or IV (62.0% vs 38.0%, $P < .001$). Hypoalbuminemia was associated with the following comorbid conditions: ventilator dependency (4.7% vs 0.1%, $P < .001$), bleeding disorder (10.1% vs 2.1%, $P < .001$), history of weight loss (3.1% vs 1.0%, $P = .047$), renal failure (0.8% vs 0.0%, $P = .018$), ascites (0.8% vs 0.0%, $P = .018$), history of transfusion (3.9% vs 0.3%, $P < .001$), and poor functional status (9.3% vs 2.5%, $P < .001$). Multivariate analysis did not yield any significant differences between the 2 groups.

Conclusion: Patients undergoing facial fracture repair were older with poorer functional status. However, the present study suggests that malnutrition is not an independent predictor of postoperative outcomes in patients undergoing facial fracture repair.

Independent Predictors for Body Dysmorphic Disorder in Cosmetic and Functional Rhinoplasty

Khawla Karra (Presenter); Nagi El Sabbagh;
Sami Pierre Moubayed

Introduction: The Standardized Cosmesis and Health Nasal Outcomes Survey (SCHNOS) questionnaire evaluates functional and cosmetic outcomes in rhinoplasty, and we believe that SCHNOS reliably and independently predicts body dysmorphic disorder (BDD). In this study, we correlate SCHNOS and the Body Dysmorphic Disorder Questionnaire–Aesthetic Surgery (BDDQ-AS) results in rhinoplasty patients and identify the SCHNOS items that most strongly predict BDD outcome.

Method: A retrospective chart review was conducted at a single-surgeon facial plastic surgery practice. The electronic medical records of patients 18 years of age and older who consulted for primary or revision, esthetic, or functional rhinoplasty between July 2017 and November 2019 and who completed the SCHNOS and BDDQ-AS questionnaires upon initial consultation were reviewed by 2 independent reviewers. The correlation between SCHNOS individual question items and the BDDQ-AS binary result was based on the questionnaires filled out by the patient at the time of first consultation. The preoperative BDDQ-AS results were recorded as positive or negative. The preoperative SCHNOS esthetic, functional, and mood components were calculated. SCHNOS items receiver-operating characteristic curves predicting BDD were calculated via bivariate and multivariate analysis.

Results: Of the 382 patients included, 32.2% screened positive for BDDQ-AS. A positive screen was associated with younger age ($P = .003$), female gender ($P < .001$), prior cosmetic surgery ($P = .002$), SCHNOS-C item questions 5 through 10 (all $P < .001$), as well as consultation for cosmetic concerns ($P < .001$). History of psychiatric disease was not found to be statistically significant. SCHNOS questions 5 (odds ratio [OR] 1.427; $P < .001$) and 9 (OR 1.690; $P = .001$) were independent predictors of BDD with significantly elevated sensitivities and specificities, positive predictive values, and negative predictive values.

Conclusion: BDD treatment is nonsurgical. Accurate screening is therefore paramount in rhinoplasty practice. Questions 5 and 9 of the SCHNOS-A are independent predictors of a positive BDD screen, with question 9 having the highest sensitivity and specificity, enabling correct identification of patients with BDD and further management guidance of such patients.

Longest Multi-segment Spinal Reconstruction Using Fibula Osseous Free Flap for Chronic Osteomyelitis

Kaitlyne Y. Pak, MD (Presenter); Sameep P. Kadakia, MD; Collin Smith, DO; Danieal Quinones, MD

Introduction: We aim to recognize the indications of complicated cervical vertebral osteomyelitis that could use anterior reconstruction with vascularized fibula flap and posterior reconstruction using a trapezius myocutaneous pedicled flap. We examine the pre- and postoperative complications of hardware failure in a patient with history of anterior cervical corpectomy and fusion. We demonstrate the longest segment of spinal reconstruction with a single-strut, vascularized, osseous fibular free flap. Reconstruction of the spine using vascularized osseous free flaps has been well documented in the medical literature, but to our knowledge, this case represents the longest segment of spinal reconstruction with a single-strut, vascularized, osseous fibular free flap.

Methods: This case represents the longest segment of spinal reconstruction with a single-strut, vascularized, osseous fibular free flap. Our patient with a longstanding history of intravenous drug abuse and C4-C7 anterior cervical corpectomy and fusion presented acutely to the emergency department with purulent anterior neck drainage, upper extremity weakness and paresthesias.

Results: Imaging obtained showed evidence of hardware failure. In the setting of the patient's repeated hardware replacement with continued infection, autologous grafting material was considered as an alternative means for spinal stability, and a multilevel cervical reconstruction, involving C3-T1, with an anterior reconstruction using a vascularized fibula flap and posterior reconstruction using a trapezius myocutaneous pedicled flap was decided on as the best reconstructive option.

Conclusion: Reconstruction of the spine using vascularized osseous free flaps has been well documented in the medical literature, but to our knowledge, this case represents the longest segment of spinal reconstruction with a single-strut, vascularized, osseous fibular free flap. Our complex presented case emphasizes the utility of the free vascularized fibula for multilevel cervical spine reconstruction in the setting of chronic osteomyelitis.

Outpatient Free Tissue Transfer in Response to COVID-19-Related Restrictions

Kevin J. Contrera, MD, MPH (Presenter); Daniel Hewes, MD; Patrick Byrne, MD, MBA; Dane Genther, MD; Brandon Prendes, MD; Michael A. Fritz, MD

Introduction: Inpatient hospitalization is nearly universal after head and neck reconstruction using free tissue transfer; however, the use of minimal access vascularization techniques and low morbidity flaps have allowed for significantly abbreviated stays without compromising patient outcomes. This experience has led to the management of select patients on an outpatient basis during the COVID-19 pandemic.

Method: Due to COVID-related hospital policies restricting inpatient admission for nonemergent and nononcologic surgeries, 2 patients elected for outpatient free tissue transfer for management of mandibular osteoradionecrosis with anterolateral thigh fascia lata rescue flaps. Patient selection, management, and outcomes are presented along with a review of the literature.

Results: Two patients, ages 62 and 70 years, with intermediate medical comorbidities and histories of chemoradiation for oropharyngeal cancer presented with progressive osteoradionecrosis refractory to conservative management, including debridement and hyperbaric oxygen therapy. They underwent further mandibular debridement and anterolateral thigh fascia lata free tissue transfer vascularized by minimal access approaches to facial and superficial temporal vessels. Surgical procedures lasted an average of 4.4 hours (range, 3.1–5.4) with placement of a facial Penrose drain that was removed prior to discharge and a leg Jackson-Pratt drain that was removed in clinic the following week. The patients were discharged home the same day (7.3 hours after surgical closure) and the following morning (21.2 hours after surgical closure). They have been followed for an average duration of 53 days (range, 39–67) with no known complications.

Conclusion: This case series represents the shortest reported hospital duration for head and neck free tissue transfer. Outpatient status was determined through a combination of case selection, patient decision, and constraints secondary to COVID-19 hospital utilization. This report suggests that outpatient free flap surgery is safe under select circumstances.

Patient Perception Regarding Timing of Facial Fracture Repair

Prashanthi Divakar (Presenter); Nithya Puttige Ramesh; Cybele Arsan; Eric Holmgren

Introduction: Often, patients will suffer a facial fracture, and initial presentation, referral, medical stability, and operating room and/or surgeon availability may lead to treatment delay. The psychological impact of living with an untreated fracture can be overlooked and hard to assess. This study aims to depict patient perception patterns and impact on quality of life.

Method: A prospective questionnaire study was performed of patients with facial fractures who underwent operative repair at a rural tertiary care academic hospital between November 2018 and November 2020. Patients were given a survey preoperatively at the inpatient floor, outpatient clinic, or preoperative holding. Data analyzed included demographics, fracture data, and a validated quality of life enjoyment and satisfaction—short form (Q-LES-Q-SF) modified for facial trauma.

Results: In total, 21 patients were included (mean age, 46.47 years). Of these, 85.71% were male and 100% identified as White. The most common etiologies included fall (33.33%), followed by assault (28.57%). Most patients were employed (66.67%) and had a mandible fracture (76.19%). Most surveys (57.14%) were administered in the preoperative holding; 71.43% did not feel that timing of the fracture diagnosis was long, and

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66.67% agreed that time between diagnosis to surgery was reasonable; 42.86% did not mind waiting a few more days, but 80.95% reported that postponing the surgery by a week would bother them; 61.90% preferred to be home prior to surgery date, and 66.67% wanted same-day discharge home postoperatively. Q-LES-Q-SF analysis noted that 61.90% reported severe impairment in quality of life as a result of the facial fracture.

Conclusion: Patient perception of the timing of facial fracture repair and quality of life are important aspects of patient care. Our patient cohort felt that the diagnosis timing and repair was reasonable and preferred outpatient surgery. Most patients did report severe impairment in quality of life. Future directions include data set expansion and correlation of perception and quality of life based on fracture type.

Practice Patterns for the Treatment of Acute Peripheral Facial Palsy

Christine M. Clark, MD (Presenter); Keon M. Parsa, MD; Alexandra Welschmeyer; Shakti Nayar, MD; Eugenia Chu, MD; Michael J. Reilly, MD

Introduction: The aims of this study are to describe the current trends in the management of acute peripheral facial palsy (APFP) among a local cohort of practicing otolaryngologists, neurologists, and emergency medicine providers and to determine if differences exist by specialty, level of training, and prior formal education regarding APFP.

Method: A cross-sectional online survey was distributed to practicing otolaryngologists, neurologists, and emergency medicine providers in the Washington, DC, metropolitan area via Survey Monkey. Residents in these fields were eligible for inclusion. General demographic information as well as prescribing practices and management strategies for APFP were elicited. Statistical analysis via Pearson chi-square testing will be performed.

Results: Preliminary data are available from 19 otolaryngologists, 52.6% of whom were attending physicians, 42.1% were residents, and 5.3% were advanced practice providers. Of these, 52.6% indicated that they see 1 to 5 new patients with APFP per year. Respondents' approaches to the evaluation of APFP were varied, with 15.8% routinely ordering Herpes virus and Lyme titers, and 31.5% routinely recommending magnetic resonance imaging. With regard to management, 73.7% indicated that they do not refer patients with APFP for facial physical therapy. All respondents indicated that they typically prescribe prednisone for nondiabetic patients with APFP; however, there were variabilities in dosing, taper, and duration of treatment. Of respondents, 73.7% reported that they routinely prescribe antivirals; however, there was no consensus regarding medication choice, dosing, or treatment duration. Follow-up routines also differed among respondents, with the majority (52.6%) indicating that they follow patients on a monthly basis until their condition is resolved or stable.

Conclusion: There is considerable variability in the paradigms used in the evaluation and management of acute peripheral facial palsy.

Predictors of Wound Complications Following Paramedian Forehead Flap Reconstruction

Tirth R. Patel, MD (Presenter); Michael Eggerstedt; Matthew J. Urban; Ryan Smith; Peter C. Revenaugh, MD

Introduction: While complication rates for paramedian forehead flaps (PMFF) are low, it is still unclear which groups of patients are at highest risk of complication. This study aims to identify risk factors for wound failure in patients undergoing PMFF.

Method: The American College of Surgeons—National Surgical Quality Improvement Program (ACS-NSQIP) database files from 2012 to 2018 were analyzed to identify patients undergoing PMFF. Patients who suffered a postoperative surgical site infection, wound disruption, or unplanned return to the operating room were deemed as having had a wound complication. Demographic factors, comorbidities, preoperative lab results, and other details related to the surgery were extracted from the ACS-NSQIP database. These variables then were compared between the groups of patients who did and did not have wound complications to identify factors that would be predictive of wound complications.

Results: Wound complications were present in 55 of 1268 cases (4.3%). On multivariate logistic regression analysis, presence of disseminated cancer ($P = .009$) and albumin level less than 3.5 mg/dL preoperatively ($P = .018$) were significant predictors of wound complications. Nonsignificant variables for wound complications included age, body mass index, smoking history, coagulopathy, operative time, surgeon specialty, year of surgery, and annual quarter.

Conclusion: Wound complications in PMFF surgery are rare. Lower serum albumin levels and presence of disseminated cancer are associated with a greater risk of wound complications.

Prophylactic Postoperative Antibiotic Use in Primary Rhinoplasty

Brittany T. Abud, MD (Presenter); Ibrahim Salah; Tatiana Dixon, MD; Julia Kerolus, MD

Introduction: Routine antibiotic prophylaxis following rhinoplasty is common practice; however, there is limited evidence to support its efficacy in preventing postoperative infections. The purpose of this study is to evaluate infection rate after primary rhinoplasty in patients treated with and without systemic postoperative antibiotics. We also explore risk factors for infection in these 2 groups.

Method: A retrospective chart review was conducted for all patients who underwent primary rhinoplasty or septorhinoplasty at a single tertiary care center from January 2019 to June 2020. Primary outcomes included development of postoperative infection and treatment methods.

Results: Our population included 46 primary rhinoplasties, 32 of which received postoperative antibiotics. In patients who got antibiotics, the mean age was 31.1 years, 15 (46.9%) patients were male, average body mass index (BMI) was 27.7, and 13 patients had comorbidities. In this group, 21 (65.6%)

were open and 16 (50%) had osteotomies. Cartilage grafting was done in 26 (81.3%) patients: 14 (38.5%) used native septum, 7 (26.9%) rib, 3 (11.5%) ear, and 2 (7.7%) temporalis fascia. In patients who did not receive antibiotics, the mean age was 33.2 years, 9 (64.3%) patients were male, the average BMI was 27, and 6 patients had comorbidities. In this group, 11 (78.6%) were open and 10 (71.4%) had osteotomies. Cartilage grafting was done in 12 (85.7%) patients: 10 (83.3%) used native septum, 1 (8.3%) rib, and 1 (8.3%) temporalis fascia. In patients who did not receive antibiotics, none developed infections. In patients who received antibiotics, 2 developed infections, for a rate of 0.063. Neither had comorbidities, and both underwent open septorhinoplasty with rib cartilage harvesting.

Conclusion: There was no increased rate of infectious complications after primary rhinoplasty in patients who did not receive postoperative antibiotics. This suggests that there may not be a role for postoperative antibiotics after primary rhinoplasty. Further studies should be done; however, this is a step forward in antibiotic stewardship as well as in standardizing postoperative rhinoplasty care.

Quantitative Analysis of Positional Changes in Nasal Tip Geometry

Ariel M. Azhdam (Presenter); Gene C. Liu, MD;
Henry H. Chen; Matthew K. Lee, MD

Introduction: It is a currently accepted tenet in facial plastic surgery that the positioning of a patient (supine or upright) influences nasal tip geometry due to the effects of gravity on the soft tissues of the nose. However, empirical data to support this commonly taught principle is lacking. In the current study, we sought to assess the validity of this principle, in addition to quantifying the degree of change in tip rotation and projection.

Method: Subjects >18 years of age with no history of prior nasal surgery were recruited for this study from December 2020 to January 2021. The photographic environment was standardized with dual studio lighting and set photographic subject distance, with all photos being taken using the same digital single-lens reflex camera. Photos were obtained in all standard rhinoplasty views, in addition to a lateral supine photo. Nasal tip geometry was analyzed using a variety of methods, including measurements of the nasolabial angle, nasofrontal angle, and assessment of nasal tip projection by the Baum, Powell, Simon, and Goode methods. Statistical analysis was performed using a paired-samples *t* test to assess for any significant differences in nasal tip geometry between the upright and supine positions.

Results: Twenty subjects (10 male, 10 female) were included in the study, with an average age of 40.5 years. Mean nasolabial angle was 89.1° in the upright position and 92.8° in the supine position. This positional change in tip rotation (mean = 3.7°) was statistically significant at $P < .05$. The mean nasofrontal angle was measured at 134.8° in the upright position and 134.3° in the supine position (not significant). There were no significant positional changes in tip projection with any of the methods used for measurement.

Conclusion: Nasal tip rotation does appear to be affected by gravitational changes secondary to patient positioning. This finding has clinical implications for cosmetic and functional rhinoplasty.

Role for Bedside Neck Exploration for Interrogating Free Flap Compromise

Quinn Dunlap, MD (Presenter); James R. Gardner, MD;
Deanne King, MD, PhD; Emre Vural, MD;
Jumin Sunde, MD; Mauricio Moreno, MD

Introduction: Flap compromise following free tissue transfer (FFT) for head and neck reconstruction has an incidence of approximately 5% across studies. We present our experience and outcomes with the use of bedside neck exploration for instances of loss of Doppler signal in the context of equivocal clinical exam in order to limit false positive results necessitating reoperation.

Method: We conducted a retrospective chart review of 371 patients who underwent FTT at an academic tertiary center from January 2017 to October 2020. All patients with equivocal clinical exam with loss of Doppler signal prompting bedside neck exploration by an experienced microvascular surgeon were included. The primary endpoints for this study were etiology of Doppler signal loss, necessary return to the operating room (RtOR), and rate of flap salvage.

Results: Nine patients underwent bedside exploration for assessment of the microvascular pedicle. In 5 of 9 cases, RtOR was avoided. Coupler malfunction was detected and corrected in 4 of 5 cases, and a venous kink was found and remedied in 1 of 5 cases. All 5 cases were discharged as previously planned. Four patients required RtOR: early venous thrombosis requiring thrombectomy with anastomotic revision, evacuation of compressive hematoma, and release of external compression. The average time from bedside exploration to the OR was 111 minutes. No venous-related total flap failures were observed in this cohort. Avoidance of RtOR provided an estimated cost saving of \$9222 per event, for a total savings of \$46,110.

Conclusion: Bedside neck exploration constitutes a safe and cost-effective intermediary to determine definitive need for RtOR, as well as for correction of simple etiologies of flap compromise, in instances of equivocal clinical exam with loss of implantable Doppler signal.

Surgical Outcomes of Septal Extension Graft Supported by Polycaprolactone Plate

Ji-Yun Choi, MD (Presenter)

Introduction: Tip plasty using a septal extension graft (SEG) is useful in the Asian population. However, complications such as decreased tip projection, infection, or deviation are noted postsurgery, and additional support using an SEG is often necessary. We aimed to transplant an additional 3-dimensionally (3D)-printed polycaprolactone (PCL) graft to the tip plasty using the SEG to reinforce the SEG.

Method: The study included 43 patients (20 males and 23 females; mean age, 28.7 years; range, 17–58 years) who

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received rhinoplasties using the SEG method combined with a 3D-printed PCL graft from November 2016 to August 2017. The mean observation period was 14.8 months (range, 12–20 months).

Results: In total, 26 patients rated their satisfaction level as excellent, 13 rated good, 3 rated fair, and 1 rated poor. In total, 28 patients did not exhibit tip drooping at the 1-year follow-up, 13 patients demonstrated mild to moderate tip drooping, and 2 patients demonstrated severe tip drooping. Some 31 patients demonstrated “stiffness” of the nasal tip, of which 11 patients reported discomfort and 20 patients reported none; 2 patients demonstrated deviation of the tip.

Conclusion: Although the 3D-printed PCL graft provided support, biocompatibility, and manipulability, care is required to prevent complications.

Head and Neck Surgery

Aberrant Molecular Pathways in Oral Cancer Patients of Pakistan

S. M. Adnan Ali, PhD (Presenter); Yumna Adnan; Hasnain Farooqui

Introduction: Karachi, Pakistan, boasts the highest city-wide incidence ever reported for oral squamous cell carcinoma, and it continues to be the leading cancer in Pakistani males and the second-most common cancer in Pakistani females. The aim of this study was to determine the expression status of EGFR, SOX2, and PDL-1; understand the molecular mechanism underlying protein expression of these markers in the Pakistani population; and correlate it with patient prognosis and other clinicopathologic characteristics.

Method: A total of 100 patients were included in this retrospective study. These patients had been diagnosed with and treated for oral squamous cell carcinoma (OSCC) at Aga Khan University Hospital, Karachi, Pakistan in the years 2013 to 2018 and had provided written informed consent for participation in the study. Surgical specimens were used for immunohistochemical staining using monoclonal antibodies specific for EGFR (Dako), PDL-1 (Dako), and SOX2 (AbCam). Patient follow-up of 5 years was taken, and history of risk factor use was also correlated with molecular markers expression.

Results: In the cohort of 100 OSCC patients, there were 55 males and 45 females. EGFR overexpression was observed in 70%, PDL-1 in 55%, and SOX2 in 75% of patients. Ethics Review Committee approval was obtained prior to the start of the study. EGFR and SOX2 were significantly correlated with poorer overall survival, increased chances of recurrence, and higher American Joint Committee on Cancer disease stage. PDL-1 was significant for only tumor stage and tumor differentiation but not survival of patients. EGFR was also correlated with high-frequency risk factor consumption habits.

Conclusion: We found increased expression of PDL-1, EGFR, and SOX2 in most OSCC patients. This study shows the potential for these markers to be used as targets for therapy using recently US Food and Drug Administration-approved drugs such tyrosine kinase inhibitors and monoclonal antibodies for

EGFR, immunotherapy for PDL-1, and silencing/downregulation of SOX2. Furthermore, this study shows a link between risk factor use and aberrant molecular expression, which can be studied further in large-scale cohort studies.

Advanced CT Localization Techniques for Primary Hyperparathyroidism: A Systematic Review

Nrusheel Kattar, MD (Presenter); Edward D. McCoul MD, MPH; Matthew R. Mignerone, MD; Michael S. DeBakey, MS; Muhib Haidari; Anna M. Pou, MD

Introduction: We recognize 4-dimensional computed tomography (4D-CT) as an effective option for preoperative localization of primary hyperparathyroidism (PHPT). We recognize 4D-CT as a potentially effective salvage imaging modality for preoperative localization in reoperative PHPT patients. We anticipate the continued emergence of new localization techniques for PHPT including positron emission tomography/CT and dual-energy computed tomography (DECT). This topic is relevant considering the vast increase in research over the past decade on 4D-CT as a first-line localization tool for PHPT patients, which has yet to be summarized as a systematic review.

Methods: PubMed, Embase, and Web of Science databases were queried for comparative observational studies. Abstracts and full texts were screened independently by 2 investigators as per Preferred Reporting items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Case series without comparison groups were excluded. Risk of bias was assessed using a standardized scale.

Results: Of 353 abstracts screened, 26 full-text articles met criteria for qualitative synthesis. Meta-analysis of 23 studies of patients with PHPT revealed pooled sensitivity, which was greatest with 4D-CT (81%; 95% CI, 77%–84%; I^2 88%) as compared with the current first-line modality of sestamibi–single-photon emission computed tomography (SPECT)/CT (65%; 95% CI, 59%–70%; I^2 93%). For patients with recurrent PHPT requiring reoperation, 4D-CT pooled sensitivity was 81% (95% CI 64%–98%; I^2 93%) in contrast to 53% (95% CI 35%–71%; I^2 81%) for sestamibi-SPECT/CT. The overall risk of bias of the included studies was moderate.

Conclusion: Meta-analyses of studies from the past decade demonstrate that the 4D-CT scan can be more sensitive than sestamibi-SPECT/CT as a first-line modality in localizing PHPT. High-quality prospective studies on cure outcomes of PHPT stratified by imaging modality are needed to define the clinical application of these findings.

Assessing HPV Status and Hypercoagulability in Oropharyngeal Squamous Cell Carcinoma

Lindsay Fleischer (Presenter); Riordan Jacob; Sherrie Wang; Bridgette Bolshem; John Gaughan; Yekaterina Koshkareva

Introduction: The pathogenesis of oropharyngeal squamous cell carcinoma (SCC) is associated with coagulopathy due to

increased expression of procoagulant proteins, decreased fibrinolysis mechanisms, and secretion of procoagulant cytokines. As the human papilloma virus (HPV) prevalence increases, it is imperative to understand how HPV status may influence the incidence of adverse hypercoagulable events in oropharyngeal squamous cell carcinoma patients.

Method: We performed a retrospective review of 33 patients with a clinical diagnosis of oropharyngeal SCC identified through the head and neck cancer database at Cooper University Hospital in Camden, New Jersey. Hypercoagulability was assessed through the occurrence of deep vein thrombosis (DVT), pulmonary embolism (PE), stroke, and/or transient ischemic attack (TIA) either before, during, or after treatment for oropharyngeal SCC. Fisher exact test and odds ratio calculations were used to compare rates of hypercoagulable events in HPV-positive vs HPV-negative patients.

Results: Of the 33 patients identified, 42% (n = 14) were HPV positive and 58% (n = 19) patients were HPV negative. Of note, 24.2% (n = 8) underwent prior tumor resection, 45.5% (n = 15) received chemotherapy, and 9.1% (n = 3) received immunotherapy. A total of 57.6% (n = 19) received radiation, 27.3% (n = 9) did not receive radiation, and 15.2% (n = 5) had an unknown radiation status. Fisher exact test showed no significant differences in the incidences of DVT, PE, stroke, or TIA in HPV-positive vs HPV-negative oropharyngeal squamous cell carcinoma (DVT: $P = .2882$, PE: $P = .1723$, stroke: $P = 1.000$, TIA: $P = .4962$). Odds ratios with 95% confidence intervals were as follows: DVT: 4.9091 (0.4524, 53.2674), PE: 7.8000 (0.3450, 176.3423), stroke: 0.6250 (0.0974, 4.0124), and TIA: 0.2414 (0.0107, 5.4397).

Conclusion: Overall, no significant differences were identified in the rates of hypercoagulable events in HPV-positive vs HPV-negative oropharyngeal SCC. However, the increased odds ratios for related DVT and PE incidence may suggest a clinically significant association. Future studies with an increased sample size will help to further explore these findings.

Assessing Virtual Surgical Planning Outcomes in Oncological Craniofacial Reconstructive Surgery

James A. Cochran (Presenter); Ofer Azoulay, MD; Robert Gurevich; Prayag Patel, MD

Introduction: Heterogeneity and lack of consensus on how to assess outcomes of the use of virtual surgical planning (VSP) is a major barrier to its validation through comparative studies and incorporation as a standard surgical planning practice in the field of head and neck surgery. This scoping review was conducted with the objective to categorize and evaluate the approaches used for outcome assessment in the use of VSP compared with conventional surgical planning for oncological craniofacial reconstruction using free-flaps.

Method: A scoping review was conducted following Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR) guidelines. A systematic search of the literature was conducted of electronic media

published between April 1, 2010, and April 1, 2020. Prespecified inclusion and exclusion criteria were applied to the search list, yielding 82 studies. These articles were assessed for content, including focus of reconstruction, methods for assessing outcomes, and statistical significance of findings.

Results: Five categories of assessing outcomes were identified as follows: accuracy, efficiency, clinical outcomes, cost analysis, and surgeon satisfaction. The most common parameter for assessing accuracy was identified as gonion angle positional deviation and evaluated by mean change from pre-operative VSP and postoperative imaging. Parameters used to assess efficiency were mean ischemia time and mean operating time. Lowered mean ischemia time and reduced total operating time most frequently correlated with a statistically significant outcome ($P < .05$).

Conclusion: Parameters that measure efficiency, including a reduction in mean ischemia time and mean operating time, are consistently being used to compare outcomes of VSP and conventional surgery. Parameters to assess accuracy are also common and, in most evaluated cases, lead to statistically significant findings of improved reconstructive accuracy with a VSP approach. Standardized guidelines for assessing accuracy outcomes have been proposed, and future studies involving these guidelines are necessary to validate their use.

Cancer-Associated Fibroblasts as a Novel Biomarker in Head and Neck Squamous Carcinoma

Seth J. Davis (Presenter); Nerymar Ortiz Otero; Michael King; Young Kim, MD, PhD

Introduction: Circulating tumor cells (CTCs) are thought to represent one of the main precursors for the development of distant organ metastasis, which is a leading contributor to treatment failure and mortality in head and neck squamous carcinoma (HNSCC). During transit, CTCs have been identified as traveling independently or in clusters with stromal support cells such as cancer-associated fibroblasts (CAFs). These CAFs, in the presence of CTCs, have the potential for use as an early biomarker for disease progression and prognosis in HNSCC.

Method: CTCs and CAFs were isolated from a buffy coat of peripheral blood samples from 13 HNSCC patients and 2 controls by a negative and positive magnetic bead selection method, respectively. Cells were subsequently fixed onto slides and immunostained with conjugated cytokeratin or anti- α -SMA, as well as anti-CD45 and DAPI. Fluorescent images were taken using an inverted confocal microscope and analyzed with imageJ software. Cells were enumerated to determine the presence and quantity of cell types by volume.

Results: A significant number of CTCs (8/mL vs 0/mL; $P = .026$) and CAFs (3/mL vs 0/mL; $P = .019$) were found to be present in the peripheral blood of HNSCC patients with locoregional metastatic disease when compared with controls. In addition, CAF levels strongly correlated with the number of CTCs identified in a near 1:1 ratio ($r = 0.9$, $P = .0047$), which

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suggests a collective migration of these circulating cells during metastatic progression. Through query of the Cancer Genome Atlas database, 20 genes were identified to have upregulated mRNA expression in HNSCC patients with distant metastasis. Of these, 75% were associated with stromal cells rather than epithelial tumor cells, alluding to the significance of CAFs in metastatic progression.

Conclusion: We have demonstrated for the first time the presence of CAFs in close association with CTCs in metastatic HNSCC, which may act as a potential biomarker for disease progression and/or prognosis. These findings might ultimately support the development of novel CAF-targeted therapies as a treatment for early metastatic HNSCC.

Cancer Stem-Like Cells and T-Cell Infiltration in Oral Squamous Cancer

Farshad N. Chowdhury, MD (Presenter); Stephen Keysar; Tugy Chimed; Hilary Somerset; Antonio Jimeno

Introduction: Understanding the crosstalk between infiltrating immune cells and cancer stem cells (CSC) is of important interest when identifying novel targets for cancer immunotherapy. Here we compare cases of primary vs locally recurrent oral cavity squamous cell cancer (OCSCC) to investigate the differences in the populations of cancer stem-like cells (CSLCs) and infiltrating immune cells.

Method: Histologic specimens from 24 OCSCC patients were stained with multiplexed fluorescent immunohistochemistry to identify CSLCs (SOX2+/ALDH+), CD4+ T cells, and T regulatory cells (CD4+/CD25+/FOXP3+). Specimens were classified as tissue from a primary resection or from a resection of a local recurrence. Slides for each case were scanned, and high-magnification images of tumor-bearing regions of interest (ROIs) were selected for each case. Images were analyzed and cell phenotypes were assigned based on a quantitative analysis of marker immunofluorescence and spatial co-localization. The T reg index (percentage of T regs of T cells), the T-cell index (percentage of T cells of all cells), and the CSLC index (percentage of CSLCs of all cells) were calculated.

Results: ROIs from recurrent OSCC (n = 211) demonstrated a higher T reg index than in primary OSCC (n = 99; 25.94 vs 18.42, $P < .0001$). Recurrent ROIs also demonstrated a decreased T-cell index compared with primary ROIs (8.52 vs 19.53, $P < .0001$). There was no significant difference in CSLC index between recurrent and primary cases (3.78 vs 5.93, $P > .05$).

Conclusion: Recurrent cases of OSCC demonstrate an increased fraction of T regulatory cells with a concurrent decrease in the overall fraction of infiltrating CD4+ T cells, suggesting decreased CD4+ T-cell immune surveillance in recurrent cases. However, there is no observed difference in the fraction of CSLCs between recurrent and primary cases. The mechanism of previously reported immunosuppressive CSC microenvironments may not be fully explained by a shift in CSC fractional composition.

Characterizing the Immunologic Profile of HPV- and IP-related Sinonasal Cancer

Abhishek Gami (Presenter); Ioan Lina, MD; Gary Gallia, MD, PhD; Lisa Rooper, MD; Nyall London, MD, PhD

Introduction: Sinonasal and skull base tumors are rare but often aggressive cancers. The potential role of immunotherapy in treating these tumors is largely unknown, particularly in human papillomavirus (HPV)- and inverted papilloma (IP)-related sinonasal squamous cell carcinoma (SNSCC). The objective of this study was to characterize the inflammatory cell, infiltrate of these tumors, and assess PD1 and PD-L1 expression.

Method: Thirty surgical resection specimens of patients with SNSCC were obtained. Immunohistochemistry evaluating CD8, FOXP3, PD1, and PD-L1 expression was conducted. Patient demographics, tumor anatomic location, and tumor grade were recorded. Tumors were subcategorized into HPV-related (n = 16), IP-related (n = 10), and de novo SNSCC (n = 4), and immune expression was compared with tumor subtypes.

Results: Patients were on average 60 years old, and most (62%) were female. Most tumors arose from the nasal cavity or septum (40%), followed by the maxillary and ethmoid sinuses (27%). For HPV-related tumors, immunohistochemistry showed a mean of 388 ± 373 CD8+/mm², 60 ± 61 FOXP3+/mm², 136 ± 119 PD1+/mm², and $46\% \pm 28\%$ PD-L1 immune. For IP-related tumors, immunohistochemistry showed a mean of 380 ± 535 CD8+/mm², 101 ± 107 FOXP3+/mm², 120 ± 127 PD1+/mm², and $37\% \pm 16\%$ PD-L1 immune. PD-L1 tumor expression was significantly higher in HPV-related SNSCC ($36\% \pm 33\%$) compared with IP-related SNSCC ($12\% \pm 12\%$, $P = .02$). There was no other statistically significant difference in immunologic profile between tumor subtypes.

Conclusion: Immunologic profiling of sinonasal tumors may allow for targeted immune checkpoint treatment. PD-L1 expression may be a susceptible target in HPV-related SNSCC.

Clinical Predictors of Transoral Robotic Surgery Exposure and Difficult Airways

Garrett Largoza (Presenter); Andrew Corr; Ethan Skinner; Ellen Paul; Joshua Atkins, MD, PhD; Christopher Rassekh, MD

Introduction: The aims of this study are to identify clinical evaluations that may contribute to difficult exposure of relevant anatomical airway structures during transoral robotic surgery (TORS) and to compare TORS exposure ratings with bedside airway tests in predicting difficult airways.

Method: This retrospective cohort study was performed at an academic center from July 2013 to May 2019. Preoperative parameters obtained during clinical and physical examination—obesity (body mass index ≥ 30 kg/m²), neck circumference, thyromental distance, interincisor gap, Mallampati score, Cormack-Lehane grading, and percentage of glottic opening seen (POGO)—were assessed. TORS exposure ratings varied from 0 = *not difficult* to 2 = *difficult* and were

determined at the discretion of the surgeon based on access and visualization of the base of tongue, palatine tonsil area, epiglottis, posterior pharyngeal wall, and false vocal cords.

Results: From a database containing 302 patients who underwent TORS of the pharynx or parapharyngeal space, preoperative categorical factors were analyzed with analysis of variance for TORS exposure ratings. TORS exposure ratings had an association with obesity ($P < .05$), neck circumference ($P < .01$), interincisor gap ($P < .01$), Mallampati score ($P < .01$), Cormack-Lehane grading ($P < .01$), and POGO ($P < .01$).

Conclusion: These results suggest that the surgeon's assessment of airway exposure is a valuable predictor of the number of airway intubation attempts. Evaluation of the patient's upper airway before TORS procedures is essential to predicting the degree of difficulty in both visualization and maneuvering that the surgeon will encounter. Future studies may assess the efficacy of radiographically enhanced airway clinical tools for prediction of difficult intubation and surgical exposure in TORS.

Comorbidity Score as a Predictor for Perioperative Outcomes Following Transoral Robotic Surgery

Neha Wadhavkar (Presenter); Craig A. Bollig, MD

Introduction: Medical comorbidities play a significant role in patient outcomes, yet their predictive impact on short-term perioperative outcomes after transoral robotic surgery (TORS) is not well defined in the literature. Our objective was to investigate the association between the Charlson-Deyo comorbidity class (CDCC) and perioperative outcomes following TORS for oropharyngeal cancer (OPC) using the National Cancer Database (NCDB).

Method: Patients with nonmetastatic T1-T4 OPC between 2010 and 2017 were identified using the NCDB. Patients were stratified based on CDCC and baseline demographics. Thirty-day unplanned readmission rates, hospital length of stay, 30-day mortality, and 90-day mortality were compared between groups using univariate and multivariate analyses. Both mortality and hospital length of stay were analyzed using Kaplan-Meier and Cox proportional hazard models.

Results: A total of 4339 patients were identified. Higher CDCC (compared with CDCC 0) were independent predictors of longer hospital stay (CDCC 2: hazard ratio [HR] 0.80, 95% CI, 0.68-0.95; CDCC ≥ 3 : HR 0.77, 95% CI, 0.60-0.98) and greater 90-day mortality (CDCC 1: HR 2.13, 95% CI, 1.20-3.77; CDCC 2: HR 2.27, 95% CI, 0.86-5.96; CDCC ≥ 3 : HR 11.85, 95% CI, 5.36-26.22). Clinical T4 (HR 2.15, 95% CI, 1.09-4.24) and CDCC 3 or greater were significantly associated with unplanned 30-day readmission (CDCC ≥ 3 : HR 2.80, 95% CI, 1.23-6.36).

Conclusion: Our national analysis demonstrates some predictive ability of CDCC on perioperative outcomes following TORS for OPC.

Complex Head and Neck Flap Reconstructions Without Blood Product Transfusion

Matthew Lin (Presenter); Liyang Tang, MD; Rick Selby, MD; Niels Kokot, MD

Introduction: Jehovah's Witnesses (JWs) will not accept transfusion of major blood fractions. They form the ideal cohort to test feasibility of transfusion avoidance during the performance of complex head and neck surgery. We describe outcomes following free and pedicled flap reconstructions in JW patients.

Method: A retrospective chart review was performed on 13 adult JWs who presented between January 2003 and December 2019. All underwent free and/or pedicled flaps to the head and neck region without transfusion of red blood cells, platelets, or plasma. Demographics, preoperative chronic coronary insufficiency score, blood augmentation data, perioperative hematologic data, and outcomes were compiled.

Results: Thirteen patients (9 female, 4 male) underwent free flap ($n = 9$), pedicled flap ($n = 3$), or free and pedicled flap ($n = 1$) reconstruction primarily for head and neck cancer (85%). Preoperative blood augmentation with iron, erythropoietin, and folate was used for 11 patients to reduce anemia risk. Mean preoperative hemoglobin (Hb) was 11.5 (range, 7.3-16). No patients had abnormal preoperative platelet counts or international normalized ratio (INR) values. Cell salvage ($n = 2$) and acute normovolemic hemodilution ($n = 3$) were used. Mean estimated blood loss was 487 mL (range, 20-2000 mL). Mean postoperative Hb was 8.6 (range, 4.0-11.2). Mean postoperative platelet count was $209 \times 10^9/L$ (range, $103-343 \times 10^9/L$). Mean postoperative INR was 1.2 (range, 0.9-1.6). Complications included postoperative infection ($n = 3$), bleeding with return to operating room ($n = 2$), and fatal carotid artery rupture ($n = 1$). Aside from a sole mortality, all flaps survived ($n = 12$).

Conclusion: Complex microvascular flap reconstructions for head and neck pathology can be safely accomplished without major product transfusion. This proof of concept leads to a broader acceptance of blood conservation and transfusion avoidance for mainstream patients.

Does Caregiver Health Literacy Impact Caregiver and Patient Outcomes?

Jymirah Morris (Presenter); Karley Atchison, MA; Jinhong Li, MS; Jonas T. Johnson, MD; Marci Nilsen, PhD, RN

Introduction: While low health literacy (HL) is known to negatively affect patient outcomes, there are limited data about its impact on caregivers (CGs), particularly caregivers to cancer patients (CGCPs). The Health Literacy of Caregivers Scale-Cancer (HLCS-C) uses 10 domains to assess the HL in CGCPs. This study seeks to use the HLCS-C to identify gaps in CG HL and see how it affects the CG and care recipient (CR) outcomes.

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Method: This is a prospective cross-sectional study of CGs to CRs with head and neck squamous cell carcinoma (HNSCC) who are undergoing or have completed treatment. Recruitment has been ongoing since October. CRs—mostly males who were posttreatment from stage 3 SCC of the oropharynx—are seen at the UPMC Head and Neck Cancer Survivorship Clinic. CR outcomes such as depression, anxiety, quality of life (QOL), perceived stress (PS), insomnia severity (IS), and more are routinely assessed. CGCPs present at the visit complete a survey that includes demographics, the HLCS-C, and the listed outcome measures. Data were analyzed via Spearman correlation coefficient.

Results: In total, 32 CGs completed the survey. The CGs were mostly retired White women caring for a spouse or a parent. The mean HLCS-C score was 82.23, with higher scores indicating higher HL (max = 136). There was a correlation between domain 7—self-care—and CG depression ($P = .03$), anxiety ($P = .02$), QOL ($P = .01$), and IS ($P = .004$). Domain 2—adequate information about cancer and cancer management—trended toward significance with CG depression ($P = .06$) and anxiety ($P = .07$). Thus far, no domains correlate with CR outcomes.

Conclusion: Our sample had high mean HL scores across the 10 domains of the HLCS-C. Domain 7 significantly affected CG patient-reported outcomes. So far, we can conclude that the HLCS-C is useful in providing targeted assessments of the strengths and gaps in HL of CGCPs. Continued analysis should reveal more gaps in HL for those CGs with lower HLCS-C scores. We hope that these targeted assessments will lead to targeted interventions to improve HL and the outcomes of CGs and their CRs.

Educational Effectiveness of Head and Neck Surgical Course in Kenya

Margaret Mitchell (Presenter); Anshul Kumar; Samuel Okerosi, MD; Seth J. Davis; Jean-Nicolas Gallant; James Netterville

Introduction: Surgical volunteer organizations aiming to develop competent surgeons in low-resource areas are challenged with measuring and maximizing the effectiveness of their educational interventions in time-constrained settings. Here we evaluated the educational effectiveness of a 2-week head and neck surgical course in Kenya and investigated the barriers to changing postcourse practice patterns.

Method: The course took place in October 2019 with 7 local Kenyan surgeons as participants and 5 American head and neck surgeons as instructors. A mixed-methods study design was used, with pre- and postcourse surveys measuring self-reported surgeon confidence as well as characterizing practice patterns that focused on thyroidectomy, neck dissection, and parotidectomy. Additional free-text survey and focus group data investigated barriers to changes in local practice patterns and learner satisfaction.

Results: Self-reported confidence of participants increased generally but not significantly across all 3 procedures and

neared significance in thyroidectomy ($P = .057$). Despite this, participants did not report a change in their case volume of these procedures after the course. The identified barriers to altered practice patterns included deficits in facilities, appropriately trained staff, and certain instruments. Learners requested the addition of alternative learning modalities outside of the operating room, such as preoperative anatomy lectures in addition to expanding a hands-on head and neck ultrasound curriculum. Intersurgeon variations in technique among the instructors was identified as a course strength.

Conclusion: This surgical course succeeded in improving self-reported surgeon confidence but did not lead to post-course changes in local practice patterns due to barriers in facilities, staffing, and instruments. Addressing these barriers in addition to surgical skill should be a larger focus of future surgical volunteerism. Competency-based metrics such as surgeon self-confidence in addition to free-text survey data provided an opportunity for educational effectiveness feedback.

Effect of Distance on Survival for Cancer Patients

Douglas R. Farquhar (Presenter); Maheer Masood; Nicholas R. Lenze, MPH; Trevor Hackman; Adam Zanation; Andrew Olshan

Introduction: It is unknown how travel burden may affect survival for patients with head and neck squamous cell carcinoma (HNSCC), which often requires complex, multidisciplinary care.

Method: Patients with human papillomavirus (HPV)-negative HNSCC were retrospectively identified from a state-wide, population-based study. Euclidian distance from home address to treatment center was calculated for radiation therapy, surgery, and chemotherapy. Multivariable Cox proportional hazards models were used to examine the risk of 5-year mortality with increasing travel quartiles.

Results: There were 968 patients with HPV-negative HNSCC with a mean age of 60 years. Patients traveled a median distance of 10.2 miles, 11.1 miles, and 10.9 miles to receive radiation therapy, surgery, and chemotherapy, respectively. Patients in the fourth distance quartile were more likely to live in a rural location ($P < .001$) and receive treatment at an academic hospital ($P < .001$). Adjusted overall survival improved proportionally to distance traveled; the effect was significant for patients in the third and fourth quartile by distance. Relative to patients in the first quartile, patients in the fourth had a reduced risk of mortality with radiation (hazard ratio [HR] 0.59, 95% CI, 0.42 to 0.83; $P = .002$), surgery (HR 0.47, 95% CI, 0.30 to 0.75; $P = .001$), and chemotherapy (HR 0.56, 95% CI, 0.35 to 0.91; $P = .020$).

Conclusion: Patients traveling farther distances for treatment of HPV-negative HNSCC appear to have improved overall survival. The benefits of coordinated, multidisciplinary care may outweigh the barriers of travel burden for these patients.

Effect of Insurance Status on Length of Stay After Free Flap Reconstruction of Oral Cavity Cancer

Nicole Kloosterman, MD (Presenter); Sarah Rohde, MD; Michael Freeman, MD; Jaclyn Lee, MD

Introduction: We analyze the current literature analyzing the effect of insurance status on free flap surgical outcomes. We explain the pertinent results and limitations of this study, and examine different tools through which we can continue to analyze systemic barriers to care for patients. Insurance coverage for large procedures such as free flap reconstruction plays an important role in postoperative patient care and support. Although much work has been done to address pre- and perioperative care as means to improve health outcomes in these types of procedures, systemic factors also can play a role in patient care. In a year in which health equity has been at the forefront of people's minds, beginning to identify structural barriers to equitable health outcomes in head and neck surgery is the first step to addressing these factors.

Methods: We performed a retrospective cohort study of patients who underwent oral cavity tumor resection and free flap reconstruction at a tertiary referral center from 2000 to 2019. Main outcomes include length of hospital stay and length of intensive care unit (ICU) stay. Univariate analysis was conducted using Kruskal-Wallis test for continuous covariates and Fisher exact test for categorical covariates. Significant variables were entered into a multivariate logistic regression model.

Results: A total of 498 patients met inclusion criteria. Median age at time of surgery was 62 years (interquartile range, 53–71), and 283 (56.8%) presented with stage IV disease. Most patients (52%) had private insurance, 32.1% were on Medicare, 8% were uninsured, 4.4% were covered by the Veterans Administration, and 3.4% were on Medicaid. Age at date of surgery ($P < .0001$, $P < .0001$), body mass index (BMI) ($P < .0001$, $P < .0001$), and insurance status ($P = .0048$, $P = .0038$) were associated with ICU length of stay and overall hospital length of stay, respectively. Medicaid patients had increased length of hospital stay relative to other patient classes ($\beta = 3.263$, 95% CI, 0.99 to 5.505, $P = .0048$) after free flap reconstruction.

Conclusion: Increased age, decreased BMI, and insurance status are risk factors for increased length of stay in the ICU and overall hospital stay for patients undergoing tumor resection. Of the insurance classes, Medicaid patients appear to have the longest length of stay.

Effect of Preoperative Dehydration on Short-Term Complications after Laryngectomy

Dongmin C. Kim (Presenter); Ariel Omiunu; Gregory L. Barinsky, PharmD; Soly Baredes, MD; Dylan F. Roden, MD, MPH; Richard C. Park, MD

Introduction: The purpose of this study was to elucidate the impact of preoperative dehydration on laryngectomy outcomes.

Method: A retrospective analysis of the 2005–2018 National Surgical Quality Improvement Program database was conducted.

The data set was queried for patients who underwent laryngectomies using Current Procedural Terminology codes. Cases with concurrent free flap procedures were excluded. Patients with existing renal failure and metastatic cancer were excluded. Dehydration was specified as a preoperative blood urea nitrogen to creatinine ratio of greater than 20.

Results: Of the 1280 cases that met the inclusion criteria, 493 (38.5%) cases constituted the dehydration cohort. Most cases in the dehydration cohort were aged 61 to 80 years (59.8%), male (77.2%), and White (65.2%). Dehydrated patients were more likely to be on chronic steroids (7.5% vs 4.6%; $P = .035$) and have dependent functional status (8.8% vs 5.1%; $P = .014$). The dehydration cohort had a greater rate of organ space surgical site infection (OS-SSI; 4.9% vs 2.4%; $P = .025$), any surgical complication (32.9% vs 27.3%; $P = .038$), and any complication overall (40.4% vs 34.8%; $P = .050$). Preoperative dehydration was also associated with a greater mean length of hospital stay (13.2 days vs 11.4 days; $P = .001$). Following multivariate regression analysis, preoperative dehydration was found to be an independent predictor of OS-SSI (odds ratio = 1.985; $P = .033$).

Conclusion: Preoperative dehydration was associated with OS-SSI and increased duration of hospitalization after laryngectomy. Understanding and anticipating complications correlated with dehydration can assist perioperative planning and improve patient outcomes.

Effectiveness of New Bonebridge Implant: Surgical and Audiological Benefit

Piotr H. Skarzynski, MD, PhD, MSc (Presenter); Katarzyna Beata Cywka; Bartlomiej Krol

Introduction: Currently, bone conduction devices are a popular medical option for patients with conductive or mixed hearing loss. Patients with microtia and atresia are unable to wear conventional hearing aids. Implantable devices are an alternative to improve hearing in this group. The new Bonebridge BCI 602 is smaller than the earlier version, BCI 601, and this size modification allows access for group of patients with limited conditions because of anatomical reasons. The main objective of this study was to evaluate the audiological and survey benefit of the Bonebridge BCI 602 in a group of patients with microtia and atresia. The secondary aim was to assess the quality of life improvement and patient satisfaction after Bonebridge implantation.

Method: From among 72 patients treated with BB602 in 2020, the study involved a group of 15 adult patients from the World Hearing Center with unilateral microtia and atresia who use Bonebridge BCI 602 and have at least a 6-month follow-up period. Audiological assessment performed in all patients consisted of pure-tone audiometry and speech audiometry in quiet and noise both unaided and aided. To assess the benefit, the Abbreviated Profile of Hearing Aid Benefit questionnaire was used.

Results: The hearing threshold of patients with the Bonebridge improved significantly compared with that of the unaided condition. Statistically significant improvements were also

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recorded in speech tests in quiet and noise. Results of the APHAB questionnaire confirm the benefits of Bonebridge BCI 602 implantation.

Conclusion: The audiological effectiveness of the Bonebridge BCI 602 was significant and noticeable in this group of patients. The Bonebridge BCI 602 can be an alternative, effective, and safe treatment option for patients with microtia and atresia.

Efficacy of Enhanced Recovery After Surgery Protocol in Major Head and Neck Surgery

Shreya Sharma (Presenter); Laura Dooley, MD

Introduction: Enhanced recovery after surgery (ERAS) protocols have been implemented as a multidisciplinary effort to improve patient experience and outcomes in major elective surgeries. Malignancies within the head and neck often require extensive surgical intervention in high-risk individuals, which consequentially leads to a prolonged and difficult recovery period. Therefore, the aim of this study is to determine the impact of an ERAS protocol on head and neck oncologic patients, during both the peri- and postoperative period, in an effort to improve patient results.

Method: Through a retrospective observational cohort study at University of Missouri Health Care, patient outcomes (n = 17) from a total laryngectomy between January 2018 and October 2020 were analyzed. Patients were divided into 2 groups: the ERAS group and the non-ERAS group. Perioperative blood loss, perioperative fluid requirement, and hospital length of stay were compared between those receiving the ERAS protocol and those in the non-ERAS group.

Results: Preliminary analyses of patients whose care followed the ERAS protocol demonstrated no difference in hospital length of stay compared with the non-ERAS group (8.50 ± 1.35 days vs 9.75 ± 4.92 days; $P = .326$, ns). In addition, there was no difference between the groups with regard to perioperative blood loss (177 ± 103 mL vs 136 ± 87.9 mL; $P = .211$, ns) or perioperative fluid requirement (3.3 ± 1.28 L vs 3.67 ± 1.28 L; $P = .309$, ns).

Conclusion: Implementing an ERAS protocol did not reveal a benefit peri- or postoperatively in patients undergoing head and neck surgery. While ERAS appears to be a feasible way to improve patient outcomes and reduce costs associated with prolonged admissions, additional evidence of the efficacy of such program would need to be obtained before permanently adopting it. Further analysis with a larger sample size is warranted to better delineate the utility of the ERAS protocol for head and neck oncology patients.

Efficacy of Topical Antimicrobial Prophylaxis for Mucosal Head and Neck Surgery: A Meta-Analysis

Jake J. Lee, MD (Presenter); Patrik Pipkorn, MD; Stanley Chibueze, MD; Joseph Zenga, MD; Sidharth V. Puram, MD; Ryan S. Jackson, MD

Introduction: We aim to understand the differences in surgical site infection (SSI) rates after major mucosal head and neck

surgery between patients who received topical antimicrobial prophylaxis and those who did not. We recognize which topical antimicrobial treatments are available for mucosal application. We explain methods for designing a multicenter, prospective trial to determine whether topical antimicrobial prophylaxis should become standard of care for patients undergoing mucosal head and neck surgery. We believe this abstract deserves consideration for late-breaking status due to its novelty and interest to the larger otolaryngology community. Our institution has been recently interested in topical antimicrobials to reduce the spread of COVID-19 in health care settings. While we were studying the effects of topical antimicrobial prophylaxis applied intranasally on SARS-CoV-2 transmission in health care workers over the past several months, we decided to translate that work to assessing SSI rates after mucosal head and neck surgery. Before considering funding a multicenter prospective study on this topic, we proceeded with this systematic review and meta-analysis to help inform future trials. Our meta-analysis reveals a greater than 50% risk reduction in SSIs in patients who underwent perioperative topical antimicrobial therapy to the oral cavity and/or pharynx compared with patients who did not receive topical prophylaxis, which is both statistically significant and clinically meaningful. We believe these findings are pertinent to all otolaryngologists who perform mucosal surgery.

Methods: A search of Ovid MEDLINE, Embase, Scopus, Cochrane Library, and Clinicaltrials.gov from inception to May 20, 2021, was performed. Clinical trials, cohort studies, and case-control studies with SSI rates of adults who underwent mucosal head and neck surgery and received perioperative topical antimicrobial therapy to the oral cavity and/or pharynx were included. Studies of dental procedures were excluded.

Results: Of 265 unique citations, 9 studies were included. Topical treatments included clindamycin, tetracycline, piperacillin-tazobactam, ampicillin-carbenicillin, neomycin-erythromycin, mupirocin, and povidone-iodine. Pooled SSI rates of 252 patients with topical antimicrobial prophylaxis and 218 control patients without topical therapy were 8% (95% CI, 3%–14%, $I^2 = 61.2\%$) and 29% (95% CI, 16%–43%, $I^2 = 79.5\%$), respectively. Another meta-analysis of 7 comparative studies totaling 192 topical therapy patients and 218 control patients revealed a pooled relative risk of 0.44 (95% CI, 0.28–0.68, $I^2 = 0.0\%$) in favor of the treatment group.

Conclusion: Patients who underwent prophylactic topical antimicrobial therapy had less than half the risk of developing SSI after mucosal head and neck surgery compared with those who received no topical prophylaxis.

Enhanced Recovery After Surgery (ERAS) Protocols for Head and Neck Cancer: A Systematic Review

Nrusheel Kattar, MD (Presenter); Edward D. McCoul MD, MPH; Steven X. Wang, MD, MS; Jeffrey D. Trojan, MS; Craig R. Ballard, MD; Brian A. Moore, MD

Introduction: We aim to recognize Enhanced Recovery After Surgery (ERAS) as an effective alternative to nonstandardized

perioperative management of head and neck cancer patients; appreciate the importance of counseling head and neck cancer patients undergoing major surgery on the benefits of an established perioperative clinical pathway; anticipate the continued evolution of ERAS protocols for specific surgical populations among head and neck cancer patients. This study is important because it highlights the role of structured care pathways in reducing postoperative opioid use and care resources among those having surgery for head and neck surgery.

Methods: PubMed, Embase, and Web of Science databases were queried for comparative observational studies. Abstracts were screened independently by 2 investigators according to Preferred Reporting items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Case series without a comparison group were excluded. Risk of bias was assessed using a standardized scale.

Results: Of 557 articles screened, 30 met criteria for full-text review, of which 9 met criteria for qualitative synthesis. Meta-analysis of length of stay (LOS) revealed a mean decrease of 1.37 days (95% CI, 0.77–1.96; I^2 0%; $P < .001$) with the ERAS group as compared with the non-ERAS controls. The standardized mean difference of the morphine milligram equivalent was 0.72 units per day (95% CI, 0.26–1.18; I^2 82%; $P = .002$) lower in the ERAS group compared with controls. The overall risk of bias of included studies was moderate.

Conclusion: Implementation of ERAS protocols is associated with decreased LOS and opioid utilization. High-quality prospective studies of ERAS protocols with stratified analysis of outcomes based on type of head and neck cancer surgery are needed.

Epidemiological Profile and Outcomes of Cases of Childhood Thyroid Cancer

Pedro Henrique Esteves Gonçalves (Presenter); Mariana Graça Nasr; Paulo Alonso Garcia Alves Junior; Rossana Corbo Ramalho de Mello; Fernando Luiz Dias; Izabella Costa Santo

Introduction: Pediatric thyroid cancer occurs in children ranging in age from 0 to 19 years and consists of a set of diseases that have their own characteristics in relation to the histological type and clinical behavior. The infant group has a better prognosis than the adult population. In Brazil, this neoplasm is highlighted in terms of the epidemiological profile, as the data in this age group reflect the relevance of this research both in terms of public spending and in the future insertion of this young group in the job market and its importance for their families.

Objective: This sectional study aims to describe the epidemiological and clinical profile of patients with childhood thyroid cancer between the years 1984 and 2020 treated at the National Cancer Institute in the city of Rio de Janeiro, which is considered a reference center in Brazil.

Method: A total of 160 cases were collected from physical and electronic medical records analyzing sociodemographics, clinical information, related time between diagnosis, and start of treatment and, in addition, verified the association among the clinical outcomes and the pre- and postoperative variables.

Results: The mean age was 14.3 (SD \pm 3.9) years, 73.7% were female ($n = 118$), the mean distance between home and the treatment unit was 68.9 km (SD \pm 101.9 km), and the median distance was 30 km (range, 0–601 km). The oncological outcome may be influenced by the delay in diagnosis and treatment due to the significant distance between the reference center and the residence. The low level of education of the parents is another variable that could affect the higher risk of recurrence and residual disease.

Conclusion: The results of this study identify the main factors that can influence the development, diagnosis, treatment, and oncological outcome of childhood thyroid cancer, since this is a high-recovery neoplasm.

Evaluating the Number of Pathologic Nodes in Oral Cavity Cancer

Roberto N. Solis, MD (Presenter); Sukhkaran Aulakh; Silvia Bastea; Megan V. Morisada, MD; Samya Faiq; Andrew Birkeland, MD

Introduction: Currently, the eighth edition of the American Joint Committee on Cancer (AJCC) staging guidelines for human papillomavirus (HPV)-associated oropharyngeal head and neck squamous cell carcinoma (HNSCC) has an entirely new staging paradigm based on pathologic nodal classification, whereas the HPV-negative HNSCC nodal staging has been largely unchanged from the seventh edition. This study aims to evaluate the eighth edition of the AJCC pathological nodal staging system in oral cavity HNSCC.

Method: A single-institution retrospective case series study was performed that included patients diagnosed with oral cavity HNSCC who underwent resection with concurrent neck dissection between 2004 and 2020. The primary outcomes were 5-year overall survival (OS), disease-specific survival (DSS), and disease-free survival (DFS) to evaluate pathologic nodes using the eighth edition AJCC nodal staging used for HPV-associated HNSCC. Multivariate analysis was performed to adjust for disease characteristics and patient demographics and characteristics. We anticipate increasing the number of subjects and comparing with the seventh edition AJCC system to determine a better predictor for prognosis.

Results: Of 152 patients identified, 83 had 0 positive nodes, 56 had 1 to 4 positive nodes, and 13 had more than 4 positive nodes. Using the eighth edition AJCC pathologic nodal staging system showed a difference between the groups for DSS ($P = .047$) and DFS ($P = .005$) but not for OS ($P = .053$).

Conclusion: Applying the eighth edition AJCC pathologic nodal staging system for HPV-associated oropharyngeal HNSCC to oral cavity HNSCC can be valuable for prognostication.

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Evaluation of Neck Disability Using Computed Tomography in HNC Survivors

Alexandria Harris (Presenter); Barton Branstetter; Jonas T. Johnson, MD; Marci Nilsen, PhD, RN

Introduction: We have previously reported in patient-reported outcome data that more than 55% of head and neck cancer (HNC) survivors have neck disability after 1 year or more following treatment. Our study aims to determine if survivors with neck disability have radiologic evidence of cervical spine degenerative disease on computed tomography (CT) to explain neck complaints.

Method: We performed a cross-sectional analysis of reported neck disability from prospectively collected data on survivors of squamous cell carcinomas without recurrence or metastasis who was evaluated in a HNC survivorship clinic from January 2017 to September 2020. Neck disability was measured using the Neck Disability Index (NDI), a patient-reported outcome index, which included questions on the effects of pain on quality of life, with higher scores indicating more severe disability. NDI was compared with cervical CT scans within 6 months for cervical degeneration of the disc and facet, and sarcopenia of the paraspinal muscles was rated on a 5-point scale, with 5 indicating more severe disease.

Results: In total, 36 mostly male (80.6%) survivors of oropharyngeal cancer were identified with an average age of 61.4 ± 8.6 years (range, 44.7–80.7 years). Most survivors had stage III to IVA cancer (91.7%), and treatments included nonsurgical (55.6%), surgery + adjuvant (31.7%), and surgery alone (2.8%). Neck disability was categorized into 3 groups: none (44.4%), mild (38.9%), and moderate-to-complete disability (16.7%), with an average time from treatment to clinic visit of 4.5 ± 2.8 years. Controlling for age, time since treatment, and treatment modality, we showed no association between NDI and spinal degeneration in discs ($P = .077$) and facets ($P = .147$). However, patients with higher NDI scores had worse paraspinal sarcopenia ($P = .047$).

Conclusion: Our study shows that neck disability symptoms are not associated with cervical degeneration but instead correlated with sarcopenia of the paraspinal muscles, supporting that neck disability is a side effect of treatment and not age-related cervical degeneration. These results support the use of the NDI as a measurement tool for HNC survivors and may suggest additional treatment modalities to minimize complications.

Feasibility and Safety of Transoral Robotic Surgery Using da Vinci Xi Platform

Keith D. Volner, DO (Presenter); Joshua Mostales; Jae Lim

Introduction: Transoral robotic surgery (TORS) has become a common surgical technique for the treatment of many oropharyngeal carcinomas (OC) and select cases of obstructive sleep apnea (OSA). Many institutions are adopting the da Vinci Xi platform, but data on the feasibility, safety, and surgical outcomes with this platform are limited for oropharyngeal surgery. We report our experience with the da Vinci Xi system

for the surgical management of OC and OSA in this case series.

Method: This is a retrospective review of a consecutive case series including 21 patients who underwent TORS using the da Vinci Xi robot from April 2019 to November 2020 at the Kaiser Permanente–Moanalua Medical Center in Honolulu, Hawaii. This review reports demographical, procedural, and outcome data including oncological outcomes and complications. No patients were excluded from the study; the cohort consisted entirely of OC and OSA cases.

Results: A total of 21 patients (14 men and 7 women) underwent TORS for OC and OSA (15 and 6 cases, respectively). The mean age was 57.6 ± 12.9 years. The mean hospital length of stay was 2.8 ± 1.9 days. There were no mortalities, readmissions, or severe complications directly related to the primary surgery. One patient had scarring of the epiglottis following TORS tongue-base resection for OSA, leading to subjective dysphagia symptoms. For cancer cases, there were 7 cases of squamous cell carcinoma, 5 of which were p16+. A positive margin was observed in 1 case with soft palate minor salivary gland malignancy, which required re-resection. All other margins in the case series were clear.

Conclusion: Our case series demonstrates that TORS is safe and feasible with the da Vinci Xi system for various cases including OC and surgical treatment of OSA. This report further supports recent studies demonstrating the efficacy and safety of the Xi platform for TORS.

Free Flap Reconstruction of Transoral Robotic Oropharyngeal Cancer Resections

Agamemnon Pericleous, MBBCh, MRCSEd (ENT) (Presenter); Nina Cunning; Zaid Awad, PhD, FRCS

Introduction: Transoral robotic-assisted partial pharyngectomy (TORAPP) is becoming an additional option in managing oropharyngeal cancer with a variety of indications. This study investigates the effect of adding robotic-assisted free flap reconstruction (RAFFR) on patients' outcomes.

Method: A prospective case-controlled study of 28 patients who underwent TORAPP with or without RAFFR in a single institution from October 2016 to August 2020 was conducted focusing on postoperative surgical and functional outcomes.

Results: Sixteen patients (57%) had TORAPP without RAFFR and healed by secondary intention, and 12 (43%) had RAFFR. Of the total, 21 cases (75%) were primary resections and 7 (25%) salvage resections. Nineteen (67.9%) were p16+ cancers and 3 cases (10.7%) had extracapsular spread. Of those who had a primary TORAPP, 13 (62%) underwent adjuvant radiotherapy, and 4 (19%) had adjuvant chemoradiotherapy. Of RAFFR, 86% (6/7) underwent adjuvant radiotherapy alone. The postoperative bleeding rate was lower in the RAFFR group (1/12; 8% vs 2/16; 12.5%, $P > .05$). The median hospital stay was 11 days for the RAFFR group vs 12 days for the other. Functional outcomes using the MD Anderson Dysphagia Inventory and the University of Washington Quality of Life Questionnaire revealed significantly

higher scores in the RAFFR vs the non-RAFFR group 6 months after treatment.

Conclusion: Early results show that RAFFR reduces morbidity in patients undergoing TORAPP and improves swallowing outcomes, especially in salvage cases and those requiring adjuvant chemoradiotherapy. The overall survival was comparable in both groups.

Head and Neck Cancer Survivorship: Hearing Loss, Tinnitus, and Psychological Distress

Rahilla A. Tarfa, PhD (Presenter); Zainab Balogun; Lori Zitelli; Catherine Palmer; Jonas T. Johnson, MD; Marci Nilsen, PhD, RN

Introduction: Treatment modalities for head and neck cancer (HNC) use surgery, chemoradiotherapy, and radiotherapy and lead to treatment-related sequelae, including progressive hearing loss and tinnitus. The extent to which hearing loss and tinnitus contribute to the observed psychological distress and quality of life (QOL) measures among HNC survivors remains to be explored. We hypothesized that hearing loss and tinnitus status may account for a significant portion of the variation in depression, anxiety, and QOL measures and predict that this will be worse among the chemoradiation group.

Method: A retrospective chart review of 1176 unique HNC survivors from the University of Pittsburgh Medical Center HNC Survivorship Clinic from 2016 to 2020 was conducted. Results of a calibrated hearing screening and self-reported tinnitus screening, patient-reported outcomes regarding QOL, and symptoms of anxiety and depression were obtained from patients' initial visit. Using regression analysis, we asked what percentage of variation in depression, anxiety, and social-emotional and physical QOL could be explained by hearing and tinnitus status.

Results: Analysis is in progress. We anticipate that hearing loss and tinnitus status may explain significant variance in depression, anxiety, and QOL among HNC survivors.

Conclusion: A proportion of the depression, anxiety, and QOL measures can be explained by the hearing loss and tinnitus experienced by HNC survivors following various treatment modalities. Hearing loss is a modifiable risk factor for depression and anxiety and can be mediated using appropriate technology. This also highlights an intervention point for coordination between head and neck surgeons, audiologists, and psychiatrists to prepare patients for the psychological impact early on in survivorship.

Head and Neck Extra-nodal Manifestations of Rosai-Dorfman Disease: A Review

Doreen Lam (Presenter); Liuba Soldatova, MD; Jalal B. Jalaly, MBBS, MS; Christopher Rassekh, MD

Introduction: Rosai–Dorfman disease (RDD) is a rare histiocytic proliferation disorder infrequently encountered in otolaryngology mainly when patients develop characteristic massive

cervical lymphadenopathy. Limited localized disease rarely requires treatment in asymptomatic patients, but in most cases of head and neck extranodal manifestations of RDD, complete surgical resection with or without adjuvant medical management is required to prevent or abate symptoms. We present a few cases of extranodal head and neck manifestations of RDD managed at our institution and summarize current management recommendations.

Method: A retrospective records review and survey of current literature was conducted.

Results: We identified 6 cases of head and neck extranodal manifestations of RDD treated at our institution between 2014 and 2020 with a median follow-up of 3 years. Extranodal head and neck manifestations of RDD included lesions in the nasal cavity and paranasal sinuses, orbital lesions, laryngeal lesions, and periparotid lesions. With the exception of 1 case, all patients required surgical management for symptom and disease control in addition to medical management and/or adjuvant radiation.

Conclusion: In our case series, clinical course and management approach varied from surgical excision of a localized RDD lesions to multimodality treatment including surgery, chemotherapy, and radiation. This management approach was consistent with the current literature recommendations to approach RDD patients based on the disease manifestations (limited/localized vs extensive/systemic) and presence of symptoms. We hope that our case series will provide additional information for clinicians who might come across this condition since this disease is rare and can have a variety of different presentations, degrees of severity, and response to treatment.

Head and Neck Paragangliomas: A Portuguese Cancer Center's Experience

Luís Castelhana, MD (Presenter); Filipe Correia; Marta Mariano; Lígia Ferreira; Pedro Montalvão; Miguel Magalhães

Introduction: Workup and treatment of head and neck paragangliomas (HN-PGL) has greatly evolved over the past 2 decades. We aimed to review our experience regarding the management of these tumors.

Method: We retrospectively reviewed the medical records of 73 patients comprising 89 HN-PGL that were treated at a tertiary referral center between 1997 and 2020. Clinical, laboratory, genetic, radiologic, treatment, and follow-up variables were analyzed. Outcomes included disease-free survival (DFS) and postoperative cranial nerve deficits.

Results: There were 40 patients identified with temporal bone paragangliomas (TB-PGL), 24 with carotid body tumors (CBT), 22 with vagal paragangliomas (V-PGL), and 3 with other sites (2 laryngeal, 1 sinonasal). Hearing loss and tinnitus were the most frequent symptoms in TB-PGL patients, while neck mass prevailed among V-PGL and CBT patients. Surgery was the mainstay of treatment for most patients and tumor locations (57:89). Twenty patients had residual disease due to incomplete tumor removal, and 7 had recurrent disease. The

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5-year overall survival was 94.9%, and 5-year DFS was 31.9%. DFS was lower with higher stages of both TB-PGL ($P = .017$) and V-PGL ($P = .042$). Hearing loss and lower cranial nerve deficits were associated with higher rates of residual or recurrent disease ($P < .043$). Facial nerve deficits were more common in female patients ($P = .025$) with tinnitus ($P = .008$) and hearing loss ($P < .001$). Preoperative cranial nerve involvement was associated with multiple postoperative deficits. Radiotherapy controlled the growth of most of the tumors treated with this modality (16/20). Regarding wait and scan, 3 patients remained stable, while 1 was referred for radiotherapy. Three deaths were attributable to the HN-PGL or its treatment.

Conclusion: This is the largest Portuguese series regarding HN-PGL. While surgery was the traditional approach, radiotherapy and observation are now viable alternatives in various scenarios. Early diagnosis has improved with genetic testing.

Hemorrhage Following Treatment for Oropharyngeal Squamous Cell Carcinoma

Jean-Nicolas Gallant, MD, PhD (Presenter);
Madelyn Stevens, MD; Michael Feldman, MD;
Rohan Chitale, MD; Michael Topf, MD

Introduction: Carotid blowout syndrome is a feared complication for patients with head and neck cancer, particularly in patients receiving radiation therapy (RT). As the incidence of oropharyngeal squamous cell carcinoma (OPSCC) continues to increase, there is a growing need to identify and appropriately treat patients presenting with a life-threatening hemorrhage.

Method: A retrospective case series at a single tertiary care center was conducted. All patients with OPSCC who were treated with radiation and developed spontaneous hemorrhagic events between 2015 and 2020 were included.

Results: Over the course of 5 years, 19 patients developed a spontaneous hemorrhage following therapy for OPSCC. Median time from completion of treatment to hemorrhagic event was 6.5 months (range, 0–75 months). Six patients (31%) required emergent interventions to secure their airway. At presentation, computed tomography angiography demonstrated active extravasation in 4 patients, pseudoaneurysm in 6 patients, luminal irregularity in 5 patients, and no vessel abnormality in 4 patients. Most (89%) patients were deemed candidates for cerebrovascular intervention. Just over half (10 patients, 52%) had additional hemorrhage events, and the median time between the first and second bleed was 27 days (range, 3–335 days). No patients were decannulated following resolution of the hemorrhage. As of this writing, 5 patients had died, with a median time from initial hemorrhage to death of 20 days (range, 6–501 days).

Conclusion: Despite advances in RT technique, acute oropharyngeal hemorrhage continues to be a life-threatening sequela following treatment for OPSCC. Most bleeds occur within a year of treatment completion, and additional hemorrhagic events are common typically within 1 month of the initial bleeding event. Given the severity of this life-threatening complication, a multidisciplinary approach with cerebrovascular and palliative care colleagues is required. Additional research

is needed to identify risk factors for repeat hemorrhagic events to optimize long-term outcomes.

Hsp90 β Inhibitor KUNB11.9 Targets Head and Neck Squamous Carcinoma Cells Co-cultured With Adipose-Derived MSCs

Katie K. Spielbauer, MD (Presenter); Chitra Subramanian;
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Introduction: Heat shock protein 90 (Hsp90) is a molecular chaperone regulating client proteins in each of Weinberg's cancer hallmarks. Cisplatin resistance in head and neck squamous carcinoma (HNSCC) is thought to be mediated in part by adipose stem cells (AdMSCs) in the cancer microenvironment through upregulation of AKT/ERK pathways. We hypothesize that given Hsp90's regulation of client proteins mediating these resistant pathways, a novel Hsp90 β -specific inhibitor, KUNB11.9, will have potency against cisplatin-resistant (CisR) HNSCC cells, irrespective of the presence of adipose cells in the tumor microenvironment.

Method: HNSCC lines (UMSCC22b or UMSCC22b CisR) were cocultured with human AdMSCs and treated with KUNB11.9. The 72-hour cell viability was determined by CellTiter-Glo. Western blot (WB) for E-cadherin, P-AKT, P-ERK, PARP, and actin as well as oncogene microarray was performed on cocultured cells treated for 24 hours with 1 μ M KUNB11.9. Pathway enrichment analysis was carried out using DAVID and STRING pathway analysis tools.

Results: KUNB11.9 was equally potent against both UMSCC22b (IC₅₀ alone: 0.078 μ M [95% CI, 0.01–0.13] vs cocultured with AdMSCs [0.069 μ M; CI, 0.01–0.12]) and UMSCC22b CisR (IC₅₀ alone: 0.284 μ M [0.23–0.34] vs cocultured: 0.233 μ M [0.04–0.62]; KUNB11.9 vs AdMSC alone: IC₅₀ >5 μ M). WB of UMSCC22b cells demonstrated PARP cleavage and >80% decrease in P-Akt and P-ERK levels ($P < .01$ vs control) after treatment with 1 μ M KUNB11.9. Pathway enrichment and oncogene array analysis revealed KUNB11.9 treatment of co-cultured cells differentially regulated immune response pathways as well as the AKT/PI3K and HIF-1 cisplatin-resistance pathways and extracellular matrix proteins.

Conclusion: The novel Hsp90 β -selective inhibitor KUNB11.9 is potent against both naïve and cisplatin-resistant HNSCC cell lines, with greater than 20- to 70-fold selectivity vs normal AdMSCs. Pathway analysis highlights alteration of the CisR pathways AKT/PI3K and HIF-1 in co-culture conditions. Validation of this novel inhibitor will require future in vivo studies to demonstrate its therapeutic potential.

Impact of a Multidisciplinary Tracheotomy Team

Nicole Ruskay, MD (Presenter); Briana Heinly;
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Introduction: There are often differences with regard to how various services manage tracheotomies. To help streamline

the care of tracheotomy patients across departments, some hospitals have implemented teams to assess the care of these patients. Our study aimed to analyze the effects of establishing a multidisciplinary tracheotomy team at our institution.

Method: This was a single-institution retrospective study that included patients undergoing tracheotomy from February 2017 to March 2020. Our multidisciplinary tracheotomy team was established in April 2018, but not all tracheotomy patients admitted after April 2018 were seen by the team. Therefore, the patients were not divided based on temporal relation to the establishment of the team but rather based on those physically seen by the tracheotomy team (postteam) and those not seen (preteam). Data were collected from the electronic medical record. Statistical analyses were done via 2-tailed independent *t* tests and Fisher exact tests.

Results: There were 198 patients in the preteam group and 195 patients in the postteam group. Of the tracheotomy patients admitted after the establishment of the tracheotomy team, 74% were seen. After implementation of the tracheotomy team, the average time to initial tracheotomy change significantly decreased from 9.48 to 7.16 days ($P = .03$). In addition, the length of stay significantly increased from 24.9 to 30.8 days ($P = .03$). There was no significant difference in (1) length of mechanical ventilation ($P = .16$), (2) percentage of patients for whom speech therapy was consulted ($P = .92$), or (3) percentage of patients who received formal tracheotomy education handouts ($P = .81$) between the 2 groups.

Conclusion: The implementation of a tracheotomy team significantly decreased the time to initial tracheotomy change, which previous research has suggested can lead to earlier use of a speaking valve and increased ability to tolerate oral intake. After establishing a tracheotomy team, we hoped to decrease time to discharge, but unfortunately, our results demonstrated an increase in length of stay. Further analysis is needed to determine what factors led to this.

Impact of COVID on Tracheotomy Practices

Jacqueline R. Tucker (Presenter); Nicole Ruskay, MD; Neerav Goyal, MD, MPH; John P. Gnaidy, MD; David Goldenberg, MD

Introduction: Coronavirus disease 2019 (COVID) can cause respiratory distress, which can lead to intubation and even tracheotomy. With the risk of viral aerosolization, tracheotomy practices were directly affected by the COVID pandemic. Our study analyzes these practices at the pandemic's inception.

Method: This was a single-institution retrospective study that included patients undergoing tracheotomy from December 2019 to June 2020. Patients were divided into 2 groups: pre-COVID (December 2019–March 2020) and post-COVID (March 2020–June 2020). Data were collected from the electronic medical record. Statistical analyses were done via 2-tailed independent *t* tests and Fisher exact tests.

Results: There were 42 patients in the pre-COVID group and 25 patients in the post-COVID group. None of the patients were COVID positive. The main indication for tracheotomy in both groups was prolonged intubation followed by adjunct to

head and neck surgery. Before the pandemic, otolaryngology performed 36% of tracheotomies, followed by thoracic surgery (29%) and trauma (26%). After the start of the pandemic, trauma performed 40% of tracheotomies, followed by otolaryngology (28%) and thoracic surgery (28%). This shift in departments was not significant ($P = .62$). There was a significant increase in the percentage of tracheotomies performed in the operating room (OR; $P = .04$). In the pre- and post-COVID cohorts, 57% and 64% of tracheotomies were performed open, respectively ($P = .62$). For patients undergoing tracheotomy for prolonged intubation, the means and ranges for time to tracheotomy in the pre- and post-COVID groups were 18 (4–40) and 20 (3–42) days, respectively ($P = .55$). There was no significant difference in overall length of stay ($P = .77$) or length of mechanical ventilation ($P = .56$) between the 2 groups.

Conclusion: At the start of the pandemic, there was a significant increase in tracheotomies performed in the OR, likely to limit viral spread, despite all patients being COVID negative. Although not significant, there was a trend toward performing more open tracheotomies. It is important to note that these data were collected early in the pandemic and additional trends may become apparent over time.

Impact of COVID-19 on Head and Neck Cancer Care Delivery

Madelyn Stevens, MD (Presenter); Ankita Patro, MD; Bushra Rahman; Sarah Rohde, MD; Michael Topf, MD

Introduction: Access to care is a known challenge for head and neck cancer patients. The coronavirus disease 2019 (COVID-19) pandemic has placed further demands on the US health care system and oncologic care. This study aims to explore the impact of the COVID-19 pandemic on head and neck cancer care delivery.

Method: A retrospective chart review was performed at a single tertiary care center from March 2020 to July 2020 (encompassing the initial outbreak of COVID-19) and March 2019 to July 2019 (serving as a control). All adult patients presenting as new referrals to the otolaryngology head and neck cancer clinic with known or suspected malignancy were included. Demographic variables collected included age, gender, race, insurance status, and distance traveled. Referral and treatment dates, telemedicine encounters, presenting symptoms, type of malignancy, and prior treatment were also collected.

Results: In total, 449 new cancer patients were included, and comparison of 2019 ($n = 236$) vs 2020 ($n = 213$) revealed no significant differences in age, gender, race, insurance status, or malignancy type. Median distance traveled decreased from 61.7 miles (greatest distance of 713.8 miles) in 2019 to 48.4 miles (greatest distance of 302.2 miles) in 2020 ($P = .588$). Median time from referral to clinic significantly decreased from 11 days in 2019 to 9 days in 2020 ($P < .001$). Median time from referral to surgery also decreased (38 days in 2019 vs 27 days in 2020, $P < .001$). Thirteen telemedicine encounters occurred in 2020 for postoperative and surveillance follow-ups.

Conclusion: Patients at our institution were seen in clinic and underwent surgery more quickly during the COVID-19

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pandemic without significant amplification of any preexisting demographic disparities. Expedited care may be a result of initial slowdown of clinical and surgical volume at the start of the pandemic, prioritization of oncologic surgical cases, cancellation of elective procedures, and the use of telemedicine. The median decrease in distance traveled suggests a reduced catchment area and a potential barrier to care during the disruptions related to the pandemic.

Impact of Lymph Node Yield in Cutaneous Squamous Cell Carcinoma

Shivam D. Patel (Presenter); Ethan Arnaud;
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Introduction: Lymph node yield (LNY) has been shown to be a predictor of survival outcomes in mucosal head and neck squamous cell carcinoma (SCC) and has been proposed as a possible quality metric in head and neck cancer care. The impact of LNY in patients undergoing neck dissection for cutaneous SCC is less clear.

Method: A retrospective chart review of 2 academic medical centers was performed of patients with cutaneous SCC of the head and neck who underwent a wide local excision with concurrent neck dissection between 2010 and 2020. Main outcome measures were 2-year overall survival (OS) and disease-free survival (DFS). LNY was analyzed as a binary variable (<18 , ≥ 18) based on previous studies. Data were analyzed using Fisher exact test and t tests for categorical and continuous variables, respectively.

Results: In total, 38 patients met inclusion criteria. The most frequent anatomic site was the cheek ($n = 11$, 28.9%), and 33 patients (86.8%) had >18 LNY. There were no differences observed among age, sex, body mass index, smoking and alcohol history, immunosuppression, history of head and neck radiation, number of neck levels dissected, and clinical T and N stage. Lymph nodes (LNs) were separated by neck level in 19 patients (50%), whereas 19 (50%) had LNs submitted as a single specimen to pathology. There was a trend toward patients who had their LN packet separated having a higher mean LNY (40.6 vs 31.5, $P = .086$). Two-year OS and DFS were 80% and 100% among patients with LNY <18 and 57.6% and 60.6% among patients with LNY >18 , respectively.

Conclusion: Preliminary results suggest that LNY may not be predictive of OS and DFS in patients undergoing neck dissection for cutaneous SCC. Submitting nodal packets as separate specimens by neck level may increase LNY.

Incidence of Occult Nodal Disease in Primary Salivary Gland Malignancies

Eve Tranchito, MD (Presenter); Claudia I. Cabrera, MD, MS;
Morgan Terry; Shawn Li, MD; Nicole Fowler;
Akina Tamaki, MD

Introduction: Malignant primary salivary gland tumors are rare neoplasms that are vastly heterogenous in their histology

and clinical behaviors. Consequently, studies have lacked the robust sample sizes needed to define treatment strategies including the management of clinically node negative necks. In this study, we used the National Cancer Database (NCDB) to identify the incidence of occult nodal metastasis and its effect on overall survival.

Method: A retrospective review using the NCDB of primary salivary gland malignancy patients between 2004 and 2016 was performed. We isolated patients with adenocarcinoma, adenoid cystic carcinoma, mucoepidermoid carcinoma, intraductal carcinoma, acinic cell carcinoma, and carcinoma ex pleomorphic adenoma. Information on demographics, surgical treatment, TNM pathological stage, histology, grade, surgical pathology, and overall survival (OS) were analyzed. Univariate and multivariate analyses were carried out using age, sex, race, comorbidity score, TNM stage, grade, regional nodal metastasis, and surgical margin status.

Results: A total of 4029 patients were analyzed and stratified by histologic subtype. Incidence of occult nodal disease was 30.4% in adenocarcinoma ($n = 1000$), 22.9% in adenoid cystic carcinoma ($n = 457$), 23.3% in mucoepidermoid carcinoma ($n = 1632$), 42.0% in intraductal carcinoma ($n = 247$), 13.3% in acinic cell carcinoma ($n = 475$), and 22.7% in carcinoma ex pleomorphic adenoma ($n = 218$). Univariate analysis showed worse OS in all histological types in the presence of pathologic lymph node involvement. On multivariate analysis, lymph node involvement had worse OS in mucoepidermoid carcinoma and intraductal carcinoma but not for other histological types. On multivariate analysis, age, presence of positive margins, comorbidity score, TNM, and grade had a variable impact on OS based on histology.

Conclusion: The incidence of occult cervical lymph node metastasis varies by subtype. Nodal metastasis is a poor prognostic factor among other variables associated with worse overall survival.

Infarcted Warthin's Tumor: A Sheep in Wolf's Clothing

Edward Westfall (Presenter); David Gannon; Jeff Petrussek;
Eric Thorpe, MD; Richard Borrowdale; John Leonetti

Introduction: Benign tumors of the parotid gland are typically slow-growing, painless, mobile lesions that rarely cause facial paresis. Warthin's tumor, the second-most common such tumor, can mimic malignant lesions when histologically labeled as an infarcted tumor. This study will focus on this unusual subset of Warthin's tumor.

Method: This was a retrospective chart analysis of 1344 parotidectomies performed at a tertiary care academic medical center between 2007 and 2020. The 14 cases of histologically proven infarcted Warthin's tumor were used for this review. Clinical signs/symptoms, fine-needle aspirate (FNA) results, and radiographic findings were collected.

Results: All 14 patients presented initially with a slow-growing tumor; however, 6 were found to have bilateral parotid neoplasms. Nine patients described recent rapid

growth, 5 following a prior FNA. Additional clinical findings included pain (9), facial paresis (4), and complete facial paralysis (1). Only 2 patients had an FNA diagnosis of infarcted Warthin's tumor, and 3 patients had an FNA consistent with carcinoma. Four FNA results were inconclusive. Parotidectomy alone was performed in 6 patients and in conjunction with a neck dissection in 3 cases. A variety of other procedures (eg, mastoidectomy, lymph node excision) were used in 9 individuals, and 1 patient received intraoperative brachytherapy.

Conclusion: Infarcted Warthin's tumor is an unusual subset of the second-most common benign tumor of the parotid gland that can dangerously mimic a malignant lesion. A variety of clinical factors can be used to preoperatively consider this diagnosis as to avoid overly aggressive surgical management.

Institutional Review of Recurrent Pleomorphic Adenoma of the Parotid Gland

Sullivan Smith (Presenter); Gurmehr Brar; Grant Harmon; Alec Block

Introduction: Surgical resection is the standard of care for pleomorphic adenoma (PA) of the parotid gland. Of these tumors 2% to 5% will recur, creating a difficult problem to manage. Recurrence usually necessitates reoperation, which is often technically challenging and puts the facial nerve at high risk. The aims of this study were to characterize the recurrent parotid PA population at a single tertiary referral center and to compare outcomes after surgery for singly recurrent and multiply recurrent tumors.

Method: This was a retrospective chart review of adults at a single tertiary care academic medical center who underwent operations for recurrent PA of the parotid gland between 2000 and 2020. Demographic data, details of surgical interventions, pre- and postoperative facial nerve function, and re-recurrence rates were studied. These factors were compared between patients with singly recurrent and multiply recurrent tumors.

Results: In total, 38 patients met inclusion criteria. Four presented with primary tumors and subsequently recurred, 26 presented with a first recurrence, 7 with a second recurrence, and 1 with a fourth recurrence. Multiply recurrent PAs were more likely to require at least partial nerve sacrifice at the time of reoperation ($P = .0092$). Significantly worse long-term facial nerve outcomes were seen following surgery for multiply recurrent PA ($P = .008$). Whether an operation was for a first or subsequent recurrence had no significant bearing on surgical margin status or likelihood of finding multifocal disease. There was no significant difference between the rate of re-recurrence following first revision surgery vs second-fourth revision surgery. Time to reoperation was significantly shorter between the first and second revision surgery than between the primary surgery and first revision ($P = .0017$).

Conclusion: Surgery for recurrent PA incurs high risk to the facial nerve, and this risk appears to increase in the setting of multiple recurrences. Re-recurrences may be recognized and intervened upon sooner than primary recurrences.

Interventional Sialendoscopy as Treatment of Sialolithiasis

Majid Al-Thobaiti (Presenter); Ahmed M. Elbana

Introduction: Sialendoscopy was introduced as a replacement noninvasive treatment for sialolithiasis to avoid neurodamage side effects of conventional sialoadenectomy. Sialendoscopy is now considered the first surgical choice in salivary gland obstruction disorders and is also used for diagnosis and treatment of a wide range of salivary duct disorders. The study aimed to assess the factors might be influencing success of sialendoscopy operations.

Method: A retrospective study design was adopted to review 23 patients (69.5% male and 30.4% female) diagnosed with sialolithiasis and admitted to Security Forces Hospital, Al Riyadh, Saudi Arabia.

Results: Study results show that age and gender have no effect on the success of sialendoscopy operations while smoking and presence of the stone for more than 6 months are related to success of sialendoscopy.

Conclusion: The study concludes the appropriation of sialendoscopy as a minimally invasive treatment of sialolithiasis, which avoids salivary gland removal, at low cost. Invasive surgeries should not be first-line treatment, although they can be helpful in some special cases when sialendoscopy is not effective, such as large stone sizes.

Intracranial Second Neoplasms After Radiotherapy for Nasopharyngeal Carcinoma

Ryan A. McMillan, MD (Presenter); Jamie Van Gompel; Chris Low; Amy Glasgow; Elizabeth Habermann; Garret Choby, MD

Introduction: The purpose of this study is to determine the incidence and risk of benign and malignant second intracranial neoplasms after radiation therapy for nasopharyngeal carcinoma (NPC).

Method: The Surveillance, Epidemiology, and End Results database from 1975 to 2016 was used to determine if patients who receive radiotherapy for NPC are at increased risk of developing second intracranial neoplasm compared with the general population by comparing standard incidence ratios (SIRs; the number of observed cases vs those expected) adjusted for demographic factors. The histologic type, sequence, and timing of intracranial tumor diagnoses were analyzed. Cases in which a separate intracranial tumor was diagnosed after treatment of NPC were analyzed.

Results: In comparison to the age- and sex-adjusted expected number of cases, there was an increased incidence of second neoplasms in patients who underwent radiation therapy for NPC overall (SIR 7.5, confidence level [CL] 5.8–10.4, $P < .01$). Subgroup analysis by time also demonstrated an increased rate in the first year after treatment (SIR 3.2, CL 1.9–5.33, $P < .01$), >1 years from treatment (SIR 4.50, CL 2.93–6.90, $P < .01$) and 5+ years from treatment (SIR 3.43, CL

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2.10-5.60, $P < .01$). Kaplan-Meier estimates of the second tumor at 1, 3, and 5 years were 0.1%, 0.2%, and 0.2%, respectively. Overall survival was not adversely affected by the diagnosis of a second neoplasm with a median survival of 259 months ($P < .01$). Meningiomas (45.7%), gliomas (22.9%), and nerve sheath tumors (14.3%) were the most common second intracranial neoplasms.

Conclusion: There is an increased risk of developing a second intracranial neoplasm at all time points after radiotherapy for nasopharyngeal carcinoma. Meningiomas, gliomas, and nerve sheath tumors are the most frequent second neoplasms.

Intraoperative Ultrasound Guided Resection of AVMs

Sabina Figurelli (Presenter); Giacomo Colletti, MD; Sara Negrello; Alexandre Anesi; Luigi Chiarini

Introduction: Surgical management of arteriovenous malformations (AVMs) can be a tricky challenge for the surgeon, as AVMs show the tendency to increase in size, expand into the adjacent tissues, and have a high rate of relapse after treatment. Here we illustrate a novel technique to evaluate intraoperatively the resection margins of AVMs using an ultrasound (US) color Doppler transducer, which could significantly reduce relapse rate.

Method: From 2016 to 2019 we enrolled 8 patients presenting with a cervicofacial AVM. Each patient was studied with a contrast enhanced magnetic resonance imaging, an angio-computed tomography, and a preoperative color Doppler US. On the basis of the clinical aspect and the exams, the AVMs were deemed radically resectable. Before surgery, the anatomical margins of the AVM were identified by means of a color Doppler evaluation, and the planned resection margins were marked on the skin. After surgical resection, the excision margins and the deep wound bed were checked again to investigate any residual disease. If after the primary resection there was any doubt of residual disease (based on the US check), then the resection was widened in those areas; this operation was repeated until healthy margins in all superficial and deep margins were reached. The mean follow-up was 29 months (range, 22 to 47 months).

Results: Five patients included in this study needed an intraoperative further extension of the preoperatively planned resection; in all of these cases, a postoperative histopathological examination of the specimens detected the presence of the typical histological features of AVM in each specimen pertaining to the main resection and in each specimen coming from the extended US-guided resection. The remaining margins were declared disease free on histology. All patients were disease free as of December 2020.

Conclusion: US Doppler could be considered a reliable means in planning and checking the resection margins of surgically managed AVMs. Our preliminary results seem to be encouraging, providing real-time monitoring of the radicality of surgery, thus giving the opportunity to enhance the cure rate.

Localization of the Angular Artery Using Standard Preoperative Imaging

James R. Gardner, MD (Presenter); Quinn Dunlap, MD; Emre Vural, MD; Mauricio Moreno, MD; Donald Benson; Jumin Sunde, MD

Introduction: The location of the angular artery (AA) is known to be highly variable. Preoperative imaging localization could provide clinical value in scapular flap harvest.

Method: A surgical and radiographic case series was performed at an academic, tertiary care center. In the surgical case series, 6 consecutive patients were reconstructed with scapular tip free flaps between August 2020 and November 2020. The surgeon and radiologist independently reviewed computed tomography (CT) of the chest with contrast preoperatively. AA origin was classified into 5 variants. Radiographic findings were compared with surgical findings (institutional review board No. 261756). In the radiographic case series, 52 patients (104 sides) with chest CTs with contrast for varying indications between October 2019 and October 2020 were reviewed by the surgeon and radiologist. Data were recorded as with the surgical series. Axillary fat dimension was recorded.

Results: In the surgical case series, patients 1 to 5 were correctly classified by both readers, giving 83.3% agreement between readers and surgical findings. This equated to a substantial level of agreement for readers relative to surgical findings (Kappa = 0.700–0.739). Maximum deviation was 2 mm from the surgical findings. The Pearson correlation coefficient for the surgeon and radiologist was 0.980 and .994, respectively. In the radiographic series, we were unable to identify the AA on 4 of 104 sides (3.8%). This correlated with fat in the axilla (6–13 mm in these 4 sides). Only 2 of 100 sides in which the AA was identified fell within this range. Nonparametric tests support rejecting the null hypothesis. The receiver-operating characteristic curve optimized cut point of 14 mm was established with a sensitivity of 0.980 and 1 – specificity of 0.000.

Conclusion: Standard preoperative imaging is able to identify the AA at a high rate in patients with more than 14 mm of fat in a transverse measurement at the third rib. The accuracy of the localization is within 2 mm and confirmed surgically.

The Long Term Effect of Postlaryngectomy Fistulas on Functional Outcome

Blake Hollowo (Presenter); James R. Gardner, MD; Deanne King, MD, PhD; Jumin Sunde, MD; Emre Vural, MD; Mauricio Moreno, MD

Introduction: The aim of this study is to examine the effect of pharyngocutaneous fistula (PCF) formation on functional outcomes in laryngectomy patients.

Method: All laryngectomy patients from November 2005 to June 2019 were included in a retrospective cohort study at an academic tertiary center. Dietary outcomes (defined as unrestricted, modified, or nothing by mouth [NPO]) and speech outcomes (defined as tracheoesophageal puncture, electrolarynx, or nonverbal) at 3, 6, 9, and 12 months postoperative

were collected for patients with postoperative fistulae. The patients were categorized by salvage vs primary laryngectomy and primary closure vs vascularized tissue reconstruction. In addition, fistulae were stratified by method of detection (imaging vs clinically apparent). Fistulized patients were compared with nonfistulized patients at 1 year and across subgroups at the above time points.

Results: Of 110 total laryngectomy patients, 34 developed a fistula postoperatively. No difference in dietary or speech outcomes were present at 1 year between all fistulized patients and nonfistulized patients ($P = .45$ and $.29$, respectively). Diet and speech outcomes between salvage and primary laryngectomy patients with fistulae were not statistically different ($P = .47$ and $.35$, respectively). Wound healing was significantly faster for fistulae noted via imaging (31.4 vs 82.8 days, $P = .31$). Salvage laryngectomy fistulae were slower to heal (90.8 vs 41.6 days, $P = .31$). Time to fistula closure predicted diet at 3 and 6 months but not at >9 months postoperatively ($P = .001$, $.009$, and $.137$, respectively). No statistically significant difference was present in healing time, unrestricted diet, or speech outcomes based on pharyngeal closure technique ($P = .15$, $.94$, and $.11$, respectively).

Conclusion: PCFs affect dietary outcomes in the early postoperative period, but patients can expect to have similar functional outcomes as nonfistulized patients at 1 year regardless of radiation history. Salvage laryngectomy and clinically apparent fistulae prolong times of fistulae healing.

Low Cervical Paraspinal Muscle in Head and Neck Microvascular Surgery

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Introduction: Sarcopenia is an increasingly recognized negative prognostic factor in patients with head and neck cancer. The objective was to ascertain the association of sarcopenia biomarkers measured radiologically from routine computed tomography (CT) imaging to short-term postoperative adverse events in head and neck cancer patients undergoing microvascular reconstruction.

Method: A cohort of treatment-naïve patients undergoing surgery for head and neck mucosal cancer with free tissue reconstruction were prospectively evaluated at a single institution. Cervical paraspinal skeletal muscle index (CPSMI) was calculated using preoperative cross-sectional CT neck imaging and adjusted for height. Sociodemographic, comorbid, and nutritional variables were collected. Postoperative adverse events were recorded within 30 days of when the index surgery was recorded. Multivariate logistic regression was used to evaluate the association between sarcopenia biomarkers and outcome.

Results: A total of 95 patients, 78 with oral cavity and 17 with laryngeal cancer, were included in the study. The mean age was 62.8 years, and 64 patients were male. Some 52 Clavien-Dindo grade 3+ events occurred within 30 days of

surgery, of which 17 patients developed an oro/pharyngocutaneous fistula. Low CPSMI was independently associated with oro/pharyngocutaneous fistula formation (odds ratio [OR] 7.68, 95% CI, 1.41–55.3), prolonged length of stay in hospital and readmission within 30 days (OR 5.41, 95% CI, 1.41–23.6) when adjusting for age, sex, and Charlson Comorbidity Index. CPSMI was not associated with Clavien-Dindo grade 3+ events nor mortality within 30 days of surgery.

Conclusion: A low cervical paraspinal skeletal muscle index was independently associated with oro/pharyngocutaneous fistula and 30-day readmission following head and neck cancer surgery with free tissue reconstruction.

Low Skeletal Muscle Mass Is a Risk Factor for Pneumonia

Kazuhira Endo (Presenter); Takayoshi Ueno;
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Introduction: This study aims to investigate whether pretreatment skeletal muscle mass index (SMI) is a predictor for the risk of aspiration pneumonia and explore the relationship between low SMI and overall survival (OS) in patients with head and neck squamous cell carcinoma (HNSCC) receiving chemoradiotherapy (CRT).

Method: We retrospectively reviewed the data of patients with HNSCC who received CRT during 2010 to 2019. Patients received a combination of radiotherapy and cisplatin-based chemotherapy (3 cycles of 80 mg/m² cisplatin on days 1, 22, and 43). Aspiration pneumonia was defined as the presence of both subjective and objective symptoms. Kaplan-Meier curves were generated to analyze survival.

Results: Among the 159 patients, 36 (22.6%) developed aspiration pneumonia during treatment. Median SMI in patients with and without pneumonia was 12.4 (9.0–20.7) cm²/m² and 13.6 (8.1–19.7) cm²/m², respectively ($P < .01$). Multivariate logistic regression revealed that SMI was the only independent predictor of aspiration pneumonia among men ($P = .0023$). Mean OS was significantly shorter for patients with low SMI than for patients with normal SMI (66.7 months vs 94.4 months, $P = .002$).

Conclusion: Pretreatment low SMI predicts development of aspiration pneumonia and is a strong negative prognostic predictor for OS in patients with HNSCC undergoing CRT. Supportive treatment can be provided to patients at high risk of a low SMI. This study is the first to report SMI as a prognostic predictor in HNSCC.

Lymph Node Density in Oropharyngeal Carcinoma: A Population Study

Rahul K. Sharma (Presenter); Sallie M. Long, MD;
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Introduction: Studies have demonstrated lymph node density (LND) to be a prognostic indicator in various malignancies, including oropharyngeal squamous cell carcinoma (OPSCC); however, many do not include HPV status or are limited by

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small sample size. We aim to determine the association of LND on survival in HPV-positive and HPV-negative OPSCC using a national database.

Method: An analysis of adults with OPSCC between 2010 and 2016 was conducted from the Surveillance, Epidemiology, and End Results registry. Demographic, tumor, and treatment variables were extracted. Patients with unknown lymph node yield were excluded. LND was defined as the number of positive nodes divided by the number of nodes extracted. Disease-specific survival (DSS) was assessed using Kaplan-Meier and log-rank statistics. Cox regression controlling for demographic, tumor, and treatment factors was used to understand the independent effect of LND on survival.

Results: A total of 3703 patients were analyzed, including 2855 (77%) with HPV-positive and 852 (23%) with HPV-negative OPSCC. Median LND for all patients was 0.06 (interquartile range 0.02–0.21). A cutoff of 0.06 was used for high vs low LND. On Kaplan-Meier analysis, LND was associated with DSS in the overall ($P < .001$) and HPV-positive ($P < .001$) groups but not in HPV-negative patients ($P = .150$). On multivariate analysis controlling for age, race, sex, TNM stage, and adjuvant therapy, LND was associated with DSS in all patients (hazard ratio [HR] 1.62, 1.20–2.19, $P = .002$) and HPV-positive patients (HR 2.03, 1.34–3.08, $P < .001$) but not HPV-negative patients (HR 1.15, 0.71–1.86, $P = .600$).

Conclusion: LND was independently associated with DSS in HPV-positive but not HPV-negative OPSCC. This is one of the largest reports of LND on outcomes in HPV-positive and HPV-negative OPSCC. Future work is needed to determine the utility of a LND threshold for risk stratification in these tumors.

Major Salivary Gland Cancer With Distant Metastasis Upon Presentation

Liliya Benchetrit, MD (Presenter); Saral Mehra; Amit Mahajan; Rahmatullah Rahmati; Benjamin L. Judson, MD; Heather Edwards

Introduction: The incidence of distant metastases (DM) in major salivary gland (MSG) malignancy has steadily increased over the past decade. However, limited data are available on DM characterization at time of first disease presentation. We aimed to evaluate the rate, histologic patterns, location, and predictors of DM in MSG cancer and suggest potential implications on diagnostic workup.

Method: We conducted a retrospective analysis of the National Cancer Database from 2010 to 2016, identifying adults with a MSG malignancy. Site and rate of DM were stratified by histologic subtype. Factors predictive of DM at presentation were determined by multivariable regression analysis.

Results: Of 5776 patients with a MSG carcinoma, 333 (5.8%) presented with DM. The most common DM site was lung (57.1%), followed by bone (46.8%) and liver (19.5%). DM was most common in adenocarcinoma not otherwise specified (NOS; 15.1%, 132/874) and salivary duct carcinoma (10.4%, 30/288). High-grade mucoepidermoid carcinoma

(MEC) and acinic cell carcinoma had the highest rates of lung metastases (81.6%, 31/38 and 66.7%, 8/12, respectively). Conversely, adenocarcinoma, NOS, and salivary duct carcinoma had the highest rates of bone metastases (61.4%, 81/132 and 60.0%, 18/30, respectively). Factors associated with increased DM likelihood were male sex (odds ratio [OR]: 1.25, $P = .033$); lack of insurance (vs private OR: 1.66, $P = .015$); submandibular, sublingual, or overlapping primary (vs parotid OR: 1.42, $P = .042$; 2.93, $P = .004$, 2.48, $P < .001$); advanced T (vs T1, T2: OR: 1.87, T3: OR: 2.68, T4: OR: 4.55, $P < .001$ for all); and N (vs N0, N1: OR: 2.91, N2: OR: 4.93, N3: OR: 16.94, $P < .001$ for all) stages. Low-grade MEC and acinic cell carcinoma were associated with a reduced DM risk (vs high-grade MEC OR: 0.13, $P < .001$; OR: 0.33, $P = .002$, respectively).

Conclusion: We identified a DM rate of 5.8% in MSG malignancy at presentation. Of patients with DM, 43% presented without DM to the lung but to the bones, liver, and/or brain. The most common metastatic sites differed by tumor histology. Staging with neck and chest computed tomography alone may fail to detect sites of DM.

Management of Cutaneous Malignancies Impacted by COVID-19 Delays

Jennifer N. Shehan, MD (Presenter); Samuel Rubin; Alan Lim; Bharat Yarlalagadda

Introduction: Coronavirus disease 2019 affected the timing of management of patients with cutaneous malignancies, delaying their surgical care by several months. The study objective is to determine the impact of delays on patients' oncologic and reconstructive management in comparison to 2 standard years.

Method: A retrospective review of all patients with surgical management for their cutaneous malignancies at a single institution in the departments of otolaryngology and plastic surgery was conducted from January 2018 to January 2021. The 2020 group was considered to have delayed care due to the health care restrictions. Demographics, malignancy characteristics, ablative and reconstructive surgery, and adjuvant management were all evaluated comparing the pre-2020 and 2020 groups. Univariate analysis was performed using a 2-sample t test for continuous variables and chi-squared test and Fisher exact test for categorical variables. Significance was determined if $P < .05$.

Results: In total 80 patients underwent cutaneous malignancy management and reconstruction during the time period, in which the squamous cell carcinoma was the most common pathology (38.75%) and the nose was the most common subsite (38.75%). In 2020 there were no cutaneous cases that were managed surgically between February and June compared with cases occurring monthly during the prior standard years, suggesting a delay in care anywhere from 1 to 4 months during this time. Despite delays, there was no significant difference between the pre-2020 and 2020 groups in terms of staging, oncologic management, or reconstruction. There were no differences in the variables between the groups.

Conclusion: There was no significant difference in presentation, oncologic management, or reconstruction required for patients requiring a several-month delay in care for the management of cutaneous malignancy compared with the 2 prior standard years. This suggests that this delay did not significantly affect management of cutaneous malignancy in this subset of patients, leading us to understand more about urgency of management in patients with cutaneous malignancies.

MicroRNA-129-3p Suppresses Tumor Progression by Targeting SOX4 in HNSCC

Joon-Kyoo Lee, MD, PhD (Presenter)

Introduction: In humans, sex-determining region-Y (SRY)-related high-mobility-group box 4 (SOX4) is linked to development and tumorigenesis, which is overexpressed in several cancers and has prognostic significance. This study evaluated whether microRNA-129-3p (miR-129-3p, which was reported to be downregulated in human cancer) and SOX4 affect oncogenic behavior and chemoradiotherapy response in head and neck squamous cell carcinoma (HNSCC) cells. It also documented the relationship between miR-129-3p and SOX4 in HNSCC cells.

Method: Reverse transcriptase polymerase chain reaction (RT-PCR), quantitative RT-PCR, Western blot, cell viability assay, cell apoptosis assay, cell invasion, and migration assays were used.

Results: SOX4 protein and messenger RNA (mRNA) expression were significantly increased in HNSCC tissues compared with adjacent tissues. On the contrary, miR-129-3p was decreased in HNSCC tissues compared with adjacent tissues. Moreover, we found that the overexpression of miR-129-3p inhibited mRNA and protein expression of SOX4 in SNU 1041, SCC15, and SCC25 cells. SOX4 knockdown by small interfering RNA decreased cell viability and induced apoptosis by activating caspases-3 and -7 and poly-ADP ribose polymerase and suppressing X-linked inhibitor of apoptosis protein in SNU1041, SCC15, and SCC25 cells; it also enhanced radiation/cisplatin-induced apoptosis and suppressed tumor cell invasion and migration. Overexpression of miR-129-3p was accompanied by the suppression of cell viability and invasion in SNU1041, SCC15, and SCC25 cells; migration in SNU1041 and SCC25 cells; and the induction of apoptosis and radiation/cisplatin-induced apoptosis in SNU1041, SCC15, and SCC25 cells, similarly to the SOX4 knockdown. In a nude xenograft model using SCC15 cells, overexpression of miR-129-3p significantly decreased tumor growth by tumor weight and size.

Conclusion: Our study provides evidence that miR-129-3p acts as a suppressor of tumor progression by targeting SOX4 in HNSCC.

Minimally Invasive Transoral Robotic Surgery for Challenging Airway Vascular Malformations

Teresa O, MD (Presenter); Josef Krespi; George Ferzli; Milton Waner, MD, MBBCH

Introduction: Vascular malformations commonly involve the upper aerodigestive tract. In some laryngeal or base of tongue

lesions, transoral access may be limited by a patient's anatomy, and thus, surgical resection can be difficult. There are very few reported cases of using transoral robotic surgery (TORS) for head and neck vascular malformations. Our objective was to summarize the current literature on robotic surgery for head and neck vascular malformations and to present our experience to highlight the advantages of this technique.

Method: All case reports and case series published in the English literature involving head and neck vascular malformations treated with transoral robotic surgery were included for review. The period of study ranged over 2 years.

Results: Two documented cases of robotic surgery for head and neck vascular malformations were identified through a comprehensive literature review. An additional 2 cases from our institution were included, bringing the total number to 4. Three of 4 cases involved lesions in the oropharynx. One of 4 was a retropharyngeal arteriovenous malformation with parapharyngeal extension. In our 2-patient series, robotic surgery was used for transoral epiglottectomy in 1 patient and for supracricoid resection in another patient. The robot provided a 2-dimensional or 3-dimensional view of the larynx and the ability to access areas that were unable to be accessed with traditional rigid scopes. Outcomes measured were ease of access, complications, residual disease, regrowth, swallowing function, and airway status.

Conclusion: TORS for head and neck vascular malformations is rare. Our case series represents the largest series in today's current literature. Robotic surgery should be in the armamentarium of head and neck surgeons and offers a minimally invasive approach to vascular lesions in the oropharynx and supraglottic larynx.

Multi-cancer Detection Test to Aid Head and Neck Cancer Diagnosis

Kathryn N. Kurtzman (Presenter); Alan H. Bryce; Minetta C. Liu; Michael V. Seiden; Jingjing Gao; Eric A. Klein

Introduction: Symptomatic presentation is the most common route to cancer diagnosis. A test that detects cancer signals across multiple cancer types, including head and neck cancer, and predicts cancer signal (tissue) origin (CSO) could aid in more efficient diagnostic workup and shorten time to cancer diagnosis.

Method: The Circulating Cell-free Genome Atlas (CCGA; NCT02889978) study is a prospective, longitudinal, multicenter, case-control study to develop and validate a multicancer detection test. The second CCGA substudy used a targeted methylation-based cell-free DNA assay and a machine-learning algorithm and included an assessment of test performance (sensitivity and CSO prediction accuracy) in a subgroup of participants with clinically presenting cancers (CPCs), including head and neck cancer. Specificity was assessed in the noncancer group and a subgroup with confounding (nonmalignant/benign) conditions (CCs; eg, oral/pharyngeal/nasal lesion).

Results: Specificity was 99.5% (95% CI, 98.2%–99.9%; 396/398) for the noncancer group and 93.8% (71.7%–99.7%; 15/16) for the CCs subgroup. Overall sensitivity for head and neck cancers was 72.0% (52.4%–85.7%; 18/25) and was comparable with overall sensitivity among participants with CPCs (66.4% [66.2%–70.3%; 344/518]). Sensitivity of cancer signal

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detection for head and neck cancer was 66.7% (20.8%–98.3%; 2/3) for stage I, 25.0% (1.3%–69.9%; 1/4) for stage II, 83.3% (43.6%–99.1%; 5/6) for stage III, and 83.3% (55.2%–95.3%; 10/12) for stage IV. CSO prediction accuracy for head and neck cancers was 88.9% (67.2%–96.9%; 16/18) and was comparable with that for the CPC participants with cancers detected (excluding those with multiple or unknown primaries; 91.7% [88.3%–94.3%; 300/327]).

Conclusion: This multicancer detection test detected cancer signals and predicted CSO in individuals with symptomatic cancer with high specificity, including participants with head and neck cancer. These findings support further clinical development of this multicancer detection test that could accelerate the diagnostic resolution of symptomatic cancers.

National Cancer Database Analysis of Comorbidities in HPV-Negative Oropharyngeal Cancer

Samantha Shave (Presenter); Craig A. Bollig, MD

Introduction: Medical comorbidities can influence treatment decisions and significantly affect patient outcomes; however, this is not well defined on the national level in the literature. Our objective was to analyze the impact of medical comorbidities on overall survival and treatment received for patients with human papillomavirus (HPV)-negative oropharyngeal cancer (OPC) using the National Cancer Database (NCDB).

Method: Patients with nonmetastatic HPV-negative OPC between 2010 and 2017 were identified in the NCDB. They were stratified by Charlson-Deyo comorbidity class (CDCC), and clinical variables were compared between groups using univariate and multivariate analyses. Predictors of treatment were analyzed using logistic regression. Overall survival (OS) was compared using Kaplan-Meier and Cox proportional hazards models. Subgroup analysis of patients with extranodal extension (ENE) and/or positive margins was also performed.

Results: A total of 27,958 patients were analyzed. Patients with increasing CDCC level had decreased overall survival relative to those with a CDCC of 0: CDCC 1 (hazard ratio [HR] 1.31, 95% CI, 1.24–1.39), CDCC 2 (HR 1.58, 95% CI, 1.43–1.73), CDCC ≥ 3 (HR 1.99, 95% CI, 1.75–2.27). As CDCC increased, rates of chemotherapy sequentially decreased in the entire cohort ($P < .001$) as well as in patients with ENE ($P < .001$) and positive margins ($P < .003$).

Conclusion: Comorbidities significantly alter treatment course, most notably the rate of chemotherapy that is administered, as well as negatively affect survival in patients with HPV-negative OPC. They are an important consideration when assessing prognosis and should be accounted for when analyzing outcomes.

Nonopioid Perioperative Analgesia for Major Head and Neck Cancer Surgeries

Beatrice C. Go (Presenter); Kevin Chorath, MD; Camille C. Go; Alvaro G. Moreira, MD; Karthik Rajasekaran, MD

Introduction: Postoperative pain after head and neck cancer surgery is commonly treated with opioids, which have

considerable side effects, including risk of addiction. The objective of this study is to analyze the safety and efficacy of using multimodal anesthesia (MMA) for patients undergoing head and neck cancer surgery.

Method: A systematic search was conducted in Pubmed, Cochrane, Embase, Scopus, and ClinicalTrials.gov for all studies comparing patients receiving MMA (gabapentin, corticosteroids, local anesthetic, acetaminophen, nonsteroidal anti-inflammatory drug [NSAID]) vs patients receiving opioids for major head and neck cancer surgeries. The primary outcome was postoperative opioid usage. Secondary outcomes included length of stay, subjective pain scores, complications, adverse effects, and 30-day outcomes.

Results: A total of 13 studies representing 1533 patients (MMA, $n = 682$; non-MMA, $n = 851$) met inclusion criteria. Gabapentin was the most commonly used intervention ($n = 467$) followed by NSAIDs ($n = 342$), acetaminophen ($n = 297$), and corticosteroids ($n = 184$). Ten studies described a significant decrease in daily postoperative opioid usage at time of discharge. Subjective pain had wider variation, with 2 nonfree flap studies (40%) reporting reduced pain at postoperative day 3 and 3 free flap studies (43%) describing no difference in pain scores. There were no differences in surgical outcomes, medical complications, adverse effects, or 30-day mortality and readmission rates.

Conclusion: With the rise of the opioid epidemic, MMA may play an important role in the treatment of postoperative pain after head and neck cancer surgery. A growing body of literature demonstrates a variety of safe and reliable perioperative regimens.

Norepinephrine-Induced Cell Proliferation via $\beta 2$ Adrenergic Receptor Activation Is Inhibited by β -Blocker in Head and Neck Cancer

Sungsu Park (Presenter)

Introduction: Some studies have shown that neurotransmitters are involved in the regulation of cancer cells via $\beta 2$ -adrenergic receptors. However, little is known regarding the effect of neurotransmitters on head and neck cancer cells. The aim of this study was to examine the regulative effect of norepinephrine, which belongs to the group of classical neurotransmitters, on the proliferation of head and neck cancer cells and the therapeutic effect of β -blockers on them.

Method: A total of 7 head and neck cancer cell lines were used. $\beta 2$ -adrenergic receptor expression was determined by reverse transcriptase–polymerase chain reaction and immunohistochemistry in head and neck cancer cell lines and specimens. Cell viability and proliferation assays were examined by use of β -adrenergic receptors agonists (norepinephrine) and antagonists (propranolol).

Results: $\beta 2$ -adrenergic receptor was expressed on all head and neck cancer cell lines and specimens including oral, larynx, pharynx, and nasal cavity cancer. The viability and proliferation of head and neck cancer cells pretreated with norepinephrine increased in a concentration-dependent

manner. Propranolol reduced the viability and proliferation of norepinephrine-stimulated head and neck cancer cells.

Conclusion: The proliferation of head and neck cancer is influenced by norepinephrine, which is one of the signal substances present in the tumor environment. This study also provides experimental evidence for the use of β -blockers in the chemoprevention of head and neck cancer proliferation.

Novel Surgical Management of Pharyngeal Pouches: A Scoping Review

Talisa Ross (Presenter); Neil Tolley;
Zaid Awad, FRCS, MFSTEd, PhD

Introduction: Techniques for managing pharyngeal pouches have evolved from open to rigid and flexible endoscopic approaches. The literature has struggled to determine which of these is superior. This review aimed to discuss the different techniques for the management of pharyngeal pouches and to review the use of various energy devices that can be deployed in their repair.

Method: A scoping review was performed in 2020 to identify all relevant literature. Case series with more than 10 participants older than 18 years were included. Studies in which repeat interventions were the primary focus were excluded. Interventions included open, rigid, or flexible endoscopic techniques. MEDLINE, Embase, and Cochrane were searched. A data extraction tool was used. Abstracts were screened, and subsequent full-text review was performed.

Results: In total, 38 studies were identified involving 2954 patients. Length of stay was shortest following endoscopic stapling. The literature was equivocal on which technique offered the best reduction in symptom recurrence, secondary to the lack of standardized reporting measures. Endoscopic approaches (both flexible and rigid) conferred an advantage in return to oral intake; however, local policies often specified when oral intake was permitted. Open surgery reduced the likelihood of repeat intervention. It was difficult to conclude which approach facilitated the greatest improvement in quality of life given the paucity of standardized, validated outcome measures. Similarly, the prevalence of complications varied significantly between case series.

Conclusion: Open, flexible, and rigid endoscopic approaches remain feasible for the management of pharyngeal pouches. The use of novel instruments is supported by a growing body of evidence; however, there are no data to support one technique over another. This review has emphasized the requirement for a multicenter randomized controlled trial with strict selection criteria and validated quality-of-life outcomes to compare the techniques.

Number of Lymph Nodes in Neck Dissection: A Prognostic Indicator in HNC

Rawan Arif (Presenter); Mohammed Nujoom;
Bushra Alharbi; Hani Marzouki

Introduction: Measuring the quality of neck dissection for aerodigestive tract cancer (ADTC) patients using total number

of lymph nodes (NLL) and lymph node ratio (LNR) is still unknown. Little research has been conducted about the NLL in neck dissection, the LNR, and their prognostic predictability in advanced differentiated thyroid malignancies. Moreover, little is known about the possibility of using these indicators to construct treatment plans. This study aimed to evaluate the effect of these indicators on the overall survival (OS) and the disease-free survival (DFS).

Method: A retrospective study was done on 121 patients diagnosed with ADTC who underwent neck dissection as part of their treatment plan as primary or secondary modality in the King Abdulaziz University Hospital and the National Guard Hospital, Jeddah, Saudi Arabia, between January 2019 and August 2019. Data were collected through medical records and analyzed using Stata (version 14).

Results: A total of 121 patients were included, 11.57% women and 88.43% men. The median age was 60 years, and the mean follow-up period was 2.7 years. Of malignancies, 44.63% were oral tongue cancer followed by laryngeal cancer (34.54%). Histopathological reports showed a median of 38 lymph nodes dissection (mean 43, range 2–228). LNR is defined as the number of positive lymph nodes taken out in a neck dissection, divided by the total number of lymph nodes extracted. The mean LNR in our cohort was 0.04, which was considered the cutoff value. LNR >0.04 was considered a high LNR (HLNR), and LNR <0.04 was considered a low LNR (LLNR). Kaplan-Meier survival estimates for the cohort were compared between the 2 groups. The 3-year overall survival was 88% (95% CI, 77%–94%) for LLNR patients but was 71% (95% CI, 47%–85%) for HLNR patients, which was statistically significant. A similar significant decreasing trend persisted at a 4-year follow-up, in which the DFS was 73% (95% CI, 61%–82%) for LLNR compared with 56% (95% CI, 35%–72%) for HLNR patients.

Conclusion: The number of excised nodes in neck dissections and their ratio might be a good prognostic indicator for OS and DFS. They may serve as valuable tools in deciding different treatment plans.

Optimal Lymph Node Yield in Elective Neck Dissection in MS-SCC

Ashna Joseph (Presenter); Yuna Choi; Amanda Wong;
Daniel Zhu; Husneara Rahman; Tristan Tham

Introduction: While previous studies have demonstrated a potential survival benefit to elective neck dissection (END) in maxillary sinus squamous cell carcinoma (MS-SCC), there is no consensus on the minimum number of lymph nodes dissected needed to provide an increase in survival. This study aims to identify the optimal lymph node cut-off value of END in patients with MS-SCC that is correlated with improved survival outcomes.

Method: Clinical data on patients diagnosed with cN0M0 stage MS-SCC was obtained retrospectively from the National

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Cancer Database (NCDB) from 2004 to 2016. Patients underwent either observation or END following primary resection with or without radiation therapy. The primary outcome variable of interest was the vital status of the patient at time of last contact. The receiver-operating characteristic curve and Youden index were used to identify the optimum cutoff value of lymph nodes dissected that affected survival.

Results: Some 267 patients from the total cohort ($n = 790$) had at least 1 lymph node dissected. The optimal cutoff for the number of lymph nodes dissected was 20.08 ($J = 0.132$, sensitivity = 0.585, specificity = 0.547) using an area under the curve of 0.574 (95% CI, 0.505–0.642).

Conclusion: This current study found that the optimal number of lymph nodes in END for MS-SSC was 21.

Optimizing Head and Neck Cancer Treatment in the Community Setting

Harleen K. Sethi, DO (Presenter); Travis Weinsheim; Matthew Brennan; Elijah Walker; Christopher E. Fundakowski, MD

Introduction: The purpose of this study was to highlight referral patterns and portions of a patient's diagnostic workup that take the most amount of time in order to optimize time until treatment initiation (TTI), package time, and overall survival.

Method: A retrospective chart review identified patients with a new diagnosis of head and neck squamous cell carcinoma who received curative therapy at a single cancer treatment center. TTI was defined as number of days from diagnosis to initiation of definitive treatment. Package time was defined as duration between initiation of treatment and completion of curative therapy. Demographic data were analyzed using descriptive statistics. Continuous variables were analyzed for normalcy with t tests and analysis of variance were used for normative data. Multivariate regression analysis was used to identify potential confounding variables.

Results: A total of 105 patients were included. The average TTI was 36.5 days. Those referred by the primary care physician saw an average package time of 72 days compared with 51 days for ear, nose, and throat physician referrals. Patients with longer treatment times saw significantly higher time to radiation oncology consult, time to operating room intervention, time to hematology consult, and long TTI.

Conclusion: An important indicator for mortality in patients with head and neck squamous cell carcinoma is TTI. No single referral pattern significantly prolonged TTI. Certain treatment teams and modalities increased TTI; however, the gross TTI still adhered to clinically accepted ranges.

Optimizing Rural Access for Head and Neck Cancer During COVID

Nicholas C. Purdy, DO (Presenter); Kevin Stavrides; Kenneth Altman; Thorsen W. Haugen, MD; Phillip Pellitteri

Introduction: Access to head and neck specialty care is challenging in rural health environments, and this has been

compounded by the COVID-19 crisis. We sought to quantify our referral patterns and processes to identify opportunities for optimization.

Method: This retrospective record review was approved by our institutional review board. All new patients presented at weekly head and neck cancer tumor boards were tabulated for calendar year 2020, which included periods before and after the global pandemic was declared by the World Health Organization on March 11, 2020. Time points included were date of referral, date of pathology diagnosis, and date of tumor board presentation. A detailed data analysis will follow over the next several weeks.

Results: A total of 259 new patients were presented at tumor boards during the study period. Most were squamous cell carcinoma ($n = 188$, 73%) primarily located in the oropharynx (24%), oral cavity (19%), larynx (17%), and cutaneous in origin (16%), with an overall relatively even distribution of T stage. Longer time points from date of referral to tumor board revealed some correlation with greater geographic distance. The period since the onset of the COVID crisis did not appear to affect access to care once in our system; however, there was some evidence that T stage was higher during this time period. Potential factors that affect access to care are reviewed.

Conclusion: This study creates an approach to map access to care by evaluating critical time points and opportunities to expedite multiple steps that initiate therapy for head and neck cancer. There are both external (rural geography and the COVID crisis) and internal aspects that may pose barriers to access. These procedures may now be utilized to prospectively advance patient care.

Oral Cavity Cancer With Lower Socioeconomic Status Incurred Worse Prognosis

Ching-Chih Lee, MD, PhD (Presenter); Bor-Huang Kang; Ching-Chieh Yang

Introduction: Oral cavity cancers were mainly treated by surgical intervention with or without adjuvant therapy. Besides traditional pathological risk features, low socioeconomic status (SES) was associated with grave prognosis in many cancers. We hoped to explore the association between SES and oral cancer outcomes.

Method: In the Surveillance, Epidemiology, and End Results database, the association between race and census-tracked level of poverty, percentage of population living below the federal poverty level, and oral cancer mortality rate of 5-year cancer-specific survival rate were explored between 2000 and 2013 with SEER*Stat software.

Results: For mortality rate, oral cavity cancer patients in high poverty ($\geq 20\%$ of persons living below the federal poverty level) had the highest mortality rate of 6 per 100,000 person-years in male patients and 2.3 per 100,000 person-years in female patients compared with 4.7 per 100,000 person-years in male patients and 1.9 per 100,000 person-years in female patients among low poverty (0%–9% of people living below the federal poverty level). In the 5-year cancer-specific

survival rate, oral cavity cancer patients in high poverty ($\geq 20\%$ of persons living below the federal poverty level) incurred the worst rate of 55% compared with 68% in oral cavity patients with those with low poverty (0%–9% persons living below the federal poverty level). The phenomenon was robust in the pathological stages I to IV.

Conclusion: Oral cavity cancer patients with lower SES were associated with higher mortality rate and lower 5-year cancer-specific survival rates. Public health strategies and welfare policies must continue to focus on this vulnerable group.

Outcomes After Oral Cavity and Oropharyngeal Salvage Surgery

Bhavya K. Sharma (Presenter); Kevin J. Contrera, MD, MPH; Robert R. Lorenz; Shlomo A. Koefman; Brandon L. Prendes

Introduction: The purpose of this study is to investigate outcomes following oral cavity and oropharyngeal salvage surgery and the factors associated with survival. Understanding survival and functional outcomes can guide clinical management.

Method: A retrospective cohort study at a tertiary care center was performed on adult patients who underwent salvage surgery for recurrent squamous cell carcinoma of the oral cavity and oropharynx from 1996 to 2018. Clinical, pathologic, and functional outcomes were recorded and analyzed. Disease-free survival (DFS) and overall survival (OS) were evaluated using multivariable cox proportional hazards regression.

Results: A total of 108 patients (72% oral cavity, 28% oropharynx) were followed for a median of 17.9 months. Patients were hospitalized for a median of 8 days, with 72% and 38%, respectively, undergoing placement of a feeding tube or tracheostomy. Median DFS and OS were 9.9 and 21 months, respectively. On multivariable analysis, surgery with adjuvant chemoradiotherapy compared with surgery alone (hazard ratio [HR] 0.15, 95% CI, 0.03–0.78) and negative margins (HR 0.36, 95% CI, 0.14–0.90) were associated with greater DFS, whereas lymphovascular space invasion (HR 2.66, 95% CI, 1.14–6.19) and higher pathologic stage (III vs I-II, HR 3.94, 95% CI, 1.22–12.71) were associated with lower DFS. Higher tumor stage was associated with worse OS (HR 3.79, 95% CI, 1.09–13.19).

Conclusion: In one of the largest published cohorts of oral cavity and oropharyngeal salvage surgery to date, patients with adjuvant chemoradiotherapy, negative margins, negative lymphovascular space invasion, and lower stage had a lower risk of recurrence. Only lower-stage disease was associated with improved survival.

Outcomes of Osseocutaneous Free Flaps in Young Patients

Aarti Agarwal, MD (Presenter); Angela Alnemri; Alyssa Givens; Ryan Heffelfinger, MD; Adam Luginbuhl, MD; Joseph M. Curry, MD

Introduction: Free flap transfer is commonly used in head and neck reconstruction. Few studies have reported outcomes in young adult patients (age <50 years) undergoing

osseocutaneous free flap transfer; therefore, we aim to investigate this population.

Method: A retrospective review of patients under the age of 50 years who underwent reconstruction via osseocutaneous free flap transfer at a tertiary academic institution between 2007 and 2018 was conducted. Patients at least 3 years out from surgery were included. Demographics, pre- and postoperative therapy, and short-term (within 30 days) and long-term (>6 months) outcomes were collected.

Results: In total, 50 patients met inclusion criteria. The average age of patients at the time of surgery was 38.7 years. Osseocutaneous reconstruction included 43 (86%) fibular free flaps and 7 (14%) osseocutaneous radial forearm free flaps. Within the 30-day postoperative period, the rate of free flap failure was 16% (n = 8), fistula formation was 4% (n = 2), and wound dehiscence was 14% (n = 7). Eight (16%) patients underwent a second free flap surgery an average of 8.3 months after the first, 2 (3.6%) of which were osseocutaneous. Average follow-up duration after surgery was 30 months. At last follow-up, 39 (78%) flaps were viable. In 38 patients with at least 6 months of follow-up, 15 (39%) had 1 or more long-term complications, of which were most commonly recipient-site wound breakdown or plate extrusion (15.7%); fistula, infected hardware, or osteoradionecrosis (13.2%); and nonunion (10.5%). On multivariate analysis, current or former smoking status ($P = .0003$) as well as older age ($P = .021$) predisposed patients to at least 1 long-term complication. Current or former smoking status was also associated with a greater number of long-term complications ($P = .012$).

Conclusion: Free flap transfers for head and neck reconstruction have proven to be reliable and safe. In this population, patients with a current or former smoking history were at higher risk for long-term complications and thus warrant close follow-up.

Outcomes of Patients With Advanced Laryngeal Cancer Treated With Surgery

Jerome Ong, MBBS, MRCS (Presenter); Jereme Y. Gan, MBBS, MRCS Ed, MMed, FAMS

Introduction: The aim of this study is to determine the factors affecting survival and functional outcomes of patients with locally advanced laryngeal squamous cell carcinoma (SCC) treated with surgery.

Method: Records of patients who underwent laryngectomy or pharyngolaryngectomy in our hospital between 2006 and 2020 were reviewed. All patients with laryngeal SCC were included, and those with hypopharyngeal SCCs were excluded. Data such as demographics, the American Joint Committee on Cancer (AJCC) stage, margin status, presence of lymphovascular invasion, and perineural invasion were collected. Patients diagnosed before 2017 were restaged to AJCC, eighth edition. Our primary outcome was 5-year overall survival (OS). Secondary outcomes were the presence of functional speech (FS) and time to tube feeding (TTF). Survival probabilities were estimated using the Kaplan-Meier method,

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log-rank, and Wilcoxon tests were performed to compare differences between estimates.

Results: In total, 66 patients were included; 55 (80%) were newly diagnosed, whereas 11 (20%) patients had salvage surgery. The group was predominantly male (97%) and Chinese (82%), with a mean age of 64 years. The mean duration of follow-up was 42.2 months. Five-year OS (n = 66) was 10.7%. Five-year OS was 33% for stage III and 5.2% for stage IVA, respectively ($P < .001$ for log-rank and Wilcoxon tests). Patients with stage IVB disease were unlikely to survive after 1 year. Patients with N3 disease fared worse than those with N0 to N2 disease ($P < .001$). There were no significant differences in survival based on Eastern Cooperative Oncology Group status, base of tongue or major cartilage involvement, or presence of lymphovascular invasion or perineural invasion. FS was present in 38% of patients. Of patients, 15% had dysphagia requiring long-term tube feeding, with a median TTF of 18.9 months.

Conclusion: Advanced laryngeal SCCs tend to have an overall poor prognosis regardless of treatment approach. Our study demonstrated that the factors that significantly affected survival were clinical stage as well as nodal status. These findings are consistent with AJCC's eighth edition update that the presence of extranodal extension upstages a patient. However, we acknowledge that our survival estimates may be lower than expected because of the short serial times of patients in this study.

Parathyroid Cysts Case Series and Review of the Literature: 2016-2020

Monica Kirollos (Presenter); Henry Zheng; Daniela Brake; Michael Hinni, MD

Introduction: Parathyroid cysts are rare and found in the neck or mediastinum. Most are asymptomatic and found incidentally. However, some cysts cause dysphagia. Classifications include a vestigial remnant arising from the third and fourth branchial clefts, degeneration of an adenoma, or a retention cyst from fluid accumulation in the parathyroid gland. Here we present 4 cases in which a parathyroid cyst was treated surgically as well as the overall recommendations for treatment. **Method:** This is a case series consisting of 4 patients seen at Mayo Clinic in Arizona and Rochester who were treated surgically between 2016 and 2020. A thorough literature review was conducted to compile treatment recommendations.

Results: Three of 4 patients were female. The mean age of the patients was 37.5 years. All patients presented with painless neck masses, while only a portion experienced dysphagia and hyperparathyroidism. A diagnosis of benign parathyroid cyst was made using ultrasound and fine-needle aspiration (FNA), with possible computed tomography imaging. Aspirated fluid was crystal clear with elevated parathyroid hormone (PTH) levels in all 4 cases. Patients were treated successfully with surgical interventions with no need for postoperative medical management of hyperparathyroidism. Only 1 patient had intraoperative ST depressions, which were resolved with esmolol. Serial troponin were negative. Otherwise, no complications were noted.

Conclusion: Physicians should consider parathyroid cysts as a diagnosis when evaluating a neck or mediastinal mass with FNA showing crystal-clear fluid and elevated PTH levels. Surgical intervention remains the recommended treatment in the literature. Endocrinology follow-up is recommended if patients have abnormal serological testing.

Patient Barriers to Seeking Care for Head and Neck Cancer

Holly Sprow (Presenter); Baveena Heer; Sarah Nuss; Farizeh Ahmed, BMBS; Joshua P. Wiedermann, MD; Amina Seguya, MBChB, MMed ENT

Introduction: The burden of head and neck cancer (HNC) is growing globally, and it disproportionately affects low- and middle-income countries (LMICs). We conducted a systematic literature review to identify patient barriers to seeking HNC care and compared the differences in these barriers between high-income countries (HICs) and LMICs.

Method: Original articles from January 2010 to November 2020 reporting patient barriers to seeking HNC care were included for the review. PubMed/MEDLINE, Web of Science, Embase, and Global Health were searched for articles pertaining to HNC, barriers, and health care access. After screening, 38 articles were included for full-text extraction and data analysis. Barriers were classified into the following themes: fear, socioeconomic status, knowledge/awareness, health care beliefs, treatment delay, access, prioritization, doctor-related factors, financials, demographics, and stigma. Articles were also stratified by country, World Bank and Lending Group classifications, stage of treatment, gender, and type of cancer studied.

Results: Of the 38 articles, the most common barriers were lack of knowledge/awareness at 63.2% (n = 24), followed by poor accessibility of health services at 52.6% (n = 20), and financial considerations at 50% (n = 19). Compared with HICs, where the most common barrier was a lack of knowledge/awareness, in LMICs, the most common barriers were financial considerations, poor accessibility of health services, and low socioeconomic status.

Conclusion: Patients in HICs face different barriers to seeking care for head and neck cancer than patients in LMICs. These unique needs may guide interventions to improve the provision of head and neck cancer services and reduce the associated morbidity and mortality.

Patterns of Substance Use Among Individuals With Parental Head and Neck Cancer

Tara E. Mokhtari, MD (Presenter); Suresh Mohan; Neil Bhattacharyya

Introduction: Tobacco and alcohol use are known modifiable risk factors for the development of head and neck cancers (HNCa). The objective of this study was to investigate patterns of tobacco and alcohol use among adults in the United States with a parental history of HNCa.

Method: The Cancer Control Module of the National Health Interview Survey (NHIS) 2015 was queried to identify individuals with a family history of HNCa. Patterns of tobacco and alcohol use were investigated in this population. Outcomes measured in the course of this investigation include (1) data regarding active (including intensity of use) vs previous tobacco use among individuals with family history of HNCa and (2) data regarding alcohol use trends for subjects with parental history of HNCa (including intensity of use).

Results: A total of 3.2 million adults were identified with a parental history of HNCa (2.5 million paternal and 0.7 million maternal). There were significant differences in tobacco use among individuals with a family history of HNCa ($P = .02$). Individuals with parental HNCa history were more likely to be former smokers (28.5% vs 21.7%) and less likely to be never-smokers (57.3% vs 63.9%) than individuals with no parental HNCa history. Of the adults, 457,000 remained current smokers (14.2%) despite a parental HNCa history. Some 200,000 adults remained heavy drinkers (9.4%) despite a parental HNCa history, although this was not statistically significant vs the general population (7.4%, $P = .31$).

Conclusion: Individuals with parental history of HNCa are more likely to have used tobacco and have rates of alcohol use consistent with population averages. Current smokers with a history of parental HNCa present an immediate opportunity for targeted smoking cessation. These findings provide impetus to extending alcohol and tobacco screening to families of HNCa patients.

Postoperative Monitoring of Buried Free Flaps Using Implantable Dopplers

Hilary McCrary, MD, MPH (Presenter); Brody King; Mitch Dunkleberger, MD; Patrick Carpenter, MD; Richard Cannon, MD; Jason Hunt, MD

Introduction: The use of buried free flaps in head and neck surgery is controversial. Given the lack of a skin paddle, postoperative monitoring can be a challenge, but the use of implantable Dopplers has improved monitoring of buried free flaps. The aim of this study is to describe the operative success of buried free flaps and to determine the safety/reliability of implantable Dopplers.

Method: A retrospective chart review from a single academic cancer hospital was conducted from 2014 to 2020. Only patients with a buried free flap without any visible skin paddle that had implantable dopplers placed were included. Charts were reviewed to determine flap viability after surgery, if there was a return to the operating room (OR) for vascular compromise, and if the Doppler accurately detected change in free flap status.

Results: A total of 65 patients were included, of which 70.8% were male. The average age was 62 years. The locations of flaps included the following: pharynx (77.3%), skull base (7.6%), trachea (6.1%), esophagus (4.6%), and facial reanimation (4.6%). The types of free flaps performed included the following: radial forearm (50.8%), anterolateral

thigh (44.6%), and gracilis (4.6%). One patient (1.5%) returned to the OR for vascular compromise, which was accurately detected on the implantable Doppler and salvaged. All free flaps in this series were found to be viable upon hospital discharge based on the implantable Doppler signals. There were no complications related to implantable Doppler use.

Conclusion: Implantable Dopplers are safe and reliable in evaluating postoperative outcome of buried free flaps. With the use of implantable Dopplers, buried free flap survival is markedly higher than traditionally thought, which allows for a cosmetically appealing reconstructive technique.

Postoperative Radiotherapy in Advanced T Classification Oropharyngeal Squamous Cell Carcinoma

Daniel O. Kraft (Presenter); Ryan Carey, MD; Aman Prasad; Jason Newman, MD; Jason Brant, MD; Robert Brody, MD

Introduction: The National Comprehensive Cancer Network guidelines recommend postoperative radiotherapy (PORT) after surgically treated oropharyngeal squamous cell carcinoma (OPSCC) when there is pathologic T3 or T4 disease, N2 or greater disease, disease in levels IV or V, perineural invasion (PNI), extranodal extension (ENE), or positive/close margins. The objective of this study was to compare survival for patients who did or did not receive PORT when their indication was advanced T stage.

Method: The National Cancer Database was queried for patients with human papillomavirus (HPV)-positive and -negative OPSCC treated with upfront surgery between 2004 and 2015. Patients with pathologic T3 and T4 tumors were included. Patients with metastatic disease, positive margins, N2 or greater disease, ENE, lymphovascular invasion, or missing data were excluded. Patients were stratified based on PORT status, and overall survival (OS) was compared. Univariate and multivariable Cox proportional hazards models were used to identify factors associated with OS.

Results: In the analysis 425 patients were included, of which 300 (71%) received PORT. Receipt of PORT was associated with age ($P < .001$), T stage ($P < .001$), overall pathologic stage ($P = .001$), and insurance type ($P = .002$) but not HPV status ($P = .071$). Five-year OS for all patients was 62% (95% CI, 0.57–0.68). Univariate analysis revealed no difference in OS in patients who did or did not receive PORT (63% vs 61%, $P = .12$). Similarly, multivariable analysis controlling for sex, age, race, and HPV status demonstrated no difference in OS in patients based on PORT status (hazard ratio [HR] 0.84, 95% CI, 0.46–1.56; $P = .58$). HPV status was associated with OS, with HPV-positive tumors showing improved OS compared with HPV-negative tumors (HR 0.14, 95% CI, 0.06–0.33; $P < .001$).

Conclusion: PORT was not associated with OS in patients with advanced T stage OPSCC without other adverse pathologic features. More work is needed to determine whether patients with advanced pathologic T stage in the absence of

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other high-risk features could be considered for de-escalation of adjuvant therapy, particularly for HPV-positive tumors.

Postradiative Impact on Immune Microenvironment in Head and Neck Carcinoma

Rui Sano (Presenter); Yasushi Fujimoto; Taishi Takahara; Susumu Suzuki; Toyonori Tsuzuki; Tetsuya Ogawa

Introduction: Lymphocytes infiltration into tumor lesion is known to work in favor of prognosis. The purpose of this study is to clarify the relationship between clinical factors and immunophenotypes in head and neck squamous cell carcinoma (HNSCC).

Method: We examined 82 cases of HNSCC with primary resection at the otolaryngology department of Aichi Medical University Hospital from January 2014 to December 2019. Immunophenotypes were evaluated by TIME classification with hepatic encephalopathy staining: “immune inflamed” in which lymphocytes infiltrated into the nest and stroma, “immune excluded” in which lymphocytes infiltrated into stromal areas but not into the nest, and “immune desert” in which very few lymphocytes infiltrated into cancer tissues. Clinical factors of age, gender, primary site, TNM stage, histologic differentiation, mortality, recurrence, surgical margin, neoadjuvant chemotherapy, initial treatment history, smoking, alcohol use, and multiple cancer were examined. We performed a statistical analysis of the relationship between the immunophenotypes and the clinical factors.

Results: In total, 7, 57, and 18 cases were classified for immune inflamed, immune excluded, and immune desert, respectively. A statistically significant correlation was shown between immune desert and a few clinical factors. Results of univariate analysis showed a correlation with statistical significance between immune desert and the clinical factors of previous history of radiation therapy and recurrence ($P < .05$). However, surgical history was not correlated with immune desert. From multivariate analysis, previous history of radiation therapy was correlated with immune desert ($P < .05$). On the other hand, no correlation was observed between the immunophenotypes of immune inflamed and immune excluded and any clinical factors. Since the observation period (median of 31.5 months) was short, the survival period was not examined.

Conclusion: Radiation therapy has been shown to have the possibility to affect the reduction of immune activity in cancer lesions.

Predicting Complications: Comparing Surgeon Assessment to Validated Risk Calculators

Kelly C. Landeen, MD (Presenter); C. Burton Wood, MD; Kelly Vittetoe; Marc Bennett, MD

Introduction: Hospitals are assessed by surgical outcomes as predicted by a validated risk calculator through the American College of Surgery (ACS). Higher ratios of observed to predicted mortalities result in negative consequences in terms of

ranking, funding, and reputation. These algorithms have been shown to perform poorly in head and neck surgery but have not been compared with preoperative surgeon predictions. We hypothesize that experienced head and neck surgeons can more accurately predict risk of morbidity and mortality in their patients than standardized risk calculators.

Method: A total of 6 head and neck surgeons were included in the study, with a goal enrollment of 100 patients undergoing inpatient procedures. The surgeon completed a questionnaire on a patient’s anticipated risk of 30-day complication or mortality. Risk factors were entered into the ACS tool to obtain predicted risk of complications and mortality. The surgeon’s risk assessment was then compared with the risk calculator’s predictions and actual patient outcomes.

Results: Preliminary data demonstrated that surgeons tend to predict lower rates of complications and mortality than the ACS risk calculator. At the halfway point of enrollment, surgeons correctly classified risk 65% of the time, whereas the ACS tool correctly classified patients only 48% of the time ($P = .42$). After final enrollment of 123 patients, 29% of patients experienced a complication and 15% experienced a serious complication; there was 1 mortality. The only risk factor assessed by the ACS tool that directly correlated with poor outcome was smoking ($P = .002$). Further analysis on the entire cohort is pending.

Conclusion: This study demonstrates that surgeons are better able to predict perioperative risks to their patients than validated risk calculators. This has implications for the use of risk calculators in determining good candidates for surgery, guiding preoperative discussions with patients, and calculating institution rank, reputation, and funding. Specialty-specific risk calculators may be more accurate, and further investigation should be made toward this development.

Prediction of Cancer Recurrence From Posttreatment Systemic Inflammatory Markers

Ji Min Yoon (Presenter); Taek Yoon Cheong; Sang Duk Hong; Manki Chung; Yoon Kyoung So

Introduction: Pretreatment values of neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) have been associated with poor prognosis for various cancers. We aimed to evaluate whether posttreatment values of NLR and PLR can be predictors of cancer recurrence and to build a machine learning model to best predict a cancer recurrence from those posttreatment values.

Method: This study was conducted on a retrospective cohort of primary head and neck cancer patients who had received definitive concurrent chemoradiotherapy (CCRT) in a tertiary hospital from March 1994 to March 2019. Blood test values that had been checked from the end of CCRT were obtained. The traditional machine learning methods such as random forest (RF), logistic regression (LR), gradient boosting (GB), and deep neural network (DNN) were evaluated. We also tuned the hyperparameter of DNN through grid search at each stage

of recurrent feature elimination (RFE) to make the best performance model. The performance of the model was measured with the receiver-operating characteristic area under the curve (ROC-AUC) and precision recall area under the curve (PR-AUC). The model was developed by Ubuntu Environment and used Python 3.5.

Results: In total, 758 patients were included. Among them, 184 had recurrence. The 5-year recurrence-free survival (RFS) rate was 94.3%, and the median RFS was 182.2 months. The ROC-AUC and PR-AUC of LR were 0.544 ± 0.034 and 0.273 ± 0.050 with LR, 0.547 ± 0.039 and 0.274 ± 0.052 with RF, 0.581 ± 0.045 and 0.290 ± 0.054 with GB, and 0.732 ± 0.060 and 0.524 ± 0.524 with DNN (all features included). With RFE, the highest performance was reached when only PLR at the time of recurrence, mean PLR, and PLR immediately after treatment were used. At the highest performance of the DNN-RFE model, ROC-AUC and PR-AUC were 0.805 ± 0.060 and 0.625 ± 0.090 , respectively.

Conclusion: Posttreatment values of systemic inflammatory markers can be useful predictors of cancer recurrence in head and neck cancers. The DNN-RFE model for prediction of cancer recurrence from posttreatment values of PLR showed high performance with ROC-AUC of 0.805.

Predictors of and Outcomes Related to Perioperative Myocardial Injury Posttracheostomy

Randy W. Lesh (Presenter); Thorsen W. Haugen, MD; Martin E. Matsumura, MD

Introduction: Perioperative myocardial injury (PMI), defined as increased cardiac troponin (Tn) following surgery, is associated with increased mortality. We describe risk factors for and outcomes of PMI in patients undergoing a planned tracheostomy within a single health system.

Method: A retrospective study was conducted of patients undergoing tracheostomy from 2007 to 2016. The PMI was defined by a postoperative Tn >99th percentile (0.100 ng/dL). Demographics and comorbidities were extracted from the electronic medical record and compared between patients with and without PMI using Mann-Whitney rank sum test for numerical variables and chi-square analysis for categorical variables. Significant univariate predictors were included in a multivariable logistic regression model to determine independent predictors of PMI. The 30-day and 1-year mortality of PMI+ vs PMI- patients was compared using chi-square analysis.

Results: Of 861 patients undergoing tracheostomy, 41 (4.76%) had PMI and 820 (95.24%) did not. PMI was associated with higher mortality at both 30 days (40.5% vs 11.2%, $P < .001$) and 1 year (73.2% vs 44.1%, $P < .001$). Patients with PMI were older (median age of 65 vs 60, $P = .002$) and more likely to have prior myocardial infarction (MI; 36.6% vs 10.7%, $P < .001$) and chronic kidney disease (31.7% vs 16.7%, $P = .024$). Interestingly, cancer diagnosis was associated with a lower risk of PMI (24.4% vs 41.8%, $P = .041$). Multivariable logistic regression revealed that older age (odds ratio [OR]

1.033, $P < .001$) and prior MI (OR 3.686, $P < .001$) were independently associated with PMI. Cancer remained independently associated with reduced PMI risk (OR 0.394, $P = .014$).

Conclusion: Patients with PMI following tracheostomy had increased short- and long-term mortality. Increasing age and history of prior MI were independent predictors of PMI, while prior cancer was associated with lower risk of PMI following tracheostomy. Older patients and those with prior MI should undergo preoperative assessment of cardiac risk prior to tracheostomy. The negative association of cancer with PMI is intriguing and should be further studied.

Predictors of Hospital Outcomes in Patients Undergoing Parathyroidectomy

Sudeepti Vedula (Presenter); Yash M. Shah; Devanshi Patel; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: The goal of this study is to investigate the impact of income status and insurance type on length of hospital stay (LOS) and hospital charges in patients who underwent parathyroidectomy.

Method: The Nationwide Inpatient Sample database was used to identify patients who underwent parathyroidectomy from 2012 to 2017. Income was classified as low income (<\$51,000) vs high income (>\$51,000). Univariate analysis was used to compare demographic variables. Binary logistic regression was performed to identify the association between demographic variables, income, insurance type, LOS, and hospital charges.

Results: In total, 55,490 patients who underwent parathyroidectomy were identified. Most patients had low income ($n = 31,235$, 56.3%) and government insurance (Medicaid or Medicare; $n = 38,915$, 70.1%). Most patients were 51 to 60 years old (23.3%), White (53.2%), and female (66.5%). Patients with high income (odds ratio [OR]: 0.838, 95% CI, 0.804–0.872; $P < .001$) and private insurance (OR: 0.398, 95% CI, 0.380–0.417, $P < .001$) were significantly less likely to have a LOS of 2 days or less. In addition, patients with a high income (OR: 0.897, 95% CI, 0.863–0.932; $P < .001$) and private insurance (OR: 0.601, 95% CI, 0.575–0.627; $P < .001$) were significantly less likely to have hospital charges less than \$44,000.

Conclusion: Lower income and having government insurance were found to be significant predictive factors of a shorter hospital stay and lower hospital charges in patients undergoing parathyroidectomy. These results are important in understanding health disparities, specifically within otolaryngology.

Preoperative Enoxaparin in Head and Neck Free Tissue Transfer Reconstruction

Christopher Roberts (Presenter); Rusha Patel

Introduction: The aim of this study is to determine the safety of preoperative chemoprophylaxis in patients undergoing head and neck oncologic surgery with free tissue transfer reconstruction.

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Method: An institutional review board-approved retrospective cohort study was designed with inclusion criteria being patients undergoing free tissue transfer for head and neck oncologic resection. Patients were divided into those who received same-day preoperative chemoprophylaxis with subcutaneous enoxaparin (Px-LMWH) and those who did not. Chart review was performed, and tumor characteristics, surgical time, and estimated blood loss (EBL) were recorded. Postoperative data included transfusion requirement, hematoma, deep venous thrombosis (DVT), and pulmonary embolus (PE). Partial or total flap loss was also recorded. Fisher exact test and Wilcoxon rank-sum test were used to examine differences in outcomes between study groups ($P < .05$).

Results: A total of 134 patients were included, of which 44 (33%) received Px-LMWH. There was no significant difference in EBL, transfusion rate, hematoma, or flap complications between groups. Patients receiving Px-LMWH had an average operative duration of 98 minutes longer than the control group. One patient in the Px-LMWH group experienced DVT and none experienced PE; 4 in the control group experienced DVT and 7 experienced PE ($P = .999$ and $.09$, respectively).

Conclusion: Patients undergoing major head and neck oncologic surgery and reconstruction are at risk for venous thromboembolus. Px-LMWH can be used in major head and neck reconstructive surgery without increasing the risk of hematoma or additional blood loss. Larger studies will need to be done to determine the impact of Clinical Performance Examination on DVT and PE in this patient population.

Prioritization of Head and Neck Surgeries During the COVID-19 Pandemic

Emily Sagalow (Presenter); Alexander Duffy, MD; Priyanga Selvakumar; David M. Cognetti, MD; Adam Luginbuhl, MD

Introduction: With the surge of SARS-CoV-2 cases in March of 2020 came strained health care resources, and much was unknown regarding mechanism of transmission. Surgical prioritization and tiering systems were developed nationwide to determine which patients were to still undergo surgery. At our institution, head and neck cancer patients were categorized as high priority for surgery scheduling during the COVID-19 pandemic.

Method: Patients who were planned to undergo head and neck cancer procedures during the lockdown between March and May 2020 were included. Patients were categorized into 3 tiers based on suspected pathology, anatomic subsites, and anticipated severity of disease progression without intervention (high priority, mid priority, elective). For rescheduled surgeries, time to procedure was calculated with medians compared across tiers. Patients were considered to have clinically significant changes to treatment plans if further surgical intervention or adjuvant treatment was warranted based on surgical pathology. During this time period, the total number of COVID-positive patients in our 908-bed hospital ranged from 48 to 195 each day.

Results: Of 208 cases scheduled between March 16 and May 29, 2020, 89 (42.79%) were canceled due to COVID-19 lockdown precautions. Some 79 (88.76%) of the canceled

surgeries were rescheduled, with tier 1 having a median of 42 days, tier 2 having a median of 60 days, and tier 3 having a median of 53.5 days after the originally scheduled date. All rescheduled tier 1 patients did not experience any clinically significant changes to their originally planned treatment course. No patients treated during this time frame contracted COVID-19 during their surgery or consequent hospital stay.

Conclusion: Our findings substantiate that use of guidelines to tier head and neck cancer surgical candidates facilitates timely and appropriate rescheduling to prevent progression of disease. With appropriate precautions, surgery can be safely performed during the COVID-19 pandemic, as evidenced by our lack of transmission to patients during their hospitalizations.

Prognostic Effect of HPV and EGFR Overexpression in Oral Cancer

Yumna Adnan (Presenter); S. M. Adnan Ali, PhD; Hasnain Farooqui

Introduction: Oral squamous cell carcinoma (OSCC), the sixth leading cancer worldwide, ranks as the most common cancer in males and the third most common in females in Pakistan, further influenced by risk factors that are widely consumed in our population. Our objective was to determine the prevalence of human papillomavirus (HPV) infection and epidermal growth factor receptor (EGFR) overexpression in Pakistani OSCC patients and their association with survival.

Method: Formalin-fixed, paraffin-embedded tissues of OSCC cases ($n = 100$) diagnosed or treated at Aga Khan University Hospital in the years January 2013 to December 2018 were used. In this retrospective study, immunohistochemistry for EGFR was performed using monoclonal antibody, and HPV was detected through conventional polymerase chain reaction using HPV general primers. If any cases were positive for general primers, further HPV subtyping was done using HPV-16- and HPV-18-specific primers.

Results: There was a majority of males (55%) in our data set; most patients were over 40 years of age (82%). Risk factor consumption was found in 73% of cases. EGFR overexpression was observed in 70% and HPV infection in 65% of OSCC patients. In total, 64% of patients were positive for both EGFR overexpression and HPV, but this association was not statistically valid. Survival analysis revealed EGFR-positive patients had markedly low overall ($P = .098$), whereas HPV was not an independent prognostic factor.

Conclusion: Our findings emphasize the role of HPV infection and EGFR overexpression in OSCC patients. Therapies targeted toward EGFR may be used for Pakistani OSCC patients to improve prognosis. The role of HPV in our population needs further elucidation.

Prognostic Value of Imaging in Head and Neck Skin Cancer

Erin R. Cohen (Presenter); Carly Misztal; Patrick Roth; Rita Bhatia; Elizabeth Nicolli; Zoukaa Sargi

Introduction: Because of aggressive features, some patients with head and neck cutaneous squamous cell carcinoma

(HNcSCC) have poorer survival than expected based on stage. Radiology can be used as an adjunct to histopathology to elucidate high-risk factors that may play a role in prognosis and management.

Method: A retrospective chart review was conducted on 104 patients with advanced HNcSCC from January 2011 to October 2019 who underwent definitive surgery involving parotidectomy and neck dissection. Preoperative imaging was reviewed by a neuroradiologist blinded to the clinical outcome, highlighting bony destruction, necrosis, skull base erosion, and perineural spread (PNS) via nerve involvement or widening of neural foramina. Formalin-fixed, paraffin-embedded specimens were reviewed with a pathologist, with special attention to perineural invasion (PNI). Primary outcome measures were overall survival (OS) and disease-free survival (DFS). Analyses using Kaplan-Meier method, chi-square test, and logistic regression were performed.

Results: A total of 87 patients had images available and were included. Of these patients, 19 presented with facial weakness or twitching indicating clinical PNS. Bony destruction on preoperative imaging was found to be significantly associated with poorer OS and DFS (OS: $P = .049$; DFS: $P = .046$). Neither necrosis nor skull base erosion appeared to correlate with survival. When evaluating for nerve involvement, 37 patients had PNI on histopathology review, but only 17 patients had radiologic findings consistent with PNS. There was a significant association between histopathologic PNI and worse DFS ($P = .0327$, hazard ratio [HR] = 2.072 [1.062, 4.042]). In contrast, radiographic PNS was not associated with DFS ($P = .135$, HR = 0.536 [0.236, 1.215]).

Conclusion: Radiologic evidence of bony erosion in patients with HNcSCC may correlate with poorer survival and increased recurrence. Furthermore, histopathologic PNI and radiologic PNS are distinct features, and the latter may be less predictive of worse outcomes, although our findings may be limited by small sample size.

Proteasome Inhibitor Carfilzomib Induces Apoptosis in HPV-Negative HNSCC

Hye-Yeon Lee (Presenter); Jiyeong Kim; Zhiyong Wang; Walt Amornphimoltham; J. Silvio Gutkind; Woo-Jin Jeong, MD

Introduction: Head and neck squamous cell carcinoma (HNSCC) presents in heterogeneous sites, has varied etiology and risk factors, and has a diverse genetic background that confers dissimilar response to treatments, including chemotherapy. Here we tested the hypothesis that investigation of the presence of human papillomavirus (HPV) in a HNSCC cell line would identify pathways contributing to oncogenesis of other HNSCC. We sought to identify pathways that differentially affect HNSCC according to the genetic background, therefore identifying targets and suitable candidates for treatment. We used genetic and pharmacologic approaches to inhibit the PSMD1 pathway in HNSCC cell lines.

Method: Chemical genetic library screening against 6 HNSCC cell lines were performed. The high-throughput combinatorial small-molecule screening for cell viability and apoptosis was carried out. Candidate agents were validated in vitro. Identified pathways and representative targeted agents were validated in vitro. The expression of related protein was confirmed by Western blot assay.

Results: The epidermal growth factor (EGFR), PIK3CA, mTOR, CDK1, HSP90AB1, HDAC1, and PSMD1 pathways were identified to be susceptible pathways in HNSCC using high-throughput chemical genetic library screening. In vitro validation of carfilzomib showed an IC_{50} of 12.7 nM in CAL-27 (HPV-) cells and an IC_{50} of 61.8 nM in SCC-47 (HPV+) cells. Knockdown of PSMD1 transcripts by transfected small interfering RNAs reduced the viability of CAL-27 cells. Inhibition of the PSMD1 pathway by treatment of second-generation proteasome inhibitor carfilzomib showed apoptosis. Carfilzomib also stimulated the phosphorylation of the mTOR pathway protein, including ERK, AKT, and S6.

Conclusion: Inhibition of the PSMD1 pathway and mTOR pathway treatment with proteasome inhibitor carfilzomib is effective in HPV-negative HNSCC cells. Taken together, our findings reveal carfilzomib induced the apoptotic pathway and suggest that carfilzomib, the representative of a new class of chemotherapeutic drug, may be utilized for overcoming cisplatin resistance in human SCC.

Quality of Life Outcomes After Transoral Robotic Tongue Base Mucosectomy

Daniel W. Scholfield, MBChB, MRCS, DOHNS (Presenter); Andrew Williamson, MRCS; Nina Cunning; Zaid Awad, FRCS, PhD

Introduction: Transoral robotic (TOR) tongue base mucosectomy (TBM) is now a key component of the algorithm for investigating the occult primary. We have assessed quality of life outcomes in our patient cohort to balance the benefit of the procedure against its risks.

Method: Prospective data were collected for 14 patients at our institution who underwent TOR TBM for the investigation of squamous cell carcinoma of occult primary (SCCOP) from January 2017 to February 2020. Data collected included demographics, risk factors, HPV status, identification, final diagnosis, treatment, complications, and hospital stay. Quality of life and swallow outcomes were collected during follow-up clinic appointments using the performance status scale for head and neck cancer patients (PSS-HNS), University of Washington Quality of Life Questionnaire (UW-QOL), and M. D. Anderson dysphagia inventory (MDADI). Primary outcomes included PSS-HN, UW-QOL, and MDADI scores; time to soft diet; and length of nasogastric (NG) feeding.

Results: The primary site was identified in 7 of 14 (50%) of cases. The median time to commencing soft diet was 0.5 days, and the median length of NG feeding was 0 days. Median UW-QOL pain and swallowing scores at 4.5 months were 100

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and 85, respectively. The median saliva score was 70, speech 100, and taste 70. The median MDADI global score was 90, and return to normalcy of diet score was 90, which indicates full oral diet with liquid assist.

Conclusion: Our data demonstrate that TBM patients have a functional postoperative swallow and are pain free, even after (chemo) radiotherapy treatment. Routine insertion of NG tube is not required postoperatively.

Radiation Doses to Carotid Branches in Laryngeal and Hypopharyngeal Cancers

Michael Berger, MD (Presenter); Amir Hakimi; Jeremy Harris, MD, MPH; Yarah Haidar, MD

Introduction: Radiation therapy is frequently used in the treatment of laryngeal and hypopharyngeal malignancies, particularly with organ-preserving strategies. Salvage surgery is performed in cases of locoregional recurrence, which will often involve a total laryngectomy with vascularized free tissue transfer. However, commonly used donor vessels in the neck tend to be within the radiation field, and radiation-induced arterial damage can affect free tissue transfer. In this study, we aim to measure and compare radiation dose exposure to 3 major external carotid artery branches used in reconstruction.

Method: Institutional review board approval was obtained for this study. Patients diagnosed with laryngeal or hypopharyngeal squamous cell carcinoma who received organ-preserving therapy were retrospectively reviewed. Patients were treated at the University of California Irvine from the years 2015 to 2020. Radiation doses (measured in Gray [Gy]) delivered to the facial artery (FA), superior thyroid artery (STA), and transverse cervical artery (TCA) were analyzed. Average volume, average maximum radiation dose, and average mean radiation dose was measured for each respective vessel.

Results: Preliminary data are presented with 11 patients included thus far. Primary sites included glottic (n = 2), supraglottic (n = 4), and hypopharynx (n = 5). All patients were treated with intensity-modulated radiation therapy (IMRT), with 10 of 11 patients receiving concurrent chemotherapy. For the FA, the average volume measured was 0.24 mL, the average maximum radiation dose was 68.9 Gy, and the average mean radiation dose was 65.5 Gy. For the STA, the average volume measured was 0.24 mL, the average maximum radiation dose was 69.1 Gy, and the average mean radiation dose was 66.7 Gy. For the TCA, the average volume measured was 0.36 mL, the average maximum radiation dose was 66.5 Gy, and the average mean radiation dose was 62.5 Gy.

Conclusion: Measured arterial doses of radiation of carotid branches may help microvascular surgeons select donor vessels in the reconstruction of salvage laryngectomy defects.

Receipt of Radiotherapy at a Different Facility in Parotid Malignancy

Christopher C. Tseng (Presenter); Jeff Gao; Gregory L. Barinsky, PharmD; Soly Baredes, MD; Richard C. Park, MD

Introduction: As parotid malignancies require comprehensive treatment plans to successfully manage, patient outcomes may be substantially affected by choice of treatment facility. This study assesses characteristics of parotid cancer patients receiving adjuvant radiotherapy (ART) at a facility different from where they were surgically treated.

Method: Parotid malignancy patients who received surgery at an academic center who also received ART were extracted from the National Cancer Database from 2004 to 2016 (n = 1838), then further stratified into those receiving ART at the same hospital (n = 1223) or an outside hospital (n = 615). Univariate and multivariate analyses were used to evaluate demographic and clinicopathologic differences.

Results: Patient age, gender, race, insurance, location, income, and education were associated with choice of treatment facility. On logistic regression, government health insurance (odds ratio [OR] 1.55, $P = .002$) and rural residence (OR 2.57, $P = .022$) had higher odds of receiving ART at another hospital, while those receiving adjuvant chemotherapy had lower odds (OR 0.58, $P < .001$). Tumor histology and grade were not associated with ART treatment facility. Patients who received ART at the same hospital had a higher 5-year overall survival than those who did not (65.7% vs 57.9%, log-rank = 0.003), although after multivariate regression, there was no statistically significant difference in survival (hazard ratio 1.05, $P = .650$).

Conclusion: Government insurance and rural residence were associated with receiving ART at a different facility in parotid malignancy patients. While patients receiving ART at the same facility had higher overall survival, there was no significant survival benefit after regression modeling accounting for other factors.

Recurrence in Cutaneous Head and Neck Angiosarcoma

Lauran Evans, MD, MPH (Presenter); Kristen Echanique, MD; Michael Armanous; Maie A. St. John, MD, PhD

Introduction: Cutaneous angiosarcoma of the head and neck is a rare and aggressive malignancy. Optimal treatment strategies are lacking and most of the literature is based on case series.

Method: A retrospective review was performed of 64 patients with cutaneous angiosarcoma of the head and neck at an academic medical center between 1983 and 2019. Demographics and clinical variables were examined for impact on recurrence and overall survival.

Results: The average age at diagnosis was 71 (32–95) years, with a 2.8 male:female ratio. The majority self-identified as White (74%), and 42% had a prior diagnosis of skin cancer. Average tumor size was 3.9 cm. Scalp subsite accounted for 53% of cases and was found to be associated with younger age ($P = .011$). Treatment modality varied with the most common being surgery + chemotherapy + radiotherapy in 30%. Of cases, 54% had positive pathologic margins; surgery was pursued for treatment of nodular cutaneous lesions more often

than diffuse ($P = .006$). Satellite lesions on presentation were associated with combination therapy ($P = .048$). Intraoperative frozen section analysis was used in 62% of surgical resections, with 50% experiencing local recurrence. Recurrence was associated with multifocal presentation ($P = .056$), American Joint Committee on Cancer stage ($P = .006$), and distant metastasis ($P = .040$). Recurrence was found in 70% of patients. Average time to recurrence was 15.3 ± 12.3 months. On Kaplan-Meier analysis, decreased recurrence was associated with use of intraoperative frozen sections ($P = .036$) and negative margins ($P = .086$). Ten patients experienced distant metastasis; of them, 4 patients expired due to complications of metastatic disease. Kaplan-Meier analysis showed poorer survival was associated with the presence of distant metastases ($P = .022$).

Conclusion: Cutaneous angiosarcoma of the head and neck can present as aggressive, diffuse tumors locally with a propensity for distant metastases. Negative margins are associated with decreased recurrence, and intraoperative frozen sections may be considered to obtain preliminary surgical margins.

Risk Factors and MMP Expression in OSCC: A Systematic Review

Seth S. Dixon (Presenter); Harrison Cash, MD; Teresa Jewell, MLS; Jeffrey Houlton, MD; Neal Futran, MD, DMD; Brittany Barber, MD

Introduction: Alterations in the expression of matrix metalloproteinases (MMPs) have been observed in oral cavity squamous cell carcinoma (OSCC) and have been proposed as biomarkers for prognosis and field cancerization. This systematic review examined the effect of risk factors such as tobacco or alcohol use on MMP expression in patients with OSCC.

Method: On December 19, 2020, 12 databases were searched for articles (PubMed, Cochrane, CINAHL, Global Health Database, Scopus, Web of Science, Embase) and gray literature (Embase Grey Literature Search, ProQuest Dissertations and Theses, University of Washington repository, EThOS UK dissertations, OpenGrey). Search terms were various derivations of “oral,” “squamous cell carcinoma,” “matrix metalloproteinases,” and risk habits (“alcohol,” “tobacco,” or “betel quid”). The risk of bias was assessed using a modified Joanna Briggs Institute Critical Appraisal Checklist for Analytical Cross-Sectional Studies.

Results: In total, 15 studies were included in the review. The quality of the evidence was low due to the retrospective nature of the studies. Quantitative measurement of MMP expression varied between studies, precluding a meta-analysis. Exposure to risk factors impacted expression of MMP-2 (3 of 3 studies), MMP-7 (1 of 2), MMP-9 (3 of 5), MMP-11 (1 of 3), and MMP-13 (1 of 2). No significant differences were found in studies examining MMP-1 (1 study), MMP-3 (2 studies), MMP-10 (1 study), membrane type-1 MMP (1 study), or tissue inhibitor of metalloproteinases-3 (2 studies).

Conclusion: This systematic review demonstrated that exposure to risk factors may alter expression of certain MMPs. This may be useful in surveillance of high-risk OSCC patients or in those with field cancerization. Further prospective study is required to determine the utility of measuring MMP expression in these clinical scenarios and the impact on prognosis.

Risk Factors for Positive Margins in Oropharyngeal Salivary Gland Malignancies

Pablo Llerena (Presenter); Kevin Wang; Craig A. Bollig, MD

Introduction: Minor salivary gland carcinomas (MSGCs) are rare oropharyngeal malignancies that are primarily treated surgically, with or without adjuvant radiation therapy. Positive surgical margins are associated with worse outcomes, but existing literature is limited mainly to small series. Our objectives were to perform a national analysis of risk factors associated with positive margins in this population, including a transoral robotic surgical approach (TORS).

Method: The National Cancer Database (NCDB) was queried for patients with T1-T4a oropharyngeal MSGC undergoing surgical treatment between 2010 and 2017. Clinical risk factors for positive surgical margins were determined using univariate and multivariate testing. Overall survival (OS) was analyzed based on patient demographics and clinical factors using Kaplan-Meier and Cox proportional hazards models.

Results: A total of 785 patients were identified, of which 165 (21.0%) had positive margins. On multivariate analysis, both T4a tumor stage (odds ratio [OR] 2.00, 95% CI, 1.03–3.88) and adenoid cystic carcinoma (OR 2.02, 95% CI, 1.29–3.18) were independently associated with positive margins. TORS vs a nonrobotic approach was not associated with positive margins (OR 1.05, 95% CI, 0.69–1.59). Positive margins were independently associated with a worse OS than negative margins (HR 1.63, 95% CI, 1.03–2.59) on multivariate analysis.

Conclusion: This study currently represents the largest national review assessing positive margins in oropharyngeal MSGC. Both histologic type (adenoid cystic carcinoma) and T4a tumor stage were predictive of positive margins. With increasing use of TORS over the past decade, there does not appear to be a greater risk of positive margins compared with nonrobotic approaches.

Role of PIK3CA Mutations in Radio Sensitivity of HPV-Positive HNSCC

Ameya A. Asarkar, MD (Presenter); Gauri Shishodia, PhD; Janmaris Marin Fermin, MD; Madison Buras, MD; Alok Khandelwal, PhD; Cherie-Ann O. Nathan, MD

Introduction: The PI3K/mTOR kinase pathway plays an important role in cell survival and radiosensitivity of head and neck squamous cell carcinoma (HNSCC). Alterations in PIK3CA gene contribute to the aberrant activation of PI3K/Akt/mTOR pathway, making selective inhibitors of this pathway

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a promising therapeutic option for HNSCC treatment. We hypothesized that selective inhibitors of PI3K/Akt/mTOR pathway might be optimal radiosensitizing agents for human papillomavirus–positive (HPV+) PIK3CA mutant HNSCC cells.

Method: HPV+ UM-SCC47 PIK3CA wild-type and PIK3CA mutant (E545K and H1047Y) cell lines were used in this in vitro study. Survival of cell lines treated with increasing doses of radiation (0, 4, 6 Gy) using a ^{137}Cs γ ray source was determined by clonogenic assay. Protein expression of PI3K/AKT/mTOR pathway genes was analyzed by Western blot.

Results: Western blot analyses showed increased phosphorylation of S6, AKT, mTOR, and 4EBP1 in HPV+ PIK3CA mutant HNSCC cells. We observed an increase in p53 expression in both HPV+ PIK3CA mutant (E545K and H1047Y) cell lines. However, p21 was upregulated in UM-SCC47 E545K and downregulated in UM-SCC47 H1047Y mutant cells. Increasing doses of radiation decreased the proliferation capacity of the HPV+ PIK3CA mutant cell lines as observed by decreased clonogenic cell survival.

Conclusion: HPV+ UM-SCC47 PIK3CA mutant cell lines did not show p53 repression. Further mechanistic studies are needed to elucidate the role of PIK3CA mutation in radioresistance. Alternative radiosensitizing therapeutics with improved treatment and functional outcomes are urgently needed.

Sclerotherapy for Benign Cystic Head and Neck Lesions: A Systematic Review

Guy Talmor (Presenter); Brandon Nguyen; Ghayoor Mir, DO; Ido Badash, MD; Rachel Kaye; Christen Caloway, MD

Introduction: The role of sclerotherapy for vascular lesions of the head and neck is well established. However, efficacy of sclerotherapy for benign cystic lesions of the head and neck is less clear. The objective of this review is to determine the efficacy and safety of sclerotherapy for benign cystic lesions of the head and neck.

Method: The Preferred Reporting Systems for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed for this systematic review. PubMed/MEDLINE, Cochrane Library, and Embase libraries were queried. Studies including patients with benign head and neck cystic masses treated primarily with sclerotherapy were included, and 32 studies met criteria for inclusion.

Results: A total of 474 cases of sclerotherapy were reviewed. Agents used include Picibanil (OK-432), ethanol, doxycycline, tetracycline, and bleomycin. Lesions included in the analysis were ranula, thyroglossal duct cyst, branchial cleft cyst, benign lymphoepithelial cyst, parotid cyst, thoracic duct cyst, and unspecified lateral neck cyst. A total of 287 patients (60.5%) had complete response, 132 (27.9%) had partial response, and 55 (11.6%) had no response. OK-432 was the most widely used agent, with a higher rate of complete response than ethanol (62.0% vs 39.4%, $P = .015$). A total of 53 cases (11.4%) required further surgical management. One case of laryngeal edema was reported and managed nonoperatively.

Conclusion: Sclerotherapy appears to be a safe and efficacious option for benign cystic lesions if malignancy is reliably excluded. Efficacy rates are comparable with sclerotherapy for vascular malformations. The rate of serious complications is low, with one incident of airway edema reported in the literature.

Seasonality of Head and Neck Cancers

Nicolette Jabbour, MS (Presenter); Taha A. Mur, MD; Jeremiah Tracy, MD; Lauren Tracy, MD

Introduction: More than 65,000 people are diagnosed with carcinoma of the head and neck each year in the United States. Several reports have demonstrated seasonal variability in diagnosis of cancers, including those of thyroid, breast, prostate, colon, and lung. Seasonality of head and neck carcinoma has not previously been studied. The purpose of this study is to investigate if there is seasonal variability in diagnoses of head and neck cancer.

Method: A total of 1406 patients diagnosed with carcinoma of head and neck from 1996 to 2019 were identified from an institutional head and neck cancer database. Patients were classified as having been diagnosed in the winter, spring, summer, or fall as defined by calendar months. Comparative analysis and chi-square analysis were performed for patient demographics, tumor pathology, primary tumor location and stage at diagnosis, and patient management for all diagnoses.

Results: From this cohort, 23%, 27%, 25%, and 25% of patients were diagnosed in the winter, spring, summer, and fall, respectively. There was no statistically significant difference between seasons of diagnosis for new head and neck cancers over all. When evaluating the impact of primary tumor location, oral cavity cancer was significantly more likely to be diagnosed in the spring, and salivary gland cancer was more likely to be diagnosed in the winter and summer ($P = .03$ and $P = .01$, respectively). T2 and N3 cancers were more likely to be diagnosed in the spring months ($P = .003$ and $P = .0001$, respectively). No other patient demographics, tumor characteristics, or methods of treatment were associated with season of diagnosis ($P > .05$ for all values).

Conclusion: Overall new diagnoses of head and neck cancer did not demonstrate seasonal variability. Oral cavity and salivary gland cancer diagnosis displayed seasonal pattern with diagnosis more common in the spring, fall, and summer months, respectively. Most patient, tumor, and management characteristics were not associated with season of diagnosis. This may be due to the diverse presenting signs and symptoms of those patients with head and neck cancer.

The SECg Staging System: An Innovative Approach to AVM Management

Sabina Figurelli (Presenter); Giacomo Colletti, MD; Alexandre Anesi; Sara Negrello; Luigi Chiarini

Introduction: Arteriovenous malformations (AVMs) are considered rare diseases, and their biology and natural course are less than well known in the general medical population. For

these reasons, they are more often approached in a casual manner, and the aim of the treatment is not always precisely defined. The SECg staging system may help to carefully establish an AVM extension and biology therefore guiding in the choice of treatment.

Method: The acronym SECg means the following: S, surgical/anatomical extension; E, endovascular features; C, clinical symptoms; g, growth. AVMs are staged after history, physical examination, and ultrasound and dMRI images have been acquired.

Results: The SECg staging system discerns AVMs as follows: For S, S1 had just 1 tissue involved (skin, subcutaneous, muscle, bone, etc); S2 had 2 or more adjacent tissues, such as skin, subcutaneous, fascia, and the parotid gland, involved; S3, irrespective of the involved tissues, every nidocystic treatment will cause significant functional and/or esthetic impairment (like in the case of AVMs of the eyelid or the ear); and S4, the AVM involves structures that are of vital importance and its extent makes them not entirely treatable. For E, E1 referred to arteriovenous communication; E2, arteriovenous communication; and E3, arteriovenular communication. For C, C0 means no symptoms presenting; C1, local symptoms (eg, redness, pulsation, warmth, etc) but no complications; C2 to local complications such as infection, bleeding, or ulceration; and C3, general complications such as heart failure. For g, g- meant the AVM was stable during the previous 6 months, and g+ meant the size or C staging has worsened in the last 6 months. When all the substages are put together, inferential consideration is doable and the AVM can be considered curable in S1 and S2; curable but with significant in S3; and not curable in S4. For indications to treat, C2 and C3 and/or g+ AVMs had absolute indications, while C0 and C1 and g- had relative or no indications.

Conclusion: The SECg staging system may provide an innovative and reliable method to aid in posing indications to treat vs observe AVMs and in considering the scopes of the treatment (cure vs palliation).

Shoulder Function and Clinical Outcomes Following Subscapular System Free Flaps

Angela Alnemri (Presenter); Anne C. Kane, MD; Brian Swendseid, MD; Ramez Philips, MD; Alyssa Givens; Joseph M. Curry, MD

Introduction: The subscapular system free flap (SF) can be harvested with a variety of skin or muscle paddles. This can be used to optimize volume restoration or skin color match after reepithelialization. The impact of harvesting various paddles on postoperative fistulas and shoulder dysfunction has not been explored in the literature.

Method: A retrospective review was conducted of patients who underwent SF reconstruction at a single tertiary care center between 2007 and 2020. Outcomes included donor site complications (hematoma, wound breakdown, infection), flap failures, and fistulas. Postoperative shoulder dysfunction was measured using the validated QuickDASH (disabilities of the arm, shoulder, and hand) Outcome Measure. Scores ranged from 0 (no disability) to 100 (most severe disability).

Results: A total of 52 patients met inclusion criteria. During a 1-year follow-up period, 2 (4%) patients developed a donor site hematoma, and 1 (2%) patient required donor site skin grafting. There were no other donor site complications. Three (6%) flaps failed. Of patients with midface reconstruction, fistula rate for surviving flaps was 8% at 30 days and 22% at 1 year. There was no significant difference in fistula rates between flaps composed of muscle and skin vs muscle only at 30 days (0% vs 15%, $P = .23$) or 1 year (18% vs 25%, $P = .70$). Mean QuickDASH score within 1 year of surgery was 19.5 ($n = 25$), with an average time from surgery of 5.4 months, indicating low postoperative shoulder dysfunction. There was no significant difference in mean QuickDASH scores between flaps composed of muscle and skin vs muscle only (14.1 vs 23.0; $P = .36$). Among 17 patients with multiple scores recorded, scores improved by an average of 10.1 between first and most recent scores, but this did not reach statistical significance (22.0 vs 11.9, $P = .07$).

Conclusion: SF flaps had minimal donor site complications and low donor site morbidity. Flap composition did not significantly affect fistula rates or postoperative shoulder dysfunction, suggesting a variable approach to skin or muscle harvest does not negatively impact outcomes for fistula formation or shoulder function.

Sinonasal Adenocarcinoma: A 19-Year Experience at a Single Institution

Brennan McMichael (Presenter); Erin McKean

Introduction: A retrospective review of patients with sinonasal adenocarcinoma treated at the University of Michigan from 1999 to 2021 was performed to analyze outcomes and prognostic factors.

Method: A retrospective review of 22 patients treated at the University of Michigan from 1999 to 2021 with primary sinonasal adenocarcinoma was performed. Data were analyzed for sinonasal adenocarcinoma as a group, as well as by histologic subtype (intestinal and nonintestinal). Independent variables analyzed included demographics, stage, operative technique, histopathology, adjuvant therapy, and treatment complications. Outcome measurements included 5-year overall survival, disease-specific survival, and recurrence-free survival. The Kaplan-Meier technique and life tables (SPSS) were used to statistically analyze the data.

Results: Of 22 patients with primary sinonasal adenocarcinoma identified, 14 were men and 8 were women. The average follow-up time was 100.9 months. Adjuvant radiotherapy was performed for high-grade and high-stage tumors. The 5-year overall survival was 77.27% across both subtypes. For non-intestinal-type adenocarcinoma (n-ITAC), the 5-year overall survival, disease-specific survival, and recurrence-free survival were 85.7% for pT1, pT2, and pT3 tumors and 50% for pT4a and pT4b tumors. For intestinal-type adenocarcinoma (ITAC), the 5-year overall survival was 77.8%, and disease-specific survival was 100% for pT1, pT2, and pT3 tumors. Five-year overall survival and disease-specific survival were 50% for ITAC pT4a and pT4b tumors. Recurrence-free survival was

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77.8% for pT1, pT2, and pT3 tumors. Only 2 patients with ITAC had pT4 tumors, and both experienced recurrence within 5 years. Tumor stage and grade were independent prognostic factors. Histologic subtype had no significant effect on prognosis.

Conclusion: Resection, often endoscopic transnasal when amenable, followed by radiotherapy in instances of advanced stage and high grade is the treatment of choice for management of sinonasal adenocarcinoma. Tumor stage and grade were independent prognostic factors. Overall, sinonasal adenocarcinoma has a favorable prognosis across both subtypes.

Sternocleidomastoid Circumference as a Measure of Sarcopenia in Head and Neck Cancer

Samantha Mohler (Presenter); Samia Nawaz;
Deanne King, MD, PhD; Ozlem E. Tulunay-Ugur, MD

Introduction: Sarcopenia has been associated with poor treatment outcomes in various surgical fields. The relationship between head and neck cancer (HNC) and sarcopenia remains to be understood. In this study, we aimed to assess sternocleidomastoid (SCM) muscle bulk as a measure of sarcopenia and its relationship with treatment outcomes, specifically dysphagia.

Method: A chart review of HNC patients who underwent concurrent chemoradiation at a tertiary cancer center was performed. To assess sarcopenia, computed tomography scan images were used to measure the circumference of the SCM muscle. Pre- and posttreatment measurements were performed for each patient. Tumor stage, response to treatment, body mass index (BMI), videofluoroscopic swallow study (VFSS) results and scores, and feeding tube use data were collected.

Results: A total of 118 patients were included in this study. The mean age was 63 years (range, 38–86 years), 33 were female, and 85 were male. Mean pretreatment BMI was 26.01; postchemoradiation BMI was 24.4. Mean SCM volume was 354 mm³ on the left and 343.08 mm³ on the right SCM pretreatment compared with 285 mm³ on the left and 270 mm³ on the right posttreatment. There was a significant decrease in posttreatment muscle volumes and BMI. A total of 34 (35.8%) patients continued to use gastrostomy tube feeding as means of nutrition during their last visit. There was no significant difference between pre- and posttreatment National Outcomes Measurement System swallowing scores on VFSS.

Conclusion: In this study, there was significant reduction in BMI and increased sarcopenia postchemoradiotherapy. This may contribute to continued feeding tube dependence and aspiration in head and neck cancer patients.

Surgical Margin Localization Using 3D Visualization and Multiplanar Radiography

Raphael G. Banoub, MD (Presenter); Heather M. Ross;
Brian P. Swendseid, MD; Ramez Philips, MD;
Yamil Selman, MD; Joseph M. Curry, MD

Introduction: Surgical margins are the most important predictor for local recurrence, increased mortality, rates and

treatment failure in head and neck squamous cell carcinoma (HNSCC). Re-resection of margins may not be associated with improved outcomes, and this is likely related to challenges in relocating resected margins, using conventional methods of nomenclature, and documentation. Few advances in margin assessment methodology have been made in recent decades; we sought to perform a proof-of-concept study for the use of 3D image reconstruction to assess margin precision.

Method: Preoperative computed tomography scans for 8 patients with HNSCC were imported into a modular, multiplanar radiology software (3D Slicer), and 3D tumor models were segmented. Surgical margin labels and margin status were collected from pathology records. Surgeons were asked to mark the anatomic location of the surgical margin on any preferred radiographic plane or directly on the 3D tumor. Each fiducial markup provided 3D coordinates (millimeters). Precision and variance were calculated from the geometric centroid.

Results: Margin data points (n = 336) were collected from 7 surgeons. Surgeons localized margins with a mean of 5.6 mm, 6.8 mm, and 6.7 mm from each margin centroid in the transverse, sagittal, and coronal planes, respectively. In 3 dimensions, surgeons localized with a mean of 12.88 mm from the margin centroid and with high variance (10.9, SD: 3.302, $P < .001$). Surgical margins positive (PSM) for carcinoma were further from their respective centroid than non-PSMs (PSM 21.02, non-PSM 12.73, $P < .01$).

Conclusion: Lack of concordance and high variance (>25 mm) in margin identification was demonstrated. This suggests that retrospective anatomic localization of conventionally labeled margins is inaccurate. Further study is needed to assess the clinical significance of this finding, but multimodal visualization tools may allow for increased precision, documentation, and communication and could have clinical impact in re-resection or planning adjuvant radiotherapy.

Swallowing Outcomes After Transoral Robotic Surgery for Oropharyngeal Carcinoma

Alden F. Smith (Presenter); Alice C. Yu;
Jenna Nuzzi, MS, CCC-SLP; William C. Lorentz, MD;
Avraham Mendelsohn, MD; Marilene B. Wang, MD

Introduction: Dysphagia is a common sequela following treatment for oropharyngeal squamous cell carcinoma (OPSCC). This study examines swallowing function after transoral surgery for OPSCC with and without adjuvant therapy.

Method: A retrospective review was conducted on 22 patients who underwent transoral surgery for OPSCC through the Veterans Health Administration from 2013 to 2020. Data collected included tumor staging (American Joint Committee on Cancer, eighth edition), clinical course, and treatment. Swallowing outcomes were assessed within 2 weeks after surgery and 3 to 6 months after completing all treatment by using the American Speech-Language-Hearing Association national outcomes measurement system (ASHA-NOMS). Analysis

was performed using the Kruskal-Wallis H test and Wilcoxon signed-rank tests.

Results: Mean age at diagnosis was 65.18 (SD \pm 7.0) years. All patients were male. Tumor primary sites included base of tongue (54.5%), tonsil (36.4%), and pharynx (9.1%). In total, 4 patients (18.2%) received surgery alone, 5 patients (22.7%) received adjuvant radiotherapy, and 13 (59.1%) received adjuvant chemoradiotherapy. Pathologic staging included stage I (54.5%), II (22.7%), III (13.6%), IVA (4.5%), and IVB (4.5%). Some 21 patients received transoral robotic surgery; 1 underwent transoral laser microsurgery. The mean ASHA-NOMS score 2 weeks postsurgery was 3.88, indicating moderate diet restrictions. This score showed a statistically significant increase to 4.85, indicating minimal restrictions, 3 to 6 months after the conclusion of therapy ($P = .041$). There was no significant difference in final swallowing outcomes between the groups treated with surgery alone, postoperative radiotherapy, or postoperative chemoradiotherapy ($P = .178$). There was also no difference in swallowing outcomes based on the site of the initial tumor ($P = .193$).

Conclusion: Time was the most important variable in improving swallowing outcomes after transoral surgery for oropharyngeal cancer. The addition of postoperative radiation or chemoradiation did not result in significant differences in swallowing outcomes within the first 6 months after treatment.

A Systematic Review of Temporal Spaces Abscesses

Sara Yang, MD (Presenter); Kyle Bartelt, MD; Paul Jones, MD; Monica Patadia, MD

Introduction: Temporal space abscesses are a rare presentation without a clear incidence defined in literature. Previously published literature has been merely anecdotal. Given the sparsity of literature related to the characteristics and findings of temporal space abscesses, an evidence-based systematic review of the literature was conducted.

Method: Thorough literature review was conducted following the Preferred Reporting Systems for Systematic Reviews and Meta-Analyses (PRISMA) statement guidelines. Literature search was conducted on PubMed, Scopus, Web of Science, and Cochrane Library data sources. Demographic data, imaging modalities, management, and status at follow-up were obtained.

Results: A total of 39 studies met inclusion criteria. In total, 45 patients with a temporal space abscess were identified, with 3 institutional patients being included in the analysis. Most common presenting symptoms reported were facial/temporal swelling ($n = 43$, 95.5%) followed by trismus ($n = 15$, 33.3%). Temporal space abscesses were discovered to be related to dental procedures ($n = 11$, 24.4%) or dental infections ($n = 9$, 20.0%). Computed tomography (CT) was the most commonly obtained imaging modality ($n = 33$, 75.0%), with only 19 CT images (57.6%) demonstrating a clear abscess at the time of evaluation. Some 44 patients had surgical

management with temporal incision and drainage (I&D; $n = 27$, 61.4%) vs a combined temporal and intraoral I&D ($n = 9$, 20.4%). Antibiotic administration was an adjuvant therapy with 17 patients (44.7%) receiving a combination of both intravenous and oral antibiotics. Osteomyelitis was a noteworthy complication, present in 9 patients (20.0%).

Conclusion: Temporal space abscesses are a rare finding. Although numerous sources of infection have been previously described in literature, odontogenic etiology remains the most commonly associated cause and should be evaluated as a possible source of infection. Formal incision and drainage is recommended for resolution of infection.

Time to Initiation of Radiation Therapy During the COVID-19 Pandemic

Betty Y. Chen, MD (Presenter); Henya Sandhaus; Eric Adjei Boakye; Brent Van Ham; Arun Sharma, MD, MS

Introduction: The coronavirus disease 2019 (COVID-19) pandemic has dramatically affected the care of head and neck cancer (HNC) patients. Given the reallocation of health care resources and focus on minimizing the risk of novel coronavirus transmission, concerns about delays in care for nonemergent conditions have been raised. Delays in presentation, diagnosis, and initiation of treatment in HNC patients have been associated with disease progression and adverse oncologic outcomes. We aim to quantify times to initiation of radiation therapy in patients with HNC during the COVID-19 pandemic.

Method: This single-institution retrospective study included 146 patients (103 pre- and 43 during COVID-19) 18 years and older diagnosed with HNC whose treatment included radiation therapy. Patients were included in the pre-COVID-19 group if treatment recommendations were made from January 1, 2019, to March 20, 2020. Patients were included in the during-COVID-19 group if treatment recommendations were made from March 21, 2020, to December 12, 2020. Multivariable linear regressions were used to examine the association between the 2 COVID-19 treatment groups and times to initiation of radiation therapy, adjusting for age, gender, marital status, and insurance.

Results: The average times to initiation of radiation therapy were shorter for the during-COVID-19 period than the pre-COVID-19 period. In the adjusted analyses, there were no significant differences between the pre- and during-COVID-19 groups with respect to time from presentation to otolaryngology ($P = .3975$), presentation to a health care provider ($P = .6237$), biopsy ($P = .1973$), pathology date ($P = .0881$), imaging ($P = .4564$), and tumor board ($P = .2466$) to initiation of radiation therapy.

Conclusion: No significant difference in times to initiation of radiation therapy was found between pre-COVID-19 and during-COVID-19 groups. Radiation therapy continues to be a viable treatment modality for head and neck patients during the COVID-19 pandemic and can be administered without delays in care.

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Tracheostomy Decannulation Predictors in Laryngeal Cancer: Preliminary Single Institution Analysis

Janmaris Marin Fermin, MD (Presenter);
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Jose M. Flores; Cherie-Ann O. Nathan, MD

Introduction: The need for tracheostomy in laryngeal cancer patients can result in significant negative impact on speech, swallowing, and overall quality of life. Not all patients are decannulated, and knowledge of predictors for decannulation could help improve patient care and treatment counseling. We sought to evaluate the incidence of both tracheostomy and tracheostomy decannulation in laryngeal cancer patients, as well as identify potential predictors of eventual decannulation.

Method: We reviewed records of patients receiving tracheostomy for reasons related to laryngeal cancer treatment at the Louisiana State University Hospital in Shreveport, Louisiana, between June 2011 and February 2017. Only patients receiving organ-preservation therapy were included in the analysis. Univariate and multivariable time-to-event analysis was performed to assess statistical associations between tracheostomy decannulation, and selected demographic variables, medical history, tumor characteristics, treatment-specific factors, and survival data.

Results: Among a total of 227 laryngeal cancer patients, 49 met inclusion criteria and 10 (20.4%) of these were decannulated after a mean time of 10.8 months ($SD \pm 7.2$). Univariate and multivariate models demonstrated a robust association between presence of any nodal disease and reduced hazard of tracheostomy decannulation (hazard ratio 0.19, $P = .03$). No other variables were significantly predictive of eventual decannulation or dependence.

Conclusion: We found a low rate of tracheostomy decannulation at our institution relative to the published literature. Nodal disease was found to be significantly associated with tracheostomy dependence. Its presence should be considered when counseling patients about their prospective treatment and potential for decannulation.

Transoral Endoscopic Vestibular Approach to the Sistrunk Procedure

Julianna Kostas (Presenter); Bracha Sachs, MS;
Sallie M. Long, MD; Victoria Banuchi, MD, MPH

Introduction: Thyroglossal duct cysts (TGDCs) are congenital abnormalities that are traditionally excised via a transcervical Sistrunk procedure, leaving an external scar that can affect patient satisfaction. The transoral endoscopic vestibular approach has been established in the literature for thyroidectomy (TOETVA), but its adaptation to other neck surgeries is sparsely reported.

Method: We describe the case of a healthy 56-year-old woman who presented with a 2.4-cm TGDC. The patient had a strong preference to avoid a scar and chose to proceed with the transoral endoscopic vestibular approach instead of the Sistrunk. In brief, a central gingivobuccal and 2 mucosal oral

commissure incisions were made. Hegar dilators were used in a subplatysmal plane through the central incision. The subplatysmal plane was developed, and the ensuing pocket was insufflated to 6 mm Hg. The TGDC was dissected from the underlying musculature, and needle aspiration of the cyst was performed to facilitate excision. Bone cuts were made using the Sonopet ultrasonic aspirator, leaving a 1.5-cm segment of hyoid adjacent to the specimen. Further dissection continued, and the specimen was removed in an Endo Catch bag.

Results: The patient was discharged home on the same day. A pressure dressing was removed after 24 hours. There were no surgical complications, and she was recovering well at her first postoperative visit. Submental sensation was noted to be intact.

Conclusion: This is one of the first reported cases of the transoral endoscopic vestibular approach instead of the Sistrunk procedure. The TGDC was successfully excised, and the patient avoided an external neck scar. This case demonstrates that experience with the TOETVA can be adapted for use in Sistrunk procedures. More reports are needed for outcome data including the risk of recurrence following this novel approach.

Transoral Nonaerosol-Generating Coblation Surgery for Deep Cervical Space Lesions

Srinivasa Rao-Merugumala (Presenter); Gaurav Kansal;
Radhika Kumta

Introduction: The objective of this study is to evaluate the efficacy and safety of transoral nonaerosol-generating coblation surgery (TONCS) in the current COVID-19 pandemic and to understand the rare presentations of deep cervical space lesions and their effective management with nonaerosol-generating (NAG) technique by coblation.

Method: A retrospective case review took place over an 18-month period. The conditions studied were parapharyngeal space (PPS) tumours and parapharyngeal and retropharyngeal abscesses. Patients were between the ages 18 and 72 years. The intervention was TONCS. Outcome measurements were postoperative pain, return to normal swallowing, cervical scarring, and hospital stay.

Results: This study included a total of 9 patients: 6 male and 3 female patients between the ages 18 and 72. The final diagnoses were 5 PPS abscesses, 2 PPS tumours, and 1 retropharyngeal abscess confirmed on magnetic resonance imaging. Endoscopic coblation dissection was made anterior to the palatoglossal arch and posterior to the pterygomandibular fold. The superior constrictor muscle was carefully dissected. The coblation probe tip was submerged in saline to prevent aerosol generation. The 3 of 5 PPS abscesses that were drained externally required 21-day hospitalization on average. This included 1 fatality. The 2 PPS abscesses and another PPS tumor were operated on uneventfully via TONCS. This group required far less postoperative analgesia with early return to normal swallowing and work. This did not require external neck incision. There was an average of only 2-day hospitalization, which in turn reduced the hospital costs.

Conclusion: This study illustrates that TONCS should be considered as a safe initial alternative to conventional/open

procedures in the management of deep cervical space lesions. This novel approach has shown to prevent injury to delicate blood vessels and nerves. It also avoids daily dressing changes and postoperative cervical scars and reduces the duration of hospitalization. This in turn is a safer and cost-effective surgery with better patient outcomes. The NAG technique by coblation is crucial in this current COVID-19 era.

Transtracheoesophageal Prosthesis Feeding After Total Laryngectomy: A Novel Approach

Eric Remer, MD (Presenter); Clifford Chang; Babak Givi, MD; Jamie Levine, MD; Adam Jacobson, MD

Introduction: Delaying oral feeding after a total laryngectomy is common practice as a preventative measure to decrease the rate of pharyngocutaneous fistulas. The common routes of feeding are either a nasogastric tube (NGT), a gastrostomy tube (G tube), or a red rubber catheter going directly through the tracheoesophageal puncture (TEP) site. We describe a novel method using the tracheoesophageal prosthesis for gastric feeding after a total laryngectomy.

Method: All patients who underwent total laryngectomy and primary puncture from 2015 to 2020 were identified and reviewed. The patients were divided into 2 groups; the first group was fed through the TEP prosthesis by a keofeed tube (TEP group), and the second group either had a nasogastric tube, G tube, or a red rubber tube going through puncture site without a prosthesis in place. Time to resumption of oral intake, length of hospitalization stay (LOS), and complications were recorded and compared between the 2 groups.

Results: During the study period, 26 patients who underwent total laryngectomy with primary TEP met the criteria. The median age was 65, and most were male (23, 88.4%). Nine patients were in the TEP group and 17 in the non-TEP group. The time to resumption of oral diet was 13 days in TEP and 35 days in the non-TEP group. The LOS was 9 days in both groups. A pharyngocutaneous fistula was documented in 1 patient (11.1%) in the TEP group and 5 (29.4%) in non-TEP group ($P = .37$). No dislodgement of the prosthesis was recorded in the TEP group, and all patients in this group were able to use their TEP prosthesis for tracheoesophageal speech.

Conclusion: We describe a novel method of using the TEP prosthesis for gastric feeding. Using the prosthesis did not result in higher complications or dislodgement while also eliminating the need for placement of the prosthesis at a later time. The method we propose could result in higher patient comfort and satisfaction.

Ultrasound-Guided Transcervical Fine-Needle Aspiration in the Diagnosis of Laryngeal Cancer

Olivia Quatela (Presenter); Quinn Self, MD; Heather Herrington, MD; William Brundage, MD; Mirabelle Sajisevi, MD

Introduction: The gold-standard approach to diagnosis of laryngeal cancer is direct visualization with biopsy. In patients with more advanced tumors, tracheostomy may be necessary to secure the airway to safely perform direct laryngoscopy and obtain tissue. Transcervical ultrasound (TCUS)-guided fine-needle aspiration (FNA) has been used for evaluation of neck and tongue base lesions, and we sought to demonstrate its feasibility in diagnosis of laryngeal masses.

Method: A retrospective chart review was conducted of 3 patients who underwent TCUS-guided FNA of laryngeal masses identified on flexible laryngoscopy and computed tomography at a single institution between July 2019 and November 2020.

Results: Three patients with laryngeal masses underwent TCUS-guided FNA. There was no cervical adenopathy identified in any of the patients. Patients 2 and 3 had tumors that obscured visualization of the airway and would have required tracheostomy under local anesthesia to proceed with direct laryngoscopy and biopsy. Cytology in all 3 cases revealed squamous cell carcinoma. There were no complications from this procedure. The tumor staging was T4aN0M0 in all cases, and the patients underwent total laryngectomy.

Conclusion: This case series demonstrates that in-office TCUS-guided FNA may be used to diagnose laryngeal cancer and can offer a safe, more cost-effective alternative to traditional direct laryngoscopy with biopsy in patients presenting with laryngeal masses. Additional benefits of this approach include rapid definitive diagnosis while avoiding general anesthesia and tracheostomy, which would have been required in 2 of our patients. Tracheostomy has been associated with increased recurrence rates and can make definitive surgery for laryngeal cancer more challenging. Another advantage to avoiding tracheostomy in the current COVID-19 pandemic is the avoidance of an aerosolizing procedure.

Updated ACS-Risk Calculator Improved Correlation With Head and Neck Outcomes

Charles D. Meyer, MD (Presenter); Robert Lindau

Introduction: The updated American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) universal surgical risk calculator is a preoperative planning tool to assess the risk of major postoperative complications and now includes additional factors specific to complications in the geriatric population. This new ACS calculator has not been validated for the head and neck microvascular free flap population.

Method: A retrospective review was conducted of all microvascular free flap patients within a tertiary care referral center performed between January 2020 and July 2020. Preoperative information for 42 patients was entered into the risk calculator and compared to observed postoperative outcomes. Binary and linear logistic regressions were used to assess the validity of the ACS calculated risk of serious complication, readmission within 30 days, return to the operating room within 30 days, return to the emergency room within 30 days, discharge

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to an acute nursing facility, and length of inpatient postoperative stay.

Results: A total 42 free flap reconstructions were performed during the examined time period. The average age was 67 years, and the average body mass index was 26.87 kg/m². Fourteen percent were evaluated as American Society of Anesthesiologists (ASA) class II, 60% as ASA class III, and 26% as ASA class IV. The 30-day mortality was 5% and morbidity was 38%. Both the ACS-calculated need for discharge to an acute nursing facility and the estimated length of inpatient stay were significantly associated with the observed outcomes ($P = .002$ and $P = .005$, respectively). However, the remaining ACS-calculated risks were not significantly associated with the observed outcomes: risk of complication ($P = .185$), risk of return to the operating room ($P = .196$), and risk of return to the emergency room ($P = .077$).

Conclusion: The updated ACS NSQIP risk calculator takes greater account of the impact of geriatric conditions such as dementia, falls, and preoperative nursing assistance. The updated calculator appears to be an improved but is still a poor predictor of outcomes in the head and neck microvascular free flap population.

Variability in Oral Cavity Reconstruction Among Head and Neck Surgeons

Kenneth E. Akakpo (Presenter); Mark Varvares, MD; Sidharth Puram, MD, PhD; Joseph Zenga, MD

Introduction: The choice between flap and nonflap reconstruction following tongue cancer resection varies widely among head and neck surgeons. The objective of this study is to demonstrate this variability so as to encourage future studies that might optimize evidence-driven reconstructive practice.

Method: Surveys demonstrating hypothetical tongue cancer defects were created, illustrating 6 defects representing T1 to T4a defects involving the oral tongue to different degrees. Each defect had varying extension to the floor of mouth or gingiva. For each defect, the responder was queried on reconstructive choice: flap reconstruction, nonflap reconstruction, or either. Responders were also queried on their thoughts about including patients with similar defects in a randomized multisite trial if one were available. These surveys were distributed to head and neck surgeons across various institutions.

Results: Surveys were distributed to 93 surgeons at 41 institutions. A total of 70 responses were received from 34 institutions. In 1 of the 6 defects represented, there was a nearly unanimous recommendation in reconstructive choice. However, in 4 of the 6 defects represented, there was at least a 15% discordance in reconstructive recommendations with 2 of these defects demonstrating a discordance of 30% or greater. From a randomization standpoint, there was a more than 70% willingness to randomize patients with 2 of the 6 defects represented. The 2 defects with the largest discordance in reconstructive choice were the same defects in which the highest willingness to randomize was seen.

Conclusion: Our results suggest that there is a subset of tongue cancers for which reconstructive choice is most variable. While

certain defects represented, such as hemiglossectomies, show more uniformity in reconstructive choice, smaller tongue defects and defects involving adjacent tissues to different extents show more variability in reconstructive choice. Furthermore, our data suggest that if a multisite trial were available, there would be interest in randomizing patients with defects for which the optimal method of reconstruction is unclear.

Laryngology/Broncho-Esophagology

Acute Tracheal Injury Assessment Following Tracheostomy in Pigs

Alexandra J. Berges (Presenter); Ioan Lina, MD; Rafael Ospino; Hsiu-Wen Tsai; Dacheng Ding; Alexander Hillel

Introduction: Tracheostomy and endotracheal tubes can lead to acute mucosal injury from cuff pressure on the tracheal wall, which can progress to laryngotracheal stenosis. The objective of this study is to develop a swine model of acute tracheal mucosal injury from tracheostomy tubes. In addition, we propose a quantitative histopathological score to assess injury and compare different tracheostomy cuff designs.

Method: Experimental pigs ($n = 5$) of mean weight 16.2 ± 4.3 kg underwent tracheostomy followed by placement of tracheostomy cuffs maintained at 30 to 40 cm H₂O. Tracheostomies were chosen to study longer periods of cuff pressure than in intubated anesthetized pigs. At time of death, tracheal specimens were harvested and underwent histopathological analysis. The histopathological scoring system included (1) percentage of basement membrane covered by epithelium, (2) lamina propria thickness, (3) capillary cross-sectional area, and (4) epithelial layer thickness.

Results: Three pigs died prior to euthanasia due to acute airway obstruction. As a result, subsequent animals were continuously monitored following surgery. Compared with noninjured trachea controls, the injury group demonstrated significantly decreased epithelial coverage ($P < .0001$) and epithelial thickness ($P = .02$) and increased lamina propria thickness ($P = .008$). There was increased capillary cross-sectional area and increased inflammatory cells observed in the lamina propria in contact with the cuff.

Conclusion: We describe a large animal model for assessing acute cuff pressure injury and a histopathological scoring system that can be used to compare cuff injury from endotracheal and tracheostomy tubes. The high incidence of airway obstruction following tracheostomy suggests swine are best used as an animal model for acute injury.

Anatomical Tracheal Changes After Open Tracheostomy in COVID-19 Patients

Laila Siddique, MD (Presenter); Erin Cohen; Christine D'Aguillo; David Rosow

Introduction: The SARS-CoV-2 virus (COVID-19) is a respiratory virus that can manifest as hypoxic respiratory

failure, requiring prolonged intubation. Critical care units often use large-diameter endotracheal tubes for increased oxygen delivery. As opposed to the pre-COVID era when tracheostomies were often performed after 7 days of intubation, the optimal time frame for tracheostomy in COVID-19 patients has been debated, given the poor prognosis of patients with respiratory compromise. We aimed to identify tracheal anatomical changes seen in these patients and associated risk factors.

Method: We performed a retrospective chart review on patients who underwent an open tracheostomy in the setting of COVID-19–associated respiratory failure from March 15, 2020, to October 1, 2020. Patients included in the study were checked for comorbidities, COVID-19 testing, duration of intubation, size of endotracheal tube, average cuff pressures, chest x-ray findings, ventilator settings, complications during and after tracheostomy, tracheostomy tube size, and number of times ENT was contacted for evaluation of tracheostomy after placement.

Results: We identified 6 patients who presented with tracheal changes including tracheal necrosis and tracheomalacia at the time of their tracheostomy procedures. These patients exhibited known risk factors for intubation-related complications such as diabetes, intubation with large endotracheal tubes, elevated endotracheal tube cuff pressures, and intubation times greater than 1 month in duration. Sequelae of these complications resulted in death for 3 of the 6 patients.

Conclusion: This case series highlights the importance of adhering to established recommendations regarding intubation in the otolaryngology literature, including intubation with smaller endotracheal tubes, avoidance of cuff overinflation, and tracheostomy after 7 days of intubation. Our review also questions whether COVID-19 patients may be at further risk of complication due to disease-specific anatomical changes leading to tracheal weakness and necrosis, therefore paving the way for further prospective research.

A Case Report and Literature Review of Non-granulomatous Supraglottitis

Nicole H. Creppel, MS (Presenter); Lauren Linker, MD; Sandra Stinnett, MD

Introduction: We describe a clinical presentation and treatment management approach of non-granulomatous supraglottitis, a rare chronic inflammatory laryngeal disorder that is sparsely described in literature.

Method: This is a report of a new case of non-granulomatous supraglottitis with literature review. A literature review performed using PubMed, Google Scholar, Scopus, and Web of Science were searched with the terms “nongranulomatous” and “supraglottitis.” Database queries included database inception to 2020 and returned a total of 4 papers from 2012 to 2019.

Results: Four case reports of chronic non-granulomatous supraglottitis are referenced in literature. Although each case presented with similar episodic symptoms, treatment methodologies varied and included corticosteroids, CO₂ laser resurfacing, azathioprine, and hydroxychloroquine. We present a

35-year-old African American woman who presented with a 10-month history of chronic hoarseness, difficulty swallowing, shortness of breath, and excessive drooling requiring multiple hospitalizations and intensive care unit admissions. She underwent a thorough diagnostic workup and was found to have chronic non-granulomatous supraglottitis, a rare disorder with an unclear etiological origin, which is characterized by inflammation of the supraglottic region with histological changes that are not otherwise attributable to granulomatous, vasculitis, infectious disease, or neoplastic process. She was ultimately evaluated and treated by rheumatology with hydroxychloroquine, which provided significant symptomatic relief as well as clinical improvement.

Conclusion: Non-granulomatous supraglottitis is rare and very minimally reported in literature. There is no defined method for identification and treatment of this condition. Further research is warranted to define this disorder and related risk factors, serological markers, and most effective treatment approaches.

Clinical, Endolaryngeal, and Videostroboscopy Findings in Laryngeal Fractures

Annette Wang (Presenter); Allen Feng; Vishwanatha Rao; Matthew Naunheim; Amy Juliano; Phillip Song

Introduction: Laryngeal fractures are life-threatening injuries that present with a host of symptoms and exam findings; recent data describing these injuries and associated exam findings are limited. Here, we describe one of the largest series of laryngeal fracture patients and examine fracture mechanisms, voice outcomes, and patterns in laryngoscopy and videostroboscopy.

Method: A retrospective chart review was performed on all laryngeal fracture injuries between 2005 and 2020 at a tertiary care trauma center. Patient demographics, cause of injury, management, voice, and swallowing outcomes were examined. Fracture type, laryngeal evaluation including stroboscopy, and radiological data were analyzed for correlations between fracture characteristics and exam findings.

Results: A total of 60 laryngeal fracture cases were identified including 49 men and 11 women, with a mean age of 39.4 years. Patients presented due to assault (n = 14), motor vehicle collisions (MVC; n = 6), sports-related injuries (n = 28), and gunshot wound (n = 1). Patients were managed conservatively (n = 39) or surgically (n = 21). All patients needing tracheotomy (n = 8) were decannulated. Some 21 patients were evaluated with stroboscopy within 4 weeks of injury, and 19 of 21 had persistent findings of acute endolaryngeal trauma including vocal fold hematomas, ecchymosis, edema, erythema, and granulation. Of 14 patients with single-sided fractures (left, n = 11; right, n = 5), trauma was seen ipsilaterally (n = 8), contralaterally (n = 3), or bilaterally (n = 3). Five patients had bilateral fractures, with right- (n = 4) or left-sided (n = 1) endolaryngeal findings. No patients had persistent dysphagia after injury.

Conclusion: Laryngeal fractures have classically been associated with MVCs; however, our findings suggest an increased

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incidence of isolated laryngeal fractures associated with blunt trauma and sports injuries. Mechanism of injury is not associated with specific exam or computed tomography findings, and laterality of fracture does not correlate with sidedness of vocal fold findings on stroboscopy. These findings emphasize the importance of a thorough and comprehensive laryngeal examination.

Comparison of Laser, Radiosurgery, and Conventional Treatments of Laryngeal Lesions

Ekaterina Rakunova, PhD, MD (Presenter);
Valery Svistushkin, PhD, MD; Svetlana Starostina, PhD, MD

Introduction: As a leading complaint of patients with benign laryngeal lesions (BLL), dysphonia considerably deteriorates their quality of life. We investigated the effectiveness of semiconductor laser with wavelength of 194 μm , radiosurgical excision, and conventional microlaryngosurgery of BLL.

Method: We included 90 consecutive patients with BLL (21 polyps, 15 fibromas, 14 papillomas, 11 cysts, 10 granulomas, 9 Reinke's edema, 8 nodules, and 2 hemangiomas) who underwent microlaryngoscopy in the Department of Ear, Nose, and Throat Diseases at Sechenov University (Moscow, Russia) between September 2014 and May 2019. They were equally randomized into cold-steel (group 1), radiosurgical (group 2), and semiconductor laser (group 3) excision. Patients received routine postoperative treatment and were advised to rest their voice for 7 days. Laryngostroboscopy and acoustic voice analysis were performed preoperatively and at 14 days, 1, and 6 months after surgery; all patients were asked to fill out the Voice Handicap Index (VHI) questionnaire. Of the acoustic parameters, pitch and dynamic ranges and maximum phonation time were assessed.

Results: Patients in 3 groups experienced significant improvement in vocal fold vibration and acoustic voice parameters and had a lower total VHI score after surgery. Fourteen days after surgery, the vocal fold vibration for laser group was better than radiosurgical and conventional groups ($P < .05$). Total VHI score for the group 3 was 1.3 and 1.8 times lower, respectively, than groups 1 and 2, 14 days after surgery ($P < .05$).

Conclusion: Data we have obtained provide the basis for choosing semiconductor laser for phonosurgical procedures in patients with BLL to shorten their voice recovery period. Further study is warranted to verify our findings.

Comparison of Ultrasound Guided Percutaneous Dilatational Tracheostomy and Open Tracheostomy

Ki Nam Park, MD, PhD (Presenter); Hyun Taek Kang;
Min Ki Lee; Seung Won Lee; Jae Yong Lee

Introduction: Recently, ultrasound-guided percutaneous dilatational tracheostomy (USPDT) is used for intensive care unit (ICU) patients, and its usefulness is known to be second only to bronchoscopic-guided percutaneous tracheostomy. To our best knowledge, a study comparing USPDT and traditional

open surgical tracheostomy (ST) performed by otolaryngologists has not yet been conducted.

Method: The aim of this study was conducted to compare and assess the efficacy of the 2 procedures and their complications by retrospective review of medical records. The study population comprised 90 ICU patients, who underwent tracheostomy from June 2019 through September 2020. USPDT was performed by checking puncture site and needle tip with real-time ultrasound using ciaglia blue rhino tracheostomy dilator kit. Open surgical tracheostomy was done by traditional method. The primary outcome was duration of the procedure, and the secondary outcomes were comparisons of estimated blood loss and intraoperative and postoperative complications according to the treatment modality.

Results: Of the 90 study patients, 37 (41%) had undergone USPDT and 53 (59%) had undergone ST. The mean duration of the procedure was shorter in the USPDT group (mean 5.3, SD 3.126) than in the ST group (mean 10.51, SD 4.937; $P < .001$). The mean estimated blood loss of the 2 groups was 5.05 (SD 5.286) and 3.81 (SD 2.653) mL, respectively, which were not statistically significant. The USPDT group had 5 minor complications, whereas the OT group had 4. Both groups had no major complications. The difference in overall complications between the 2 groups was insignificant ($P < .35$). There was 1 case requiring surgical conversion due to tracheal ossification in the USPDT group and took only 3 minutes.

Conclusion: We found that USPDT is time efficient and safe compared with conventional tracheostomy for ICU patients.

Corticosteroids in the Management of Chronic Cough: A Retrospective Analysis

Holden W. Richards (Presenter); Nicole M. Santucci, MA;
Andrew Palmer, PhD, CCC-SLP; Joshua Schindler, MD

Introduction: Chronic cough in adults is the most common primary complaint when pursuing medical treatment in the United States. The management of these patients is complex due to their varying symptoms, cough durations, and previous treatments. We assess these patient-level characteristics as well as the responsiveness to corticosteroids as an initial diagnostic and therapeutic intervention for chronic cough.

Method: Patients presenting with "chronic cough" from January 2018 to December 2018 at a tertiary laryngology clinic were retrospectively identified. Demographics and associated symptoms as well as oral corticosteroid (OCS) and inhaled corticosteroid (ICS) cough improvement were recorded. Cough improvement was determined by patient subjective satisfaction, dissatisfaction, and percent reduction of coughing.

Results: A total of 37 patients who initiated OCS were included. Of those patients, 19 did not progress to ICS therapy, while 14 completed both OCS and ICS. Throughout the 3 groups, shortness of breath, rhinorrhea, and hoarseness were the most common presenting complaints. After the 37 patients completed 14-day OCS treatment, 30% (11) were >85% improved and satisfied, 19% (7) were <85% improved but satisfied, 3% (1) was <85% improved and unsatisfied, and 11%

(4) noted no improvement in cough. Overall, 47% (18) demonstrated satisfactory steroid response. At 3-month follow-up, 78% (14) of these steroid-responsive patients had continued steroid using ICS and 86% (12) remained satisfied with cough control.

Conclusion: Almost half of patients with a presenting complaint of chronic cough can be identified as steroid responsive with OCS and can be effectively treated with subsequent ICS.

Diabetes Mellitus–Associated Vocal Fold Paralysis: Case Report and Systematic Review

Robert M. Tuliszewski, MD (Presenter); Vincent M. Desiato, DO; Mark Harlor; Thomas L. Kennedy, MD

Introduction: Diabetes mellitus (DM) is common, and up to 50% of patients with DM will develop diabetic neuropathy (DN). However, DN precipitating laryngeal nerve dysfunction is rare and likely underreported. The objective of our investigation is to present a patient with DM-associated bilateral vocal fold paralysis (VFP) and systematically review the published literature describing DM-associated VFP.

Method: A systematic review was conducted in accordance PRISMA guidelines to identify articles reporting DM-associated VFP. Patient and clinical data were extracted from included studies.

Results: In total, 12 articles and 1 case reported within were included and described 58 subjects with DM-associated VFP. Study objective and methodology varied, and the weighted mean age was 58.7 years (range 7–77 years). Vocal fold involvement was described in 20 subjects; 15 (75%) were unilateral, and 5 (25%) were bilateral. The most common symptom was hoarseness or dysphonia, reported in 87.5% of symptomatic patients. Stridor was reported in 4 subjects, all with bilateral VFP. Of those with documented clinical course, 92.9% had return of VF function.

Conclusion: This systematic review encountered many challenges due to small sample sizes, heterogeneity in study design, and limited patient-specific data. Despite these limitations, this study of 58 patients is, to the best of our knowledge, the largest systematic review evaluating DM-associated VFP. The results of this study support the need for a standardized approach to evaluating VFP in patients with DM.

The Effects of Electronic Cigarettes on Perceived Voice Quality

Drew H. Smith, MD, MS (Presenter); Hannah C. Sullivan; Madhu Mamidala, PhD; Amy P. Nabors, CCC-SLP; Miriam van Mersbergen, PhD; Sandra Stinnett, MD

Introduction: Vaping, or use of electronic cigarettes, is on the rise among young adults ages 18 to 29 years. A recent poll showed that 20% of young adults in America vape regularly or occasionally, while only 16% admitted to smoking regular cigarettes. While vaping has been shown to cause pathological changes to the larynx, investigations of perceived voice changes among young adults who vape are scarce.

Method: This is a cross-sectional study using a survey titled “Perceived Voice Changes in Young Adults Who Vape,” which incorporated components of the validated National Adults Tobacco Survey and Voice Handicap Index-30. The survey was distributed via QuestionPro and contained 78 questions detailing demographics, preconceived notions of vaping effects, use of e-cigarette products, and self-perceived voice changes. The survey was disseminated to higher education institutions across the United States from August 2020 and will continue through September 2021. All participants confirmed they were 18 years of age or older and provided electronic consent.

Results: In total, 75 surveys were collected by December 2020. Some 22 participants had a past or present history of vaping and answered all questions, and 7 of the 22 (32%) indicated that their voice worsened after vaping. Among those who vape, 36% (n = 22) believed that vaping is just as or more dangerous to one’s health than normal cigarettes as compared with 80% (n = 50) of participants who did not vape (odds ratio = 0.143, $P < .001$). For the same vaping cohort, 15 (68%) believe that vaping causes little to no harm on one’s voice when using on some days, while only 11 (22%) of the non-vapers had the same opinion (odds ratio = 7.79, $P < .001$).

Conclusion: More than 30% of participants who vape noted worsening voice. Despite this, vapers are still 7.79 times more likely to believe vaping causes little to no harm on their voice when they vape compared with young adults who do not. This preliminary data suggest that education and preventative measures are needed to convince young adults that vaping, like normal cigarettes, can negatively affect one’s voice.

Endoscopic-Assisted Medialization Laryngoplasty Using Dacron: Our Experience and Outcome

Ahmed A. Teaima (Presenter)

Introduction: Dysphonia due to unilateral vocal fold paralysis is distressing and can affect the quality of life. This study evaluated the efficacy of our technique for medialization laryngoplasty in glottic incompetence due to unilateral vocal fold paralysis.

Method: This study is a case series study done at our tertiary referral center from January 2018 to May 2020, involving 18 adult patients with unilateral vocal fold paralysis due to different reasons with phonatory gap more than 2 mm and no improvement for more than 9 months. They underwent our technique of endoscopic-assisted medialization laryngoplasty using Dacron® and are followed-up for 1 year for any complications postoperatively or recurrence of symptoms. Patients were evaluated pre- and postoperatively (1 week, 3 months, and 1 year after) by laryngoscopic examination, Grade, Roughness, Breathiness, Asthenia, and Strain score (GRBAS), and Voice Handicap Index–10 score (VHI-10).

Results: Eighteen patients were involved in this study (aged 20 to 65 years; 11 were women). All patients showed improvement of glottic closure postoperatively and in follow-up. Also, there was statistically significant improvement in GRBAS and

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VHI-10 postoperatively and in follow-up. None of the patients exhibited major complications. Only 1 case developed wound dehiscence after 1 week, which was managed conservatively.

Conclusion: This technique was found to be effective in closure of the glottic gap and improvement of dysphonia with negligible rate of complications and rapid recovery time.

Flexible Robotics: Five-Year Review

Vyas M. Prasad, FRCS (Presenter);
Marc Remacle, MD, PhD; Georges Lawson, MD

Introduction: Flexible platforms for transoral robotic surgery (TORS) have been used for more than 5 years. The aim of this review is to provide a thorough appraisal of the impact of flexible robotic systems in head and neck surgery and laryngology, the advantages and disadvantages compared with other systems, and cost and benefits as well as future prospects in the development of robotics in otolaryngology.

Method: This is a retrospective review of TORS with the currently developed and used flexible robotic system that had its first documented use in living patients by the authors in June 2014. This robotic system has undergone several modifications since then and has been used internationally for a variety of procedures in several sites of the upper aerodigestive tract including but not limited to the oropharynx, tongue base, and larynx. Several publications on the experiences of various groups have provided insights into the benefits of the system as well as the potential improvements that are necessary with comparison between the more established da Vinci system.

Results: The results of this review provide a balanced and concise comparison of flexible vs rigid line of sight systems, the potential for hybridization of systems, the weaknesses, and the future applications and improvements that are necessary to move TORS forward as an equitable and effective technology.

Conclusion: This review of a highly innovative area of robotics provides the audience a summary of where flexible robotics in otolaryngology has gone, will go, and needs to go to remain applicable and beneficial while still remaining economically viable.

Gluten Sensitivity Underlying Resistant “Laryngopharyngeal Reflux” Symptoms and Signs

Lauren E. Melley (Presenter); Bailey Balouch; Jane Tong;
Heather Yeakel; Ghiath Alnouri; Robert T. Sataloff, MD

Introduction: Gluten sensitivity may contribute to or mimic symptoms and signs of laryngopharyngeal reflux (LPR).

Method: A total of 117 adult outpatients (75 female, 41 male) from the medical practice of the senior author with a diagnosis of LPR were included in this retrospective study (mean age = 52.3 ± 18.1 years). Patients were treated with medical reflux therapy (mean duration = 9.5 ± 9.6 months) and subsequently underwent gluten sensitivity testing due to refractory LPR symptoms and/or signs. Patients with ≥ 1 positive human leukocyte antigen (HLA) and/or antibody gluten

sensitivity marker (GSM) were advised to begin a therapeutic trial of a gluten-free diet (mean duration = 4.3 ± 4.2 months). Reflux finding score (RFS) and patient-reported symptoms were the primary outcome measures.

Results: In total, 74 patients (63.2 %) were positive for ≥ 1 GSM, with 59 patients positive for ≥ 1 HLA marker (48 DQ2+, 19 DQ8+), 24 patients positive for ≥ 1 antibody marker (1 for TTG IgA, 4 DPG IgA, 15 AGA IgG, 6 wheat IgE), and 12 patients positive for both an HLA and antibody marker. Baseline RFS did not differ significantly between GSM+ vs GSM- patients (10.6 vs 10.0, $P = .455$). With medical reflux therapy, RFS decreased similarly for both GSM+ (-0.6) and GSM- (-0.9) patients ($P > .627$). Of the 74 GSM+ patients, 44 completed a gluten-free diet, and 25 (56.8%) reported subjective improvement in LPR symptoms. The RFS decreased by a mean of 0.5 after the gluten-free trial, which was not significant ($P = .064$). Diet duration was not a significant predictor for RFS reduction ($P = .317$). Sixteen patients demonstrated objective improvement on the gluten-free diet as measured by significant reductions in their RFS (-2.6 , $P < .001$). Patients with fewer total reflux events ($P = .08$), upright reflux events ($P = .045$), and weak acidic events ($P = .017$) on baseline 24-hour pH testing were more likely to benefit from gluten abstinence.

Conclusion: Abstinence from gluten decreases reflux symptoms in over half of GSM+ LPR patients and produces a modest but measurable decrease in RFS in more than one-third of these individuals. These patients had less severe reflux on 24-hour pH impedance testing at baseline.

Idiopathic Subglottic Stenosis: Is It Always Idiopathic?

Yash Mittal, MBBS (Presenter); Pradeep Pradhan;
Pradipta Parida; Asutosh Adhikari; Zaid Shaikh;
Chappity Preetam, MS, DNB

Introduction: Idiopathic subglottic stenosis (ISGS) is an uncommon disorder with no proven definitive management described in literature. Biopsy usually elicits nonspecific inflammation, and outcomes of treatment are varied.

Method: A retrospective review of data from February 2013 to December 2020 for cases of ISGS in a tertiary care setting was performed. Five cases were identified. Patient records were screened and data tabulated. All patients were females, out of whom 4 patients consented for and underwent biopsy of subglottic region. The most common presenting symptom was difficulty in breathing. All patients were treated with pulse-dose steroid therapy and balloon dilatation followed by immunomodulators in 4 patients for 6 months to 1-year duration, depending on response. One patient underwent antitubercular treatment for localized tuberculosis. Data regarding response to therapy and recurrence was collected.

Results: Systemic and hematological evaluation did not reveal any abnormality in any of the 5 patients. The biopsy specimen of 2 patients revealed a definitive diagnosis. One patient had localized tuberculosis (acid-fast bacillus-positive), which responded well to 6 months of antitubercular therapy,

and another had evidence of granulomatosis with polyangiitis. One patient had nonspecific inflammatory cells along with skin lesions, which was diagnosed as anti-neutrophilic cytoplasmic autoantibody–negative vasculitis. Another patient developed extranodal marginal zone lymphoma, and the ISGS responded to treatment. All patients showed improvement in the symptoms during the follow-up with no recurrence in symptoms.

Conclusion: Biopsy should be a part of routine workup in all ISGS patients as it helps in administering disease specific treatment. Radical surgical approaches can be complicated with recurrence in reconstructed airway if an infective cause is missed. Minimal intervention with serial balloon dilatation along with medical management can yield good outcomes. A neoplastic lesion like lymphoma should also be ruled out.

Image-Guided Endoscopic Surgery for Vertebral Artery Migrated Foreign Body

Lu Hui Png (Presenter); Song Tar Toh;
Wei Yang Neville Teo

Introduction: Migrated aerodigestive tract foreign bodies can lodge within vital organs and vessels, causing potentially devastating complications. It is often difficult to localize these foreign bodies with extrication, requiring open approaches which may cause significant morbidity and scarring. We present the case of a migrated stingray bone lodged within the cervical spine and adjacent to the vertebral artery, managed via an endoscopic approach with the assistance of the image guidance system.

Method: This study was presented in the format of a case report, describing our experience and learning points managing a patient with a foreign body migrating to the C2/3 cervical spine and vertebral artery. We evaluated methods to aid successful removal and avoid potential complications.

Results: Intraoperatively, the foreign body was successfully identified and endoscopically removed using the image guidance system. The integrity of the vertebral artery was preserved, and the resultant pharyngeal perforation was managed by keeping the patient nil by mouth with feeding via a nasogastric tube.

Conclusion: Our study shows that image-guided endoscopic surgery is a safe, precise, and feasible option in the localization and removal of migrated aerodigestive tract foreign bodies involving critical neurovascular structures. Further studies are required to assess the limitations of this technique.

Impact of the Day of Week on Tracheostomy Patient Timeline

Emily L. Mace (Presenter); Nicole Kloosterman;
Michael H. Freeman; Alexander Gelbard, MD

Introduction: In a number of surgical specialties, weekday vs weekend date of hospital presentation has been associated with time to intervention. This study investigated the impact that day of consultation (weekday vs weekend) had on patients requiring urgent tracheostomy.

Method: Retrospective review of electronic health records of patients presenting to the emergency department (ED) that required an otolaryngology consultation for airway evaluation from December 1, 2015, to January 1, 2018 was performed. Patient demographics; time of ear, nose, and throat consultation; time of tracheostomy; and data of discharge were abstracted. Patients were included based on the need for tracheostomy after ED consultation. Time from consultation to tracheostomy was compared between patients presenting on a weekday vs weekend.

Results: A total of 75 patients required a tracheostomy following ED presentation. Of these, 53 underwent tracheostomy on a weekday (Monday, Tuesday, Wednesday, or Thursday), and 22 underwent tracheostomy on a weekend (Friday, Saturday, or Sunday). The average time from consultation to procedure was not significantly different between the 2 groups (weekday vs weekend: 16.1 vs 18.9 hours, $P > .05$). The weekday group stayed an average of 5.4 days after operation, while the weekend group stayed an average of 6.5 days, without significant difference between groups ($P > .05$).

Conclusion: Time from consultation to tracheostomy does not appear to vary based on day of the week. These findings represent practice patterns within a single institution and require confirmation across multiple institutions and diverse practice settings.

Initial Experience with 3-Dimensional Exoscope (VITOM-3D)–Assisted Laryngoplasty

Tetsuji Sanuki, MD, PhD (Presenter); Naoki Takamoto;
Shogo Sumiya

Introduction: Laryngoplasty requires manipulation of the vocal cords, which are not visible during the operation, and the technique's widespread use is limited by the need for adequate knowledge of local anatomy, the small surgical field, and the high level of skill required for the procedure under local anesthesia. Although it is possible to train surgeons to use a microscope or an endoscope, as in otological and nasal surgeries, this has not been done in the case of laryngoplasty, as the position of the trunk, neck, and head cannot be changed freely, and the patient's position is unnatural. In recent years, an exoscope has been developed that can provide a stereoscopic view similar to that of a microscope, while using the same compact tool as an endoscope. The study aims to assess whether the 3-dimensional (3D) exoscopic surgical technique can be applied in laryngoplasty and to explore the possibility of it ultimately replacing this macro surgery in the future.

Method: This is a retrospective study in which were included 20 patients affected by voice disorders, who underwent surgery either using the 3D exoscope or without this device (macro surgery). The exoscope and macro groups each included 10 cases. The feasibility of all the surgical steps solely using the 3D exoscope was evaluated. The exoscope group and macro group were compared, taking into account the following factors: time of the surgery and vocal function outcomes as well as intraoperative and postoperative complications.

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Results: No intraoperative or postoperative complications occurred in any of the procedures. The average operative time was 143 minutes in the exoscope group and 135 minutes in the macro group. No significant statistical differences were identified between the 2 groups ($P > .05$). The vocal function outcomes were fully comparable.

Conclusion: While this study represents an initial experience, our results indicate that the exclusive use of the 3D exoscope is feasible for all open approaches. The use of the 3D exoscopic technique shows promise for future laryngoplasty.

Inpatient Injection Laryngoplasty for New Onset Vocal Cord Immobility

Anthony Grady, MD (Presenter); John Cheng; Micheal Randall, MD; Mark Witte, MD

Introduction: Retrospective studies assessing injection laryngoplasty (IL) following new onset unilateral vocal cord immobility status post cardiothoracic surgery have reported decreased pulmonary complication rate with early IL. This study aims to clarify the indications and efficacy of inpatient IL across all etiologies.

Method: Retrospective chart review identifying patients diagnosed with new onset unilateral vocal cord immobility was conducted over the past 10 years at a single tertiary care institution. Baseline characteristics including etiology of paralysis, glottic closure, and IL status/timing were recorded. Primary endpoints included postparalysis intubation, bronchoscopy, and pneumonia/aspiration pneumonitis. Length of hospital and intensive care unit stay were also calculated. Endpoints were compared between groups based on timing of IL (5 or less days vs >5 days), IL status (IL during hospital stay vs no IL), and glottic closure (complete vs incomplete).

Results: Forty-four patients received inpatient IL, while 47 patients (control group) did not. There was no significant difference in primary endpoints between control group vs IL group and early vs late IL group. Compared with patients with complete glottic closure, patients with incomplete glottic closure had significantly higher intubation rates ($P = .006$) and trended toward significantly more episodes of pneumonia/aspiration pneumonitis ($P = .0795$).

Conclusion: Although the small sample size coupled with group heterogeneity prevented multivariate analysis, IL did not demonstrate a significant impact on pulmonary complication rates. However, incomplete glottic closure appears to be a significant factor in predicting complications following vocal cord paralysis. This study demonstrates a need for higher-powered and prospective studies to establish criteria justifying inpatient injection laryngoplasty.

Juvenile Recurrent Respiratory Papillomatosis: Preliminary Investigation of Treatment Disparities

Jany Quiz (Presenter); Kaci Dejarnette; Cem Akkus, PhD, MS, MPH; Madhu Mamidala, PhD; Jerome Thompson; Sandra Stinnett, MD

Introduction: Recurrent respiratory papillomatosis (RRP) is a rare disease that affects all ages, costing nearly \$100 million annually. As this may unreasonably affect patients from certain demographic and socioeconomic groups, our study investigates potential disparities in the treatment and management of RRP patients from Memphis, Tennessee, and surrounding areas.

Method: A retrospective study was conducted using a local children's hospital's electronic medical record EMR from 2009 to 2019. Patient demographic variables were obtained from Policymap and the US Department of Agriculture then compared with treatment outcomes. We created the Papilloma Burden Factor (Derkay scores \times No. of operations \times 1/interop holiday) to standardize disease burden. Each group was analyzed with a t test or Mann-Whitney U test.

Results: Most patients lived in a medically underserved area (30 vs 3) or in an area with a high social vulnerability index (27 vs 6). Patients who received human papillomavirus (HPV) subtyping (23%) were positive for low-risk HPV. Posttreatment Derkay scores in males ($P = .04$) and average interop holidays in patients with higher SVI ($P = .04$) were significantly higher. Papilloma burden was higher in African Americans, males, higher poverty percentage rates, rural areas, and medically underserved areas (MUAs), although results were not statistically significant.

Conclusion: These data suggest that patients with vulnerable backgrounds frequent the operating rooms less often; however, it is unclear whether this is attributable to medical care accessibility. In total, 91% of our patients are from MUAs, although they do not appear to have issues accessing care. Further research is needed to determine whether these disparities result from physiologic or genetic differences, socioeconomic status, race, or ethnicity. This will help further characterize disease burden and outcomes considering the rarity of RRP.

Kaposi Sarcoma of the Larynx: A Systematic Review

Ariel Omiunu (Presenter); Joseph Celidonio; Christina H. Fang, MD; Corina Din-Lovinescu, DO; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Kaposi sarcoma of the larynx is a rare disease, with few cases reported in the literature. Risk factors include HIV and preexisting cutaneous Kaposi sarcoma. We provide a comprehensive review of laryngeal Kaposi sarcoma including patient characteristics, treatment, and clinical outcomes.

Method: PubMed, CINAHL, Scopus, and the Cochrane Library were used to search the literature. Variables analyzed included patient demographics, clinical findings, diagnostic and therapeutic approach, patient outcomes, and follow-up period.

Results: A total of 35 studies (34 case reports and 1 case series) were included, totaling 36 patients. The mean age was 48.7 years (range, 20–81 years). There was a 5:1 male to female ratio. Eighteen patients (50.0%) required emergency

tracheotomy to relieve upper airway obstruction, 9 patients (22.2%) underwent endoscopic CO₂ laser excision, and 1 patient underwent total laryngectomy. Radiotherapy and chemotherapy were used in 12 (33.3%) and 16 patients (44.4%), respectively. Doxorubicin was the most frequently used chemotherapeutic agent (n = 6, 26.1%). Follow-up was reported for 31 patients. Twenty patients (55.6%) had no recurrence or evidence of disease, and 1 patient remained alive with the disease at final follow-up. Ten patients (27.8%) expired, 2 of these patients (5.6%) died of the disease, and 8 of them (22.2%) from other causes. Follow-up time ranged from 1 to 108 months (mean, 21.4 months).

Conclusion: Kaposi sarcoma of the larynx is a rare manifestation of HIV. Many patients require intervention for airway obstruction. Surgical resection appears to be the mainstay of treatment and is commonly combined with chemotherapy and/or radiotherapy.

Life Expectancy in Extra-laryngeal Malignancy and Vocal Cord Paralysis

Veronica Drozdowski, MD (Presenter); Steven Charous

Introduction: Vocal cord paralysis leading to laryngeal dysfunction is not without consequence, and this may be especially evident in the oncologic population. We hypothesize that with advancements in cancer treatment, patients survive longer and are more likely to benefit from intervention. The goal of this study was to analyze overall survival in cancer patients diagnosed with vocal cord paralysis and identify trends in treatment of laryngeal dysfunction.

Method: This was a retrospective chart review of all patients with both a diagnosis of vocal cord paralysis and any cancer, excluding laryngeal cancer, treated at Loyola University Medical Center from 2007 to 2021. Patients were identified using *International Classification of Diseases, Ninth Revision, Ninth and Tenth Revisions* (ICD9 and 10) codes, and information on demographics, cancer diagnosis and treatment, and exam and imaging findings as well as intervention for vocal cord dysfunction was collected.

Results: In total 401 patients were identified, and 86 were excluded, totaling 315 patients with vocal cord paralysis related to 35 distinct types of cancer. Paralysis was secondary to direct cancer invasion or nerve compression in 56.8% (179/315) and iatrogenic in 43.2% (136/315) of patients. Most patients (63.5% [200/315]) were deceased by the conclusion of this study, with mean overall survival of 28.89 (SD 32.7) months. Vocal cord paralysis was diagnosed on average 13.27 (SD 25.3) months after cancer, and 46.3% (146/315) of patients received treatment for laryngeal dysfunction.

Conclusion: Our study shows that cancer patients with vocal cord paralysis can survive for several months to years after diagnosis. Treatment options include minimally invasive in-office injections to more invasive but permanent surgical medialization. Given the morbidity associated with vocal cord paralysis, cancer patients should be given the option to pursue treatment.

Managing the Laryngectomee in the Field: Educating the First Responder

Jacqueline R. Tucker (Presenter); Erin Sarsfield, MSN, RN; Neerav Goyal, MD, MPH

Introduction: Because of the relative rarity of a laryngectomy procedure, many health professionals are unfamiliar with how to assist and care for this population. Specifically, it is important to understand the distinction between laryngectomy stomas and tracheotomies. In the emergent setting, understanding this difference can save crucial minutes in providing advanced life support.

Method: A brief paper survey was given to first responders to assess their knowledge in identification and treatment of laryngectomy and tracheotomy patients. Following this, a head and neck surgeon provided an interactive lecture regarding the management of both laryngectomy and tracheotomy patients. Educational materials included a lecture, video clips, and a patient's case study discussion. A postintervention paper survey was completed by participants to assess changes in knowledge and confidence after receiving this education. Statistical analysis of the pre- and postsurvey was performed using *t* tests and Mann-Whitney *U* tests.

Results: A total of 53 attendees completed the pretraining survey. The average number of tracheotomy patients they treated in the past year was 3.9 vs 0.3 laryngectomy patients ($P < .01$). Participants reported feeling significantly more confident about treating tracheotomy patients than treating laryngectomy patients ($P < .05$). There were 48 participants who also completed a posteducational survey. Every attendee indicated an increase in knowledge after the educational session. In total, 95.8% of participants reported an increase in confidence for treating tracheotomy patients, and 91.7% reported increased confidence in treating laryngectomy patients.

Conclusion: This study showed that paramedics are more comfortable with treating tracheotomy patients than laryngectomy patients. After education from a head and neck cancer surgeon, their confidence in treating both groups increased. Educating care teams in the local community and especially first responders can help improve their knowledge and confidence in evaluating and managing laryngectomy patients in the acute and emergent setting.

Medialization Thyroplasty Complications via NSQIP Analysis

Mattie R. Rosi-Schumacher, MD (Presenter); Lauren DiNardo; Cathleen C. Kuo; Michele M. Carr, MD, DDS, MEd, PhD

Introduction: Unilateral medialization thyroplasty surgery is indicated for patients with vocal fold movement impairment. The purpose of this study was to identify variables that could influence length of hospital stay (LOS), reoperation, and readmission.

Method: Adults who underwent unilateral medialization thyroplasty procedure were identified using the 2017-to-2019 National

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Surgical Quality Improvement Program (NSQIP) database via Current Procedural Terminology code 31591. Data collected included patient demographics, comorbidities, preoperative lab results, American Society of Anesthesiologists classification, inpatient status, operative length, and complications. Univariate and multivariate logistic regression were used to analyze variable effects on total LOS, reoperation, and readmission.

Results: A total of 353 patients were identified, with mean age of 61 years (95% CI, 59.4–62.5) and a male-to-female ratio of 1.13:1. A total of 47 (13.3%) patients reported dyspnea as a preoperative symptom. There were 5 patients (1.4%) with reported postoperative complications: 2 surgical site infections, 2 pneumonias, 2 unplanned intubations, 2 myocardial infarctions, 1 septic shock, and 1 cardiac arrest. Inpatient procedures totaled 219 (62%), with a mean LOS of 1.48 days (95% CI, 0.89–2.05). Abnormal preoperative lab values (total bilirubin and aspartate aminotransferase) were the only variables whose effect on LOS was statistically significant ($P < .001$). There were 9 (2.5%) readmissions and 5 (1.4%) reoperations. Regression analysis revealed that preoperative dyspnea was significantly associated with readmission ($B = .131$, $P = .017$) and reoperation ($B = .109$, $P = .029$).

Conclusion: Medialization thyroplasty is a procedure with a low risk of mortality. However, preexisting patient comorbidities are associated with increased risk of postoperative complications and increased length of stay.

Multi-institutional Study on Tracheotomy: Patient Factors Dictate Operating Surgeon Specialty

John Pang (Presenter); David Francis; Paul Bryson; Ashli O'Rourke; C. Kwang Sung; Philip Weissbrod

Introduction: Tracheotomy is a procedure performed by numerous clinical services. The goal of this study is to assess for potential clinical differences in patients undergoing tracheotomy by otolaryngologists and non-otolaryngologists at 9 academic medical centers.

Method: Retrospective chart review was performed examining clinical characteristics (demographics, comorbidities, and preoperative medications) of all patients undergoing tracheotomy between 2013 and 2016 at each study site. Multivariable logistic regression was performed to assess for clinical factors associated with tracheotomy by otolaryngology vs other services.

Results: Across study sites, 4707 tracheotomies were performed by 6 specialties (otolaryngology, general surgery, trauma surgery, cardiothoracic surgery, pulmonology, and burn surgery). Of these, 40% were placed by otolaryngology, 19% by general surgery, and 14.5% by trauma surgery. On multivariable regression, otolaryngology patients were more likely to have higher body mass index (odds ratio [OR], 1.02 per 1-unit increase; CI, 1.01–1.03; $P < .001$), have a history of neck irradiation (OR, 2.98; CI, 2.08–4.27; $P < .001$), be on aspirin 325 mg at time of surgery (OR, 1.51; CI, 1.10–2.08; $P < .001$), have prior neck surgery (1.89; CI, 1.57–2.27; $P < .001$), and have more comorbidities (OR, 1.06 per 1-unit increase in Charlson Comorbidity Index; CI, 1.03–1.10; $P < .001$), and have

benign obstruction (OR 4.85; CI, 3.75–6.29; $P < .001$), or malignant obstruction (OR 10.67; CI, 7.95–14.3; $P < 0.001$). Otolaryngology patients were less likely to have myocardial infarction (OR 0.73; CI, 0.57–0.94; $P = .015$) and congestive heart failure (OR 0.63; CI, 0.5–0.78; $P < .001$).

Conclusion: Patients undergoing tracheotomy by otolaryngology tend to be more anatomically complex than those undergoing tracheotomy by other services.

Operative Management of Laryngeal Fractures

Annie E. Moroco, MD (Presenter); Vijay Patel, MD; Robert A. Saadi, MD; John Gniady, MD; Jessyka G. Lighthall, MD

Introduction: Laryngeal trauma is a rare but potentially devastating injury that requires timely identification and management, as the mortality rate is reported as high as 40%. Despite clinical advances in the operative management of laryngeal trauma over the past 2 decades, there remains a lack of consensus in the surgical literature with regard to the optimal methods for functional repair of the laryngeal framework.

Method: Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol, independent searches of the PubMed and MEDLINE databases were performed. Articles from 1963 to 2020 were collected using the Boolean method and relevant search term combinations, including “Laryngeal,” “Fracture,” “Operative,” and “Management.” Included articles were assessed using the methodological index for nonrandomized studies, instrument and baseline characteristics, demographics, diagnostics, and operative intervention, and outcome data were extracted for analysis.

Results: A total of 588 relevant unique articles were identified for analysis. Of these, 24 articles were deemed appropriate for inclusion in the literature review. Patients were male (84.8%), young (mean age 34), and subject to blunt injury (85.9%). Many patients (58.5%) underwent operative intervention, including titanium plating (18.6%), suture fixation (26.0%), stenting (9.2%), and laryngotracheal anastomosis (2.4%). Due to variability in study design and outcome measures, formal synthesis of data in the form of a meta-analysis was not possible.

Conclusion: Laryngeal fractures are rare traumatic injuries that require early identification and evaluation with complex management options. This comprehensive review aims to highlight the breadth of the topic with regard to presentation and clinical management. Although there remains no clear best practice for laryngeal fracture management, we review trends in clinical practice throughout the literature.

Outcomes Following Inhalational Airway Injury Using the National Trauma Databank

Neil N. Luu (Presenter); Kevin Chorath; Harman S. Parhar, MD; Alvaro G. Moreira, MD; Karthik Rajasekaran, MD

Introduction: This study uses the US National Trauma Data Bank (NTDB) to elucidate the outcomes and predictors of

mortality as well as the effects of procedural interventions on patients following traumatic inhalational airway injury.

Method: A retrospective observational study was performed. Patients over the age of 18 years admitted between 2008 and 2016 to NTDB-participating sites were included. Patient, disease, and hospital characteristics were noted. Procedures of interest included endotracheal intubation, laryngobronchoscopy, and tracheostomy. In-hospital mortality and length of stay were the primary outcomes. Multivariate regression analyses were performed using SAS.

Results: The final study cohort included 13,351 patients. History of active smoking was negatively associated with in-house mortality, with an odds ratio [OR] of 0.33 (0.25–0.44). History of alcohol use and presence of significant medical comorbidities were positively associated with in-house mortality, with ORs of 5.28 (4.32–6.46) and 2.74 (1.94–3.86) respectively. There was little to no association between procedural interventions and in-house mortality. Intubation, laryngobronchoscopy, and tracheostomy had ORs of 0.90 (0.67–1.20), 1.02 (0.79–1.30), and 0.94 (0.58–1.51), respectively. However, procedural intervention did affect both the median hospital and intensive care unit (ICU) lengths of stay of patients. Median hospital and ICU length of stay were shorter for patients receiving endotracheal intubation. Median hospital length of stay was longer for patients undergoing bronchoscopy and laryngoscopy, but median ICU length of stay was shorter for patients undergoing bronchoscopy and laryngoscopy. Patients receiving a tracheostomy have both significantly increased median hospital and ICU lengths of stay.

Conclusion: Active smoking was associated with decreased odds of in-hospital mortality, while the presence of preexisting medical comorbidities and history of alcohol use disorder were associated with increased odds of in-hospital mortality. Procedural intervention had little to no association with in-hospital mortality but did affect overall hospital and ICU length of stay.

Pediatric Bronchoscopy for Airway Foreign Bodies: Mortality and Morbidity

Mohamed Elrakhawy, MD (Presenter); Kristina Powers; Kelcy McIntyre; Michele M. Carr, MD, DDS, MEd, PhD

Introduction: Airway foreign bodies (AFB) in children are clinically challenging. Our goal was to examine morbidity and mortality associated with bronchoscopy for pediatric AFB.

Method: Multicenter retrospective review using the American College of Surgeons Pediatric National Surgical Quality Improvement Program database from 2014 to 2019 was performed. Patients were identified using Current Procedural Terminology code 31635. Demographics, comorbidities, perioperative events, length of stay (LOS), and complications were collected. Regression analysis was used to identify factors associated with adverse events.

Results: A total of 2302 patients were included, 1427 (62%) males and 875 (38%) females. The mean age was 3.9 years

(95% CI, 3.7–4.1 years). Of the patients, 2025 (88%) retained AFB as a postoperative diagnosis. Comorbidities included structural pulmonary abnormalities in 234 (10.5%), asthma in 149 (6.5%), impaired cognitive status in 134 (5.8%), and tracheostomy in 67 (2.9%). Mean LOS was 1.7 days (95% CI 1.5–1.9 days). Most common complications were pneumonia in 19 (0.8%) and reintubation in 10 (0.4%). Ten (0.4%) had prolonged LOS over 30 days. Nine (0.4%) children died within 30 days; 7 (78%) were ventilated prior to surgery, and 6 (67%) had cardiopulmonary resuscitation prior to surgery. Eighteen (0.8%) returned to OR for a related reason, and 15 (0.7%) were readmitted for a related reason. Linear regression showed an association between American Society of Anesthesiologists class ($\beta = .708, P < .001$), operative time ($\beta = .015, P = .013$), and reintubation ($\beta = 10.5, P < .001$) with LOS. Time in the operating room (OR) was associated with later return to the OR ($\beta = .008, P = .004$) through logistic regression.

Conclusion: Morbidity is low in this group of children undergoing bronchoscopy for AFB. Mortality is usually associated with preoperative lifesaving maneuvers.

Postintubation Subglottic Stenosis in Children: Grades and Treatment Strategies

Enrique G. Ortiz Hernandez, MD (Presenter); Andrea Mendoza Michel; Sergio Adrian Trujillo Ponce; Ana Paula Vazquez Navarro; Eloy Sanchez Hernandez

Introduction: Subglottic stenosis occurs as a result of a pathological fibroinflammatory repair process producing recurrent and excessive scarring in the larynx. The most common cause is postintubation. Balloon dilation and endoscopic cricoid split techniques may allow the avoidance of tracheostomy in patients with mild to moderate subglottic stenosis. However, patients with severe subglottic stenosis are often tracheostomy dependent. Open surgical techniques may be needed to treat severe disease, such as laryngotracheal reconstruction and cricotracheal resection.

Method: Retrospective review of patients with the diagnosis of postintubation subglottic stenosis treated in an academic tertiary care institution between 2017 and 2019 was performed. The variables sex, age, associated symptoms, comorbidities, history of intubation, degree of stenosis according to the Cotton-Myer classification, type of treatment used, and follow-up time were studied.

Results: Twelve patients were included in the study, and 7 (58.3%) were women with median age at diagnosis of 5.3 years, and in 3 of them were associated with comorbidity: an ependymoma case, another congenital hydrocephalus and Bartter's syndrome. The clinical presentation included respiratory difficulty 75%, dysphonia 66.6%, and stridor 41.6%. In total, 83.33% had a history of 1 endotracheal intubation and the rest of 2 to 5 intubations. Cotton-Myer grade I was found in 8% (1), grade II in 66.6% (8), and grade III in 25% (3). Patients with grade II underwent balloon dilation and local application of mitomycin C at diagnosis with weekly review; subsequently,

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a patient required tracheostomy management. Of the patients, 66.6% (2) with grade III underwent single-state laryngotracheal resection, and the other one required tracheostomy prior to surgical management with double-state laryngotracheal resection. There was a 1- to 18-month follow-up.

Conclusion: Postintubation subglottic stenosis is increasingly frequent, especially in university hospitals, and endoscopic management with dilatation in low-grade stages was successful. In severe stages (III and IV), laryngotracheal resection in single or double stage had a good result.

Practice Habits in Endotracheal Tube Selection and Posterior Glottic Stenosis

Steven Chau, MD (Presenter); Seth Dailey, MD; Stephen Schoeff, MD; Sunil Verma

Introduction: Posterior glottic stenosis (PGS) is a rare but challenging condition to treat, with etiologies such as radiation, sarcoidosis, trauma, and, most commonly, prolonged intubation. Prior studies have identified an endotracheal tube size of greater than 7.5, among other factors, as a risk factor for PGS. This study aims to determine practice habits and factors in selecting endotracheal tube (ETT) sizes, familiarity with PGS, and attitudes toward change across 2 academic medical centers.

Method: A survey (institutional review board exempt at both sites) was distributed to otolaryngology, emergency medicine, anesthesiology, and intensive care unit departments of 2 academic medical centers. In total, 187 responses were gathered.

Results: Most providers select a size 7.5 or smaller ETT for men (85.6%) and 7.0 or smaller for women (82.3%). Larger tubes are preferred for patients with anticipated bronchoscopies (88.7%) and is controversial for patients who are taller (45.5%). Preferences are not affected by weight, medical comorbidities, or duration of intubation. Providers are familiar with the concepts of subglottic and PGS, although they are less familiar with the link between PGS and ETT size. Providers are willing to adapt their practice habits should there be strong data to show a link between large ETT size and PGS.

Conclusion: In general, providers are using appropriate ETT sizes from the PGS risk perspective (<8.0), with tube size primarily determined by gender and expected bronchoscopies. There is room for improvement and enthusiasm for education about PGS.

Results in Microphonosurgery of Unilateral Benign Vocal Fold Lesions

Matias L. Alvarez, MD (Presenter); Phoebe H. Ramos; Andres Rosenbaum; Norma Leon; Pedro Badia; Carla A. Napolitano

Introduction: Unilateral benign vocal fold lesions (UBVFL) correspond to phonotraumatic lesions of the membranous middle-third of the vocal folds that include the following: vocal polyps, cysts, and fibrovascular masses, among others. Their management consists of voice therapy and vocal rest to

laryngeal microphonosurgery. Our objective was to analyze the outcomes and complications of patients diagnosed with UBVFL forwarded to laryngeal microphonosurgery in a Chilean tertiary voice center.

Method: This was a nonconcurrent prospective study of patients diagnosed with UBVFL in the UC Voice Unit between 2015 and 2019. We included all patients with the diagnosis of vocal cyst, vocal polyp, and fibrovascular mass forwarded to microphonosurgery and with a postoperative follow-up of at least 1 month. All patients underwent suspension microlaryngoscopy plus resection of the lesions via cold microflap with subsequent standardize postoperative voice therapy. Analysis of videoendoscopy and comparison of pre- and postoperative Voice Handicap Index-10 (VHI-10) and VRQOL Spanish validated surveys were performed.

Results: In total, 60 patients were included. All patients were studied through laryngeal videostroboscopy; 52.5% were men, with an average age of 42.7 years. The results showed 5.1% correspond to elite voice users, 32.2% to professional voice, and the rest to nonprofessional. In addition, 81.4% had vocal polyps, 15.2% had intracordal cysts, and the rest had fibrovascular masses. At 1 month after surgery, 98.3% of the patients had complete resolution of the primary lesion, and 3.4% had recurrence of the phonotraumatic lesion. Regarding quality of life, 98% of the patients had improvement according to VRQOL, with an average change of 38.3%. On the VHI-10, 92% showed improvement, with an average change of 20 points. Both VHI-10 and VRQOL pre- and postoperative differences were significantly different ($P = .000$). In terms of specific postoperative complications, 22% presented with dysgeusia, 6.8% lingual paresthesias, 1.7% vocal fold scar, and 3.3% postoperative vocal fold hemorrhage.

Conclusion: We present our outcomes of anatomic results, improvement in quality of life, and complications after UBVFL microphonosurgery.

Severe Transient Hyperglycemia After Intralesional Corticosteroid Injection for Subglottic Stenosis

Margaret Nurimba, MD (Presenter); Yael Bensoussan, MD, MSc; Karla O'Dell, MD

Introduction: Serial in-office awake steroid injections (SSIs) have gained popularity in laryngology for treatment of subglottic stenosis. They can be used as an adjunct to dilation under general anesthesia or as a primary treatment. Hyperglycemia has been observed in intra-articular corticosteroid injections, specifically in diabetic patients. However, the effect of in-office intralesional subglottic steroid injections on blood glucose levels has not been previously reported.

Method: A case report is presented of a 61-year-old woman with insulin-dependent type 2 diabetes mellitus who underwent an in-office intralesional SSI as part of our usual SSI protocol for subglottic stenosis. The patient glucometer readings pre- and postinjection, recorded per her usual routine, were obtained for review.

Results: The patient's glucometer reading recorded severe hyperglycemia with a peak plasma glucose of 590 mg/dL 5 hours after SSI and greater than 300 mg/dL for 24 h after the procedure. The patient had increased insulin requirements for 3 days postinjection with return to baseline plasma glucose levels on postprocedure day 4. No acute complications from her hyperglycemia were noted.

Conclusion: While intralesional corticosteroids are generally thought to have minimal systemic effects, further understanding of how these injections affect glucose control in diabetic patients is crucial for counseling and monitoring patients receiving these treatments in the future.

Thyroplasty in the 3D Printing Era: Unveiling a New View of the Paralyzed Paraglottis

Eliezer Kinberg, MD (Presenter); Diana Kirke, MD

Introduction: We aim to appreciate anatomic changes in the paraglottic space in the setting of vocal fold paralysis; recognize the ability of 3-dimensional (3D) modeling to unveil laryngeal height asymmetry and volume differences in the setting of vocal fold paralysis; and understand the role of 3D modeling in thyroplasty planning and intraoperative decision making. The framework for this research project was laid well before the COVID pandemic. Primary research activities were delayed as the health system's focus transitioned to innovations related to the care of COVID patients. As a result, we were unable to complete our research activities until after the prior submission deadline. The ability to appreciate volume and height differences in a paralyzed hemilarynx may yield significant benefit in thyroplasty outcomes.

Methods: The study was conducted from 2020 to 2021. A retrospective chart review was conducted to identify adult patients with a diagnosis of unilateral vocal fold paralysis on the basis of stroboscopic examination. We performed 3D modeling of the paraglottic space in the denervated and innervated side separately using the Brainlab modeling software. The resultant template was viewed to assess for height differences between the hemilarynges. A 2-tailed *t* test was used to compare the volumes between the 2 sides.

Results: Thirteen patients were identified. Eleven of 13 patients demonstrated a smaller paraglottic space on the paralyzed side, with a mean volume difference of 0.18 cm³ (*P* = .0002) as compared with the innervated side. Two of 13 patients with paralyzed vocal folds were found to have a height asymmetry at the level of the glottis. In both instances, the paralyzed vocal fold was found to be lower than the innervated side. There was no correlation between duration of dysphonia and volume difference between the hemilarynges.

Conclusion: The results of our study demonstrate that 3D modeling of the paraglottic space provides an enhanced understanding of the anatomy and can unveil a height mismatch at the level of the glottis. Significant volume differences were identified between innervated and denervated hemilarynges, which confirms currently suspected postdenervation change.

Timing of Initial Adjuvant Therapy for Recurrent Respiratory Papillomatosis

Taylor Freeman (Presenter); David Allen, MD; Rishabh Sethia, MD; Brad deSilva, MD; Laura Matrka, MD

Introduction: Respiratory papillomatosis (RRP) can be a debilitating disease that leads to significant morbidity in patients of all ages. Surgical debulking has been the standard of treatment, with adjuvants such as cidofovir and bevacizumab used in more severe clinical courses. However, limited literature exists on the indications and timing of adjuvant use in RRP. The primary objectives of this study are to (1) describe the time between initial presentation at an academic tertiary care facility and first use of adjuvant treatment and (2) describe the number of procedural interventions at our institution prior to initial use of adjuvant treatment. This study hypothesizes that practitioners are using adjuvants earlier in RRP disease course.

Method: A retrospective chart review was conducted for patients who had been diagnosed and treated for RRP at a single institution from 2008 to 2020. Inclusion criteria included the following: (1) patients older than 18 years of age with RRP, (2) patients who underwent a surgical or in-office debulking of papillomatosis, and (3) patients who underwent an intralesional injection of cidofovir and/or bevacizumab for the purposes of treating RRP. Specific focus was given to timing of first adjuvant use following presentation and number of procedural interventions prior to first adjuvant therapy. Details of adverse events related to adjuvant use were also collected.

Results: This cohort included 33 patients, with 85% of patients receiving at least 1 dose of cidofovir and 30% receiving at least 1 dose of bevacizumab. The average number of days from presentation at our institution until first dose of adjuvant therapy was 404.7 days. There was an average of 1.87 operating room interventions and 0.63 office interventions from first presentation to first use of adjuvant therapy.

Conclusion: Our study demonstrates a trend toward earlier use of adjuvants in RRP disease course compared with existing literature and survey-based results. The results also support that earlier use of adjuvant therapy is not associated with increased adverse effects.

Use of Botox for Sialorrhea and Dysphagia in Neonates

Nadine H. Haykal, MD, MPH (Presenter); Jennifer L. McCoy, MA; Allison Tobey, MD

Introduction: Botox is frequently used for sialorrhea in patients with compromised airways and those with etiologies causing difficulty with secretion management (ie, strokes, neurologic disorders, etc). There are no published studies regarding the use of botulinum toxin (BoNT) in the neonate population. We aim to discuss our experience and safety of BoNT use in the neonate population in regard to alleviating secretion management and airway protection.

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Method: A retrospective review was performed of neonates admitted to the neonatal intensive care unit (NICU) <12 months of age who received BoNT injection to submandibular (SMG) and parotid (PG) glands for sialorrhea/dysphagia. BoNT was administered under ultrasound (u/s) guidance by interventional radiology.

Results: Six children were examined; 2 (33%) were male. The average NICU stay was 87.5 ± 33.1 days. Two underwent surgical airway intervention prior to injection. The mean age at initial BoNT was 1.5 ± 0.7 months. The average weight at injection was 4.0 ± 1.1 kg. Each PG and SMG was injected in 5 of 6 cases. Bilateral SMG were unidentified on u/s in 1 case and thus not injected. The dose range injected per gland was 5 to 15 Uu. All (100%) required feed tubes, and 50% with tubes distal to stomach (nasogastric tubes/nasoduodenal tubes). Some 83% were completely nil per os before injection, and there was no noted clinical improvement in oral skills post injection. All had noted desat/apneas prior to injection, and 83% had reported decreased events postinjection. Half (50%) had reported a decrease in O_2 requirements and frequent suctioning 2 weeks after injection; however, 2 (33%) required surgical airway intervention after injection (trach, supraglottoplasty/mandibular distraction osteogenesis). Four of 6 (67%) trialed medical therapy, anticholinergics being the most common. Half (50%) underwent a second injection (age = 6.5 ± 0.3 months) on average 4.7 ± 0.7 months after the first injection, and the same 3 patients underwent a third injection (age = 12.5 ± 2.4 months) on average 6.1 ± 2.5 months after the second injection. One patient had a total 6 injections. There were no injection-related complications.

Conclusion: BoNT injection is a safe, noninvasive alternative for management of sialorrhea in neonates. Further extensive study needs to be performed to identify the optimal dose per gland in this population.

Vocal Cord Paresis: A Case Report on a Novel Complication of the Moderna COVID-19 Vaccine

Brandon Perez, MD (Presenter); H. Steven Sims, MD; Christopher Mularczyk, MD

Introduction: We present a rare case of vocal fold paresis after administration of the Moderna COVID-19 vaccine. We recognize the significance and possibility of a vocal fold paresis effect from the Moderna COVID-19 vaccine, and examine possible reasons for the inflammatory adverse reaction to the COVID-19 vaccine. Given the recent introduction and authorization of mRNA COVID-19 vaccines, their safety and potential complications have not been entirely assessed. We introduce what we believe to be the first report of an adverse laryngological reaction to the Moderna COVID-19 vaccine. The patient reported acute-onset voice changes 3 days after administration. This case suggests potential complications from mRNA COVID-19 vaccines in order to inform the otolaryngological society and medical community at large of such unforeseen adverse complication. It is late breaking due to the timeline of vaccine administration creating the pool of candidates to study for vaccination responses.

Methods: Retrospective case presentation.

Results: A 28-year-old woman with no prior medical history presented in our outpatient department with a 2-month history of persistent complaint of sudden voice changes 3 days after receiving the second dose of the Moderna COVID-19 vaccine. The patient stated she noticed her voice becoming more fatigued, hoarser, and diminished in volume. She denied any recent viral illnesses and any additional symptoms. Results of videostroboscopic investigation revealed mild weakness of the left true vocal fold with decreased tensioning with phonation. Also noted was reduced mobility and decreased glottic closure that improved with higher pitches. Without any further confirmatory etiologies of this patient's presentation, we propose the likely source of this patient's vocal cord paresis is likely due to an inflammatory adverse reaction to the COVID-19 vaccine with a review of recent literature regarding neuro-pathic sequelae from the mRNA vaccines.

Conclusion: The case presented here adds an additional differential for a possible side effect of the Moderna COVID-19 vaccine. A complete and detailed history is imperative when patients present with hoarseness and voice changes after receiving certain vaccines as to target the etiology of the source.

Voice Disorders in the Workplace: A Scoping Review

Laura Allen, MD (Presenter); Amanda Hu

Introduction: Professional voice users are people who require their voice for their job, and they are at risk for developing voice disorders. Otolaryngologists need to advocate for workplace accommodations for patients with voice disorders. The objective of this study was to qualitatively assess the literature on voice disorders in the workplace.

Method: The Preferred Reporting Items For Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR) protocol was used to conduct a scoping review of the EBSCO, PubMed, Google Scholar, UBC libraries, and SpringerLink databases from inception to 2020. English-language studies were identified using a search strategy developed with the aid of a librarian. Oxford Levels of Evidence were used to determine the quality of the studies. A total of 2 reviewers screened all articles. Common themes and types of accommodations/barriers were explored.

Results: A total of 193 were screened; 32 studies met inclusion criteria. Quality of the studies ranged from levels 3 to 5 by Oxford Levels of Evidence. The 3 most common themes were prevalence among various professions, occupational risk factors for the development of voice disorders, and the importance of raising awareness medico-legally, politically, and among professional voice users. Accommodations and barriers were discussed.

Conclusion: There is emerging literature on voice disorders in the workplace. A multitude of voice disorders exist with varying pathologies, types of barriers/ accommodations, and effect on the workplace. Otolaryngologists are responsible for advocating for their patients. Thus, we play a unique role in

diagnosing voice disorders and defining workplace accommodations.

Otology/Neurotology

Acute Hearing Loss and SARS-CoV-2 Infection

Emma J. Djabali, MS (Presenter); Rex Haberman, MD

Introduction: There have been several international case reports/series and 1 single case report from the United States describing acute hearing loss in the context of recent SARS-CoV-2 infection. This study includes a review of the literature and the first case series of acute hearing loss associated with SARS-CoV-2 infection from the United States.

Method: A literature review was conducted to examine the possible mechanisms of SARS-CoV-2 infection causing acute hearing loss, the incidence and characteristics of acute hearing loss associated with laboratory-confirmed SARS-CoV-2 infection, and the attempted treatments described thus far. We also identified all patients who received the diagnosis of hearing loss with a positive SARS-CoV-2 test in 2020 at a single institution to further study this association.

Results: Possible underlying mechanisms include erythrocyte infection with subsequent cytokine release and hypoxia in the temporal lobe's hearing center, ischemia due to thrombosis formation in the brain's hearing centers, damage to outer hair cells in the cochlea, and viral meningitis with resultant cochlear inflammation. The exact frequency of hearing loss in patients suffering from a SARS-CoV-2 infection is unknown. The hearing loss has been reported as either unilateral or bilateral. Other described SARS-CoV-2 otologic symptoms include otalgia, vertigo, and tinnitus. A minority of reports of SARS-CoV-2-related hearing loss include attempted treatments of oral or intratympanic corticosteroids and cochlear implant insertion. The results of these treatments are mixed. Finally, the prevalence of hearing loss in the context of a SARS-CoV-2 infection at a single institution was examined.

Conclusion: Hearing loss is likely a clinical manifestation of SARS-CoV-2 infection. Further research is greatly needed as the hearing loss associated with SARS-CoV-2 infection has been reported as occasionally persistent despite resolution of the infection.

An Agglomeration of the Rarest of Temporal Bone Pathologies

Neha Singh, MBBS, MS (ENT) (Presenter); Ravisankar Manogaran

Introduction: This study includes a vast variety of temporal bone pathologies with rare incidence evaluated and treated at a tertiary care center in India. The aim is to give an insight into the unique presentations and individualized treatments that led to successful outcomes.

Method: This is a retrospective study that was conducted from October 2019 to January 2020, in which rare temporal

bone pathologies were encountered in a referral center in North India and were studied in terms of their varied clinical presentation, spread, specific treatment aimed at curative intent, and their specific histopathology. The study included patients who had been referred from various parts of India, were operated on at the said center, and were under regular follow-up. The treatment was designed specific to the disease and its spread.

Results: Presentation, the course of disease, treatment protocols, and the histopathological analysis were done for cases of not only paragangliomas and malignancies of temporal bone but also pathologies such as invasive fungal infection, aneurysmal bone cyst, hemangioma, nonsyndromic superficial angio-myxoma, facial nerve schwannoma, fibro-osseous lesion, petrous chondrosarcoma, giant cell lesion, middle ear adenoma, rhabdomyosarcoma, and intradiploic epidermoid cyst specific to the temporal bone.

Conclusion: This study highlights the unique clinical presentation of diseases that have rare occurrence in the temporal bone. Owing to complicated anatomy and various important structures, the treatment was designed specific to the individual patient. Although the aim was curative, some of the conditions required adjuvant treatment. Despite this drawback, a large number of diseases are highlighted.

Aging and Middle Ear Compliance: Meta-analysis of 226 Hz Tympanometry

Prithwjit Roychowdhury (Presenter); Melissa Castillo-Bustamante; Sara Holmes; Jeffrey T. Cheng, PhD; Elliott D. Kozin, MD; Aaron K. Remenschneider, MD, MPH

Introduction: Tympanometry is an objective test of middle-ear function that can be used to assess middle ear compliance. Prior cohort studies have collected tympanometric data in older adults to investigate the effects of aging on middle ear compliance, but conclusions from individual studies have been variable. Herein, we performed a systematic review and meta-analysis of 226 Hz tympanometry to summarize the effects of aging on middle ear compliance.

Method: We queried the Cochrane Database of Systematic Reviews, PubMed/Embase, Scopus, Web of Science, and Google Scholar to identify studies related to "Aging" OR "Elderly" AND "Acoustic Impedance Tests" OR "Tympanometry." Only studies with the necessary tympanometric data (peak compliance/acoustic admittance) in patients without a history of middle ear pathology were included. Two researchers reviewed and abstracted relevant study characteristics for comparison.

Results: A total of 16 studies and 17,502 total ears met inclusion criteria. Qualitative synthesis revealed decreased compliance with age in 8 studies (10,878 ears), increased compliance with age in 2 studies (4488 ears), and no difference in compliance with age in 6 studies (2136 ears). Quantitative analysis of studies with compliance data available for abstraction (8 studies, 6524 ears) derived the following mean \pm SD compliance values by age group: age 50 to 59 (0.68 ± 0.57 [$n = 2501$]), age

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60 to 69 (0.71 ± 0.61 [$n = 2255$]), and age 70 to 79 (0.73 ± 0.68 [$n = 1768$]). A *t* test revealed a significant increase in peak compliance ($+0.05$) between the ages of 50 to 59 and 70 to 79 ($P = .0115$).

Conclusion: Secondary analysis of compliance data from available studies of 226 Hz tympanometry in older adult patients reveal an increase in middle ear compliance with age.

Anatomic Correlation of Incus Short Process to Descending Facial Nerve

Ryan Hellums (Presenter); Joshua Senter, MD; Arun Gadre

Introduction: This cadaveric study evaluates the anatomic relationship between the upper border of incus and the mastoid segment of the facial nerve at the second genu. We examined whether there is a consistent association that can be used during ear surgery to safely identify and preserve the facial nerve.

Method: A total of 35 cadaveric temporal bones were dissected under the surgical microscope. A digital Vernier caliper was used to precisely measure anatomical relationships between the upper border of the incus and the second genu of the facial nerve to the second decimal place. The following measurements were obtained: (A) distance from incudo-malleolar joint to the tip of the short process of the incus, (B) tip of the incus short process to the posterior border of the descending facial nerve (in the same plane as the short process of the incus), (C) length of the incus short process, and (D) distance from the tip of the short process of the incus to the anterior border of the descending facial nerve (in the same plane as the short process of the incus). Variables were then compared to establish the following anatomic ratios: B to A, D to C, and D to A.

Results: A total of 35 bones with healthy mastoid cavities were studied. The ratios of B to A, D to C, and D to A were 1.05 (95% CI, 1.03–1.08), 1.25 (95% CI, 1.20–1.30), and 0.6 (95% CI, 0.57–0.62), respectively.

Conclusion: This study demonstrates a consistent correlation between the upper border of the short process of the incus and the descending facial nerve. This information can be used intraoperatively to safely identify and preserve the facial nerve at the second genu.

Applications of In Vitro Human Middle Ear Cells

Karen B. Teufert, MD (Presenter);
Sung K. Moon, MD, PhD

Introduction: There remains an urgent need for novel therapeutic agents to treat otitis media (OM) based on an understanding of its molecular pathogenesis. To elucidate the cell and molecular mechanisms involved in bacterial recognition and innate immune response, we have established a stable human middle ear cell line. Here we provide a review of studies using this in vitro system of human middle ear epithelial cells (HMEEC) and discuss future directions of OM studies using these cell lines.

Method: This study is a review of publications using cultured HMEEC (2000-present).

Results: Cultured HMEEC have been used in a number of studies: mucin gene expression; effects of retinoic acid, triiodothyronine, and hydrocortisone on mucin and lysozyme expression; activation of an Src-dependent Raf-MEK1/2-ERK signaling pathway; synergistic effect of interleukin 1α on nontypeable *Haemophilus influenzae*; induction of beta defensin 2 by NTHi; distal NF- κ B binding motif, which functions as an enhancer for nontypeable *Haemophilus influenzae*-induced DEFB4 regulation; and NOD2/RICK-dependent β -defensin 2 regulation, which is protective for nontypeable *H influenzae*-induced middle ear infection.

Conclusion: Our understanding of the molecular pathogenesis of OM has been significantly advanced, particularly in the areas of inflammation, innate immunity, mucus overproduction, mucosal hyperplasia, middle and inner ear interaction, genetics, and genome sequencing, by the development and application of a cultured human middle ear cell line. Some of these studies are still in the experimental stage, but they may enable us to identify new potential therapeutic targets. Future preclinical and clinical studies can provide further insight for translating these in vitro findings into novel therapeutic strategies.

Are Superior Semicircular Canal Dehiscence and High-Riding Jugular Bulb Associated?

Douglas Totten, MD (Presenter); Pooja Santapuram;
Nauman Manzoor; Elizabeth L. Perkins, MD; Nathan Cass;
David S. Haynes, MD, MMHC

Introduction: Previous studies have identified a possible association between the presence of posterior semicircular canal dehiscence (PSCD) and that of a high-riding jugular bulb (HRJB). As PSCD is a rare phenomenon that can present with symptoms similar to those of superior semicircular canal dehiscence (SSCD), this study was designed to explore whether any association may exist between SSCD and HRJB.

Method: After institutional review board approval, a retrospective cohort study was performed at a tertiary skull base center for the years 2008 to 2018. Imaging of patients with documented SSCD was evaluated to determine the presence or absence of HRJB and jugular bulb diverticulum (JBD). A control cohort, consisting of cochlear implant patients who had received imaging through the standard process of care, was identified and imaging was similarly reviewed. Single-predictor binary logistic regression evaluated possible associations between SSCD and HRJB/JBD through comparison of the 2 cohorts.

Results: A total of 197 patients from 2008 to 2018 were included in this study, of whom 105 had existing SSCD. Age was similar between the 2 cohorts: median (interquartile range [IQR]) SSCD: 48 years [38–59]; non-SSCD: 48 years [39–62]). A higher percentage of females was present in the SSCD group vs the non-SSCD cohort (59% to 51%). A total of 136 ears had radiographic evidence of SSCD, as 31 patients

had dehiscence. SSCD was not present in 258 ears. HRJB was present in 11 SSCD cases (8.1%) and 12 non-SSCD cases (4.7%). JBD was present 3 SSCD ears (2.2%) and 3 non-SSCD ears (1.2%). All JBD cases were in the presence of coexisting HRJB. There was no significant difference in the presence of HRJB or JBD between the 2 cohorts ($P = .17$; $P = .43$).

Conclusion: There does not appear to be an association between the presence of SSCD and the presence of HRJB or JBD.

Association of GERD With Increased Risk of Chronic OME

Cha Dong Yeo, MD (Presenter); Eun Jung Lee, MD, PhD

Introduction: This study aimed to evaluate the risk of developing chronic otitis media with effusion (OME) in individuals with gastroesophageal reflux disease (GERD).

Method: A retrospective, propensity score-matched cohort study was performed using data from the Korea National Health Insurance Service. The GERD group ($n = 3532$) included certain individuals who had been diagnosed with GERD between January 2002 and December 2005. A comparison control group ($n = 14,128$) was chosen using propensity score matching, according to sociodemographic factors and year of enrollment. Each patient was monitored until 2013. Survival analysis, the log-rank test, and Cox proportional hazard regression models were used to calculate the incidence, survival rate, and hazard ratio (HR) of chronic OME for each group.

Results: Among the 17,660 individuals included in the study population (53.2% male), the overall incidence of chronic OME during the 11-year follow-up was 1.84-fold higher in the GERD group than in the non-GERD group (1.8 vs 3.0 per 1000 person-years; adjusted hazard ratio [HR], 1.84; 95% CI, 1.46–2.31). Moreover, the adjusted HRs of developing chronic OME (allergic rhinitis, 1.69 [95% CI, 1.37–2.10], asthma, 1.29 [95% CI, 1.02–1.64], and chronic rhinosinusitis, 1.61 [95% CI, 1.26–2.05]) were greater in patients with comorbidities.

Conclusion: This study suggests that GERD is associated with an increased incidence of chronic OME in adults. Specifically, it found that patients with allergic rhinitis, asthma, or chronic rhinosinusitis showed a higher risk of developing chronic OME than those without these conditions.

Auditory Brainstem Implant Tilt in Neurofibromatosis Type 2 Patients

Alejandro Garcia, MD (Presenter); M. Christian Brown, PhD; Daniel J. Lee, MD; Barbara S. Herrmann, PhD

Introduction: Patients with adult-onset profound hearing loss due to cochlear nerve damage from neurofibromatosis type 2 (NF2) usually obtain more benefit from an auditory brainstem implant (ABI) than a cochlear implant. The ABI provides sound detection and speech pattern perception in most patients. Although auditory perception measures correlate with ABI array position seen on computed tomography, this type of imaging does not visualize the target of the ABI: the cochlear

nucleus. Thus, we are seeking other measures that reveal the array position with respect to the cochlear nucleus. Herein, we hypothesize that electrical threshold levels across the multi-channel ABI electrode array are associated with distance and tilt of the device relative to the underlying cochlear nucleus.

Method: This was a retrospective cohort study of adult NF2 ABI users. Electrical electrode thresholds from the most recent clinical programming session were extracted and converted to charge. The array was divided into proximal (2–8), middle (9–17), and distal (18–22) electrodes. Charge was categorized as low, medium, and high according to interquartile range. Array threshold tilt (Th) was measured based on the difference in charge threshold between inferior and superior edge electrodes. This was analyzed with respect to charge threshold and speech perception category.

Results: We analyzed thresholds and audiologic data from 20 ABI patients. The median ABI Th tilt across the entire array was 42.65° (95% CI, 30.74–58.24). Patients having ABIs with low- to medium-charge electrodes had smaller tilts in the distal section of the array ($P < .04$). Although not statistically significant, patients with better speech perception appear to have smaller distal tilts ($P = .08$).

Conclusion: The tilt threshold (Th) may indicate the position of ABI electrodes in relation to the cochlear nucleus. Patients with low charge and best speech performance trend toward having a small ABI distal tilt. This may be related to the torsion force of the array or surgical placement. Further studies are required with a larger cohort to replicate these results.

Auditory Changes in a Rodent Repeat Mild Traumatic Brain Injury Model

Hossein Mahboubi, MD (Presenter); Ronald Sahyouni; Khodayar Goshtasbi; Harrison Lin

Introduction: Mild traumatic brain injury (mTBI) is caused by direct physical trauma to the head and accounts for more than 2 million emergency room visits, hospitalizations, and deaths in the United States annually. Although mTBI causes a variety of well-known cognitive and physiological deficits, its effects on the auditory system remain poorly understood. We investigate changes in auditory brainstem (ABR) and middle latency responses (MLR) in a murine model of repeat mTBI.

Method: ABR and MLR changes were measured across 5 time points before (baseline) and after (day 1, week 1, week 3, and week 5) injury at 4 frequencies (8, 16, 24, and 32 kHz). Stimuli intensities ranged from 20 to 80 dB (increments of 10 dB) for ABR, and only an 80-dB intensity was presented for MLR, to 3 different wild-type C57/Bl6 mice groups (sham [$n = 7$], 5-Hit [$n = 8$], and 10-Hit [$n = 8$]). Direct cortical impacts were delivered to each isoflurane-anesthetized mouse with a TBI-0310 Impactor (speed: 5 m/s, depth: 1 mm, dwell time: 500 ms).

Results: Using a 3×5 repeated-measures mixed analysis of variance with Tukey honest significant difference post hoc pairwise comparisons, between-group significant differences at week 1 were found between 10-Hit and 5-Hit at all frequencies ($P < .01$) and between 5-Hit and sham at 8 kHz, 16 kHz, and 24 kHz ($P < .05$). In addition, within-group significant

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differences ($P < .001$) were found by comparing week 1 with baseline MLR at all frequencies for the 10-Hit group only. A similar behavior was observed in ABR wave-V amplitudes at 8 kHz. In addition, we saw a 60% decrease in ABR wave I amplitude ($SE = 0.15$) and a 0.28-ms shift ($SE = 0.11$) in ABR wave I latency at 32 kHz.

Conclusion: Our results suggest that mTBI may cause temporary MLR and ABR changes. Future studies are needed to understand the acute and chronic effects of repeat head injury on auditory processing.

Balloon Technology for Mitigation of Eustachian Tube Dysfunction

Macaulay Ojeaga (Presenter); Arianna V. Ramirez; Victor Espinoza; Blake Hensler, PA-C; Vincent Honrubia, MD

Introduction: Eustachian tube dysfunction (ETD) is a chronic disease that can significantly affect quality of life. Patients with ETD commonly present with complaints of ear fullness, ear pain, loss of smell, and dizziness. Balloon dilation is a novel intervention offered as a treatment for ETD. Our study aims to assess the outcomes of balloon sinuplasty and balloon dilation of the Eustachian tube in the treatment of ETD.

Method: This is a retrospective chart analysis on 176 patients who presented with symptoms indicating ETD from 2016 to 2019 and underwent balloon dilation of the Eustachian tube. Patient ages ranged from 18 to 89 years. The Sino-Nasal Outcome Test (SNOT-20) was used to assess patient-reported symptoms preoperatively and postoperatively in 1 month. The primary endpoint was a postoperative reduction in the SNOT-20 score for ear pain, ear fullness, and dizziness.

Results: A paired t test suggested a significant reduction in patient-reported dizziness ($t = 12.261$, $df = 175$; $P < .01$), ear pain ($t = 11.741$, $df = 175$; $P < .01$), and ear fullness ($t = 10.98$, $df = 175$; $P < .01$) for patients who underwent balloon sinuplasty and balloon dilation of the Eustachian tube. On average, patients experienced a 56.1% decrease in dizziness symptoms, a 53.9% decrease in ear pain symptoms, and a 41.8% decrease in ear fullness symptoms.

Conclusion: Balloon dilation of the Eustachian tube is a minimally invasive procedure for patients presenting with ETD. Improvement of patient-reported dizziness, ear pain, and ear fullness suggest balloon dilation as an effective treatment option. Further investigations, including longer postoperative follow-up, may provide new insight into the appropriate population and indications for surgical intervention in patients suffering from ETD.

Betahistine for Primary Tinnitus: A Randomized Clinical Trial

Gustavo Leao Castilho, MD (Presenter); Norimar Hernades Dias, PhD; Regina Helena Garcia Martins, PhD

Introduction: Evidence suggests that the histaminergic system modulates tinnitus. Betahistine dihydrochloride is a weak

histamine H1 receptor agonist and a potent histamine H3 receptor antagonist commonly used to treat primary tinnitus. Even with a biological plausibility and some positive results, the efficacy of betahistine for primary tinnitus is still inconclusive due to the absence of rigorous clinical trials. Therefore, the objective is to assess the use of betahistine to treat primary tinnitus following the SPIRIT and CONSORT statements. Is betahistine dihydrochloride more effective than a placebo to treat primary tinnitus?

Method: This is a randomized, double-blind, placebo-controlled, 2-arm, parallel-group, single-center trial conducted in a Brazilian tertiary referral center. Adults aged 18 to 70 years with subjective, idiopathic, nonpulsatile bothersome tinnitus of 6 months' duration or longer were recruited from November 2018 to March 2020. Patients were sorted into random-blinded allocation (1:1), either to 24-mg betahistine twice daily or matched placebo twice daily for 12 weeks (independent variable). The primary outcome was the assessment of tinnitus before and after intervention by Tinnitus Handicap Inventory (THI) score. Secondary outcomes included the Clinical Global Impression-Improvement (CGI-I) score and safety. Of 310 patients initially screened for eligibility, 62 were recruited.

Results: An intention-to-treat analysis was performed on 62 participants recruited at the end of the 12 weeks of intervention; 6 participants lost the final evaluation (last observation carried forward). The primary outcome, no improvement difference in the THI score, was found between treatment arms ($Z = -0.52$, $P = .6$). The secondary outcome, no impression of improvement difference in the CGI-I score, was found between treatment arms ($P = .15$), and the betahistine arm showed 35% of the side effects in comparison with 9% in the placebo arm ($P = .03$). The per-protocol analysis did not modify the results.

Conclusion: Betahistine was ineffective to treat primary tinnitus and with a higher incidence of side effects.

Cerebral Venous Sinus Thrombosis After Translabyrinthine Resection of Vestibular Schwannoma

Scott B. Shapiro, MD (Presenter); Ravi Samy, MD; Meghan Grojean, MD; Allie Mains, MD; Edward Doyle, MD; Norberto Andaluz, MD

Introduction: Recognize the risk of translabyrinthine vestibular schwannoma resection on cerebral venous sinus patency in the short and long term. Understand the clinical consequences of cerebral venous sinus thrombosis. Implement appropriate treatment of symptomatic cerebral venous sinus thrombosis. This is a study of a potentially dangerous complication (cerebral venous sinus thrombosis) of neurotologic surgery that we found occurs commonly and yet has been studied very little. Magnetic resonance images (MRIs) required for this study became available only recently, such that we could not make the original deadline.

Methods: MRI with gadolinium (cMRI) and clinical records were reviewed of patients who underwent translabyrinthine resection of vestibular schwannoma between 2015 and 2020. MRIs were classified as early postoperative (within 1 month of

surgery) or late postoperative. Decompression of the sigmoid sinus was performed in all cases. Any thrombus in the transverse-sigmoid-internal jugular venous system on the operative side was noted as were complications related to thrombosis.

Results: In total, 92 patients met the criteria; 46 had an early postoperative cMRI, 24 (52.2%) of whom had evidence of at least partial sigmoid/transverse sinus and/or internal jugular thrombosis, and 46 patients had a late postoperative cMRI; 4 (13.0%) showed thrombosis. Five patients with initial postoperative thrombosis also had a late postoperative cMRI, 3 of whom showed resolution of thrombus. Three patients had symptoms attributable to thrombosis, all of whom had propagation of thrombosis to the torcula and sagittal sinus and were treated with anticoagulation.

Conclusion: Thrombosis of the sigmoid-transverse-jugular venous system on the operative side is common after trans-labyrinthine resection and is likely asymptomatic unless the thrombosis propagates to the sagittal sinus. Early postoperative thrombosis is likely to resolve on long-term imaging. Our data show a higher incidence of asymptomatic thrombus compared with prior studies, possibly because of the type of radiologic study performed.

Challenges Faced During Cochlear Implantation in IP3

Neeraj Suri (Presenter)

Introduction: Our technique of electrode insertion in IP 3 cases and the complications encountered intraoperatively/postoperatively in these cases are discussed. The management of complications that were encountered during surgery or in the postoperative period is then described in detail.

Method: This is a retrospective study, conducted in 7 pediatric cochlear implant patients with IP3 malformation who were operated on at the Ear, Nose, and Throat Department of the Gujarat Medical Education & Research Society Medical College and Civil Hospital in Gandhinagar, Gujarat, India, from January 2016 to January 2020. Two cases in our series had issues with electrode insertion, and we used a modified technique for electrode insertion. In 1 case, the electrode migrated into the external auditory canal 6 months after an uneventful implantation. In the other case, an intraoperative Stenvers view revealed the insertion into the internal auditory canal (IAC). In both the cases, the electrode array was bent laterally to provide proper trajectory for insertion and was then successfully inserted into the cochlea without advancing into the IAC.

Results: With the modified technique, it is easier to insert electrodes into the cochlea. Cerebrospinal fluid and facial nerve abnormalities were managed.

Conclusion: IP3 malformation does pose a challenge, but with expertise, it is easily managed with fairly good outcomes.

Characterization of P2RX2 p.V60L Mutant Otic Epithelial Progenitor Cells

Aida Nourbakhsh, MD, PhD (Presenter);
Nicholas Gosstola; Derek Dykxhoorn; Xue Zhong Liu

Introduction: Progressive sensorineural hearing loss (PSHL) is the most common cause of sensory impairment. Our laboratory has identified the P2RX2 gene implicated in autosomal dominant deafness-41 (DFNA41). This gene encodes for purinergic ionotropic P2X2 receptors, and phenotypes caused by the mutant variants may be difficult to recapitulate or model in mice. Thus, the generation of inner ear organoids from patient induced pluripotent stem cells (iPSCs) provides a model that allows the investigation of the human gene and the role the missense variants play in HL. For this study, the WT, P2RX2+/p.V60L mutant iPSCs were differentiated into otic epithelial progenitors (OEPs). We demonstrate that the p.V60L mutation results in decreased expression of the receptor and alters the cellular localization of the protein.

Method: Following the differentiation protocol of iPSCs to OEPs, characteristics of the cells were determined by immunocytochemistry (ICC) using otic progenitor markers. The transcript and protein levels for P2X2 receptors were determined by quantitative reverse transcriptase-polymerase chain reaction and Western blot, respectively. ICC was used to demonstrate the subcellular location of P2X2 receptors. Adenosine triphosphate (ATP)-stimulated permeability of the receptor channel was tested with FM1-43 staining in the presence and absence of a nonselective P2 receptor antagonist, suramin.

Results: The identity of cells was confirmed by immunostaining using PAX2, PAX8, SOX2, and DLX3 antibodies for OEPs on day 12 of differentiation. Immunostaining with P2RX2 antibody demonstrated an altered subcellular location of the mutant channel and significant reduction in protein expression levels. The ATP activation of P2X2 receptor channels was demonstrated by FM1-43 permeability.

Conclusion: Our results demonstrate successful differentiation of human iPSCs to OEPs with a series of characterization studies. We provide an in vitro model of human disease to perform functional analysis of the mutated channel receptors. In a future study, we will generate inner ear organoids to perform more in-depth studies to understand the role of P2RX2 in hair cell survival and electrophysiological activity.

Chronic Tympanic Membrane Perforation: Histopathological Evidence of Animal Evidence

Zhanna Mokoyan, MD (Presenter); Anna Zolotova;
Valery Svistushkin, PhD, MD; Mikhail Svistushkin

Introduction: This study demonstrates the histopathological evidence of chronic tympanic membrane perforation in an animal model.

Method: We compared 3 models of chronic tympanic membrane perforation. The experimental study included 18 male chinchillas, divided into 3 equal groups. In groups 1, 2, and 3, perforations were performed bilaterally in the anteroinferior part of the tympanic membrane using laser myringotomy, infolding technique, and myringotomy alone and with ventilation tube insertion, respectively.

Results: Eight weeks after the beginning of the follow-up, the longest perforation patency was detected in group 3,

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whereas the shortest was in group 2 (8 vs 2 weeks, respectively). Table 1 demonstrates the results of this series of experiments. Although the mean perforation patency in group 2 was significantly higher than in group 1 (5 vs 2.4 weeks, $P < .01$), both failed in the creation of chronic perforation according to time parameters. Group 3 demonstrated the longest mean perforation patency among investigated models (8 weeks). A histological examination of perforations, which were considered chronic, revealed that stratified squamous epithelium continued from the lateral surface around the perforation edge to join with the medial mucosal layer of the tympanic membrane.

Conclusion: Our findings demonstrated that the combination of infolding technique and ventilation tube insertion seems to be a potential candidate for an effective animal model of tympanic membrane perforation. Further large-scale studies are required to verify our promising results.

Cochlear Implantation in Charcot-Marie-Tooth Patients

Doron Sagiv (Presenter); Oliver Chin; David Sheaffer; Hilary Brodie

Introduction: Charcot-Marie-Tooth (CMT) is the most common inherited neuropathy with a prevalence of 1:2500. The mechanism of hearing loss in CMT is related to neural dys-synchrony resulting in auditory neuropathy (AN). To the best of our knowledge, only 3 prior cases of cochlear implantation (CI) in patients with sensorineural hearing loss (SNHL) attributed to CMT have been reported in the English literature. Our goal is to evaluate the audiological outcomes and quality of life (QOL) after CI in CMT patients suffering from SNHL.

Method: Our cohort includes 5 CMT patients, 4 of whom are in a single family. Two patients underwent CI in our university-affiliated, tertiary medical center in 2019 to 2020. The other 3 patients had undergone CI in different medical centers. Patients' charts were reviewed for demographic characteristics and pre- and postimplantation audiology evaluation (including pure tone audiometry and speech perception performance according to the tests performed in the medical center that performed the CI). All cohort patients completed the Cochlear Implant Quality of Life-10 (CIQOL-10) Global questionnaire of the University of South Carolina. The study was approved by the Institutional Review Boards of the UC Davis Health Medical Center.

Results: Our study includes 5 patients who underwent CI at the mean age of 61.3 ± 17.9 years (range, 50–82 years). Preimplantation, the mean pure-tone average (500 Hz, 1000 Hz, and 2000 Hz) was 77 ± 7 dB and 88 ± 13 dB (right and left ear, respectively), and the mean word discrimination score was 0% in the implanted ear and better hearing ear $6\% \pm 8\%$. An AzBio sentence test was performed in quiet, revealing a mean of $4\% \pm 1.4\%$ in the implanted ear. The mean result of the CIQOL-10 questionnaire was 31 ± 11 .

Conclusion: To the best of our knowledge, this is the largest series describing the results of CI in CMT patients suffering from AN. Our cohort suggest that CI is a safe and reliable

method for hearing rehabilitation that can achieve good speech performance and improve the QOL in CMT patients.

Cochlear Implantation in Children With Mondini Dysplasia: Our Experience

Neeraj Suri (Presenter)

Introduction: This study details the intraoperative complication and a comparison of auditory scales postimplantation in profoundly deaf young children with radiologically normal inner ears (group A) and Mondini dysplasia (group B).

Method: This is a retrospective survey of 338 patients with severe to profound sensorineural hearing loss who underwent cochlear implant surgery from February 2015 to May 2017. Patients were divided into 2 groups of 27 patients each. Both groups were followed up to 3 years postimplantation.

Results: Cerebrospinal fluid (CSF) ooze developed in 12 patients, and in 2 patients gusher was encountered, out of which 1 had to be explored within 24 hours. After implant use for 1 year, both groups had similar speech perception scores.

Conclusion: The CSF gusher in Mondini dysplasia should be anticipated and adequately managed intraoperatively. This study highlights the tailoring of a postimplant rehabilitation program according to the individual's needs.

Cochlear Implantation in Poorer Hearing Ear Is a Reasonable Choice

Ryotaro Omichi, MD, PhD (Presenter); Yukihide Maeda; Kunihiro Fukushima; Shin Kariya; Akiko Sugaya; Mizuo Ando

Introduction: Choosing the most effective side for cochlear implant surgery is frequently a difficult problem.

Method: This study compared outcomes following the first unilateral cochlear implant (CI) surgery of better or poorer hearing ears in cases involving hearing asymmetries. To accomplish this, we reviewed the audiological records of 74 adult patients with asymmetric hearing loss whose CI surgery was performed in the Okayama University Hospital from January 2009 to December 2019. The identification of better and poorer ears was determined by the average of pure-tone audiometry. After implantation, multiple regression analysis testing was performed to assess the relative contribution of potential predictors to speech recognition performance levels.

Results: Of those surveyed, 52 patients had received CI surgery in their poorer ear. The period over which the patient's hearing aids were deemed ineffective varied between 0 and 55 years. The usage rate for hearing aids on the other side was higher in the CI group that had received implantation in their poorer ear (77% vs 26%). Examining the results of univariate analysis, we found that speech recognition scores on the CI surgery side showed no significant differences between better and poorer ears ($P = .309$). Next, by constructing a multiple regression model, we found that patient age at the time of CI surgery and the presence of prelingual hearing loss exerted significant effects on speech recognition outcomes ($P = .014$).

and $P = .001$, respectively), whereas the choice of CI surgery side did not significantly affect postsurgical speech recognition levels ($P = .201$).

Conclusion: Unilateral CI in the poorer ears of hearing-impaired persons could be a reasonable choice for adult patients with severe postlingual hearing loss.

Comparison of Outcomes in Unilateral and Bilateral Pediatric Implants

Rajesh Vepuri (Presenter); Neeraj Suri

Introduction: Cochlear implantation has proven to be a very successful way to restore auditory communication in severe to profound hearing loss, especially for patients who have well-developed central auditory pathways. Cochlear implantation is being done for prelingual hearing loss, postlingual hearing loss, and also as a treatment option if hearing aids do not provide sufficient benefit.

Method: This retrospective study was carried out with 83 children aged between 12 months and 2.5 years; this number included 41 children with bilateral cochlear implants and 42 with unilateral implants. Of these 41 children, 21 received simultaneous and 20 received sequential cochlear implant. All children were operated on at the Gujarat Medical Education & Research Society Medical College and Civil Hospital in Gandhinagar, Gujarat, India. Categories of Auditory Performance (CAP), Speech Intelligibility Rating (SIR), localization, traffic noise, and speech in noise scores were assessed at regular intervals over the period of 4 years. Also, the drug administration time, surgical time, and operating room time were assessed for simultaneous and sequential cochlear implant surgery.

Results: Children with bilateral simultaneous implants fared significantly better with CAP, SIR, localization, speech noise, and traffic noise scores than sequential bilateral implants and unilateral implants, with a significant difference of means t tests between the 2 groups. Simultaneous cochlear implant surgery is associated with reduced surgical time and operating room time; it shortens the total patient stay. There is less drug administration and bilateral implants are stimulated simultaneously.

Conclusion: Bilateral cochlear implants perform better with respect to auditory perception skills and spontaneous speech when compared with unilateral implants, but simultaneous surgery is a better and safer option for pediatric cochlear implantation.

Conservative Management of Temporal Bone Fractures With Facial Nerve Weakness

Emily Ray (Presenter); Tyler Merrill, MD;
James R. Gardner, MD; Deanne King, MD, PhD;
David Walker, MD; John Dornhoffer, MD

Introduction: A feared complication of temporal bone fracture is partial or complete paralysis of the facial nerve. The aim of this study was to analyze the outcomes of surgical vs nonsurgical management of facial nerve injury following temporal bone fracture.

Method: A retrospective analysis was performed on 16 patients with facial nerve paralysis (ICD G51.0–G51.9, 351.0–351.9)

following temporal bone fracture from 2014 to 2019, of whom 7 had bilateral fractures. A total of 23 temporal bone fractures were analyzed. Facial nerve function, presence/onset of weakness, and degree of recovery were assessed using the House-Brackmann grading scale. The medical records were reviewed to include age, gender, mechanism of trauma, and performance of nerve studies. Temporal bone fractures were characterized by their laterality, otic capsule involvement, presence of ossicular chain disruption, and violation of facial canal.

Results: A total of 23 sides were evaluated for facial nerve weakness. The mean follow-up period was 229 days. Two patients underwent surgical exploration for facial nerve weakness. Significant improvement in facial nerve function occurred from the initial ear, nose, and throat (ENT) evaluation to the most recent evaluation by ENT ($P = .001$). Significant worsening in function was noted from the initial evaluation to the initial outpatient evaluation ($P = .012$); however, these patients significantly improved from their initial outpatient evaluation to their final evaluation ($P < .001$). Patients undergoing surgery saw no increase in facial nerve function ($P = .5$) in the follow-up period, while those who did not undergo surgery did experience a significant increase in facial nerve function ($P = .001$). Involvement of the otic capsule by the fracture and ossicular chain disruption had no association with facial nerve function.

Conclusion: Patients who suffer temporal bone fractures with facial nerve weakness can expect recovery of facial nerve function with conservative, nonoperative management. Nerve function typically worsens in the acute period.

Corrective Saccades of Video Head Impulse Test in Cerebellar Infarction

Gi-Sung Nam, MD, PhD (Presenter);
Hyun-June Shin; Sun-Young Oh

Introduction: We quantitatively analyzed the vestibulo-ocular reflex (VOR) gain and properties of corrective saccades in patients with posterior inferior cerebellar artery stroke and vestibular neuritis (VN) and in normal subjects in all 3 semicircular canals using video head impulse test (vHIT).

Method: In total, 17 patients with cerebellar stroke confirmed by MRI, 15 patients with VN, and 17 normal subjects between March 2017 and August 2018 were included. VOR gain and the properties of corrective saccades (CSs), including incidence, amplitude, and latency, were extracted.

Results: The VOR gain of patients with cerebellar stroke was reduced bilaterally in the horizontal canal (HC; mean gain, 0.87 and 0.84 at the ipsi- and contralateral sides; $P < .001$ and $P < .001$, independent t test) and the posterior canal (PC; mean gain, 0.89 and 0.87; $P < .001$ and $P < .001$, Mann-Whitney U test), whereas gain for the anterior canal (AC; mean gain, 1.00 and 0.98; $P = .10$ and $P = .27$, Mann-Whitney U test) was preserved compared with healthy subjects. Compared with the patients with VN, the CSs for the contralateral side of the patients with cerebellar stroke were observed more frequently during the HC (71% vs 23%) and PC (64% vs 50%) tests but not during the AC (22% vs 24%)

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test. The bilateral CSs of cerebellar stroke were found in 82.3% of HC, 94.12% of PC, and 53% of AC. The CS gains of patients with cerebellar stroke were reduced in the ipsilesional HC ($P < .001$) and AC ($P = .005$), but the CS gain of contralateral HC ($P = .03$) was increased compared with patients with VN. There were no statistical differences in CS latency among groups.

Conclusion: The distinctive features of cerebellar stroke in our data are bilateral, mild gain reduction with the presence of contralesional CS in HC and PC and increased contralesional CS gain in HC. In addition to the gain of VOR, quantitative assessments of CSs during the vHIT can provide further objective parameters to distinguish between the peripheral vs central vestibulopathies, such as cerebellar stroke.

Correlation Between Enhanced MRI and Audio-Vestibular Tests in Ménière's Disease

Henrique F. Pauna, MD, PhD (Presenter);
Alexandre Gasperin; Luiz Otavio Coelho

Introduction: Ménière's disease (MD) is a disorder of the inner ear, usually attributed to endolymphatic hydrops (EH). Different electrophysiological tests and imaging techniques have been developed to improve the diagnosis of EH.

Method: Patients fulfilling the criteria for the diagnosis of MD (definitive or possible) were retrospectively included from January 2016 to December 2019 at the Hospital IPO. EH was graded on magnetic resonance imaging (MRI) using the inversion of the saccule to utricle ratio, which is defined as when the saccule looked equal to or greater than the utricle and Reissner's membrane distension. The correlation of the inner ear MRI scan after intravenous gadolinium injection with extratympanic click electrocochleography, distortion product otoacoustic emissions, cervical vestibular evoked myogenic potentials, and audiometry for the diagnosis of MD was performed.

Results: In total, 29 patients were evaluated (16 females and 13 males, totaling 58 ears). The contralateral normal ear served as our own control group. The most common symptom was tinnitus (86.2%), followed by dizziness (79.3%), hearing loss (75.9%), and aural fullness (65.5%). We observed vestibular EH in 82.8% and cochlear EH in 24.1% of the affected ears (grades 2 or 3). There was a correlation between the complaint of fullness and EH ($P = .03$; Fisher exact test).

Conclusion: MD is a disorder of the inner ear of multifactorial origin, which is detected through histological studies of temporal bones after autopsy or suggested after complementary exams. By allowing the visualization of the boundary between the endolymphatic and perilymphatic spaces, MRI images after gadolinium contrast injection facilitated the detection of hydrops in living patients.

Cortical Mechanisms of Binaural Integration Investigated Using Functional Near-Infrared Spectroscopy

Gabe Sobczak (Presenter); Xin Zhou, PhD; Liberty Moore;
Ruth Litovsky, PhD

Introduction: To date, the binaural hearing deficits of single-sided deaf cochlear implant (SSD-CI) and bilateral CI (BiCI) listeners have not been studied on a neural level. We aim to assess neural mechanisms of binaural integration by measuring cortical activity using functional near-infrared spectroscopy (fNIRS).

Method: This is a nonclinical, quantitative study conducted over 10 months in 20 normal-hearing (NH) subjects at the Waisman Center. Using speech segments alternating between ears to examine binaural integration and fNIRS, this study assessed activity in the left auditory cortex (LAC) and left inferior frontal gyrus (LIFG). We simulated SSD-CI (right ear vocoded) and BiCI (both ears vocoded) conditions; nondegraded speech was presented in a third speech condition (NH). Speech was presented at a 2-, 4-, 8-, and 32-Hz switching rate. fNIRS data were analyzed at a group level across all 12 listening conditions, and speech intelligibility scores were obtained for all subjects.

Results: We found significant main effects of switching rate and speech condition on speech intelligibility scores and a significant interaction between switching rate and speech condition ($P < .001$ for all). Minimum LAC activity occurred at 4 Hz in the SSD-CI and BiCI condition, corresponding with minimum intelligibility in the BiCI condition only. Peak LIFG activity occurred at 4 Hz in the SSD-CI condition and at 32 Hz in the BiCI condition. For the NH condition, LAC activity was highest at 4 Hz, and LIFG activity monotonically decreased from 2 to 32 Hz.

Conclusion: The LAC and LIFG exhibit differing activation patterns in response to speech switching across the 4 rates, suggesting different degrees of intelligibility (LAC) and varying listening effort expenditure to understand speech (LIFG). Degraded speech conditions altered patterns of LAC and LIFG activity across switching rates compared with the NH speech condition, notably in the SSD-CI condition at 4 Hz switching rate. These findings suggest that degraded speech inputs in 1 or 2 ears affects cortical integration of binaural speech stimuli without necessarily impacting behavioral data.

COVID-19 and Tinnitus

Pramod Chirakkal, MD, MS (Presenter); Amira Al Hail

Introduction: COVID-19, an infectious respiratory disease caused by SARS-CoV-2, brings with it a plethora of health concerns. But the damaging impact of COVID-19 on the hearing organs in the inner ear is a new finding yet to be explored. Hearing loss and tinnitus is a common pathology seen in otolaryngology, and there are numerous papers in the literature describing its associations with other infections. However, this is the first reported case of hearing loss and tinnitus in a COVID-19 patient in the state of Qatar, and this case report strives to contribute to the ocean of literature highlighting the need for otorhinolaryngologists to be aware of its correlation with COVID-19 virus.

Method: A 35-year-old female patient presented to the ear, nose, and throat clinic with a ringing sensation and reduced

hearing sensitivity in the left ear. The patient had a history of COVID-19, and treatment was done conservatively at home as she had no features of pneumonia. She had experienced hearing loss and tinnitus during COVID-19, and these symptoms persisted even after recovery from COVID-19. Hence, a detailed audiological evaluation was mandatory.

Results: The low-frequency pure-tone thresholds as well as the transient evoked otoacoustic emissions (TEOAE) and distortion product otoacoustic emissions (DPOAE) low-frequency amplitudes were absent. The results of the current study showed that COVID-19 infection had deleterious effects on the outer hair cells in the cochlea. Moreover the absence of the major symptoms does not guarantee a safe healthy cochlear function. The damage to the outer hair cells was evidenced by the reduced amplitude of the TEOAEs and DPOAEs.

Conclusion: This case report highlights the importance of detailed audiological diagnostics in COVID-19 patients who experience isolated tinnitus and hearing loss. As with all pandemics, COVID-19 should be kept under close monitoring, and the otolaryngologist must keep in mind that COVID-19 can manifest itself with different findings. A detailed history, clinical examination, and audiological assessment are mandatory in the evaluation of patients with tinnitus and hearing loss.

Current Variations and Practice Patterns in Tympanic Membrane Perforation Repair

Robert A. Saadi, MD (Presenter); Cody Sacks; Sarah Benyo; Vijay Patel, MD; Huseyin Isildak, MD

Introduction: Management of tympanic membrane perforations is quite varied, and many techniques will appear versatile and feasible for a given patient. There are no data in the literature discussing the current trends and variations in operative techniques used in myringoplasty and tympanoplasty. Our goal is to gain a better understanding of current practice patterns and how practice setting and subspecialty training may affect surgical decision making.

Method: An electronic questionnaire was distributed to American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) members. Respondents were separated into groups by fellowship training (general otolaryngology, pediatric otolaryngology, otology/neurotology), length of practice, and practice setting. Chi-square tests were performed for determination of significance.

Results: The survey was successfully received by 3148 members of AAO-HNS. The response rate was 10.2% (n = 321). Most respondents were generalists (60.4%), in private practice (60.8%), with a primarily adult (50%) practice (59.8%). Fellowship training was the factor most commonly associated with significant variations in management, including preoperative antibiotic usage ($P = .019$), contraindications ($P < .001$), approach to traumatic perforations ($P < .002$), use of local vs general anesthesia ($P < .001$), type of graft material ($P < .001$), tympanoplasty technique ($P = .003$), use of endoscopes ($P < .001$), and timing of postoperative audiology evaluation ($P = .011$). Comparison of academic with private practice settings demonstrated significant differences in

preoperative contraindications ($P = .007$) as well as graft material ($P = .002$), tympanoplasty technique ($P = .001$), and endoscope use ($P < .001$). No significant differences were found with respect to length of practice.

Conclusion: Subspecialty training appears to be the main variable associated with significant differences in preoperative, operative, and postoperative decision making for surgical repair of tympanic membrane perforations.

Delays in Diagnosis and Management of Superior Semicircular Canal Dehiscence

Sarah Benyo (Presenter); Robert A. Saadi, MD; Huseyin Isildak, MD

Introduction: Superior semicircular canal dehiscence (SSCD) is often misdiagnosed due to similar presenting features to other otologic diseases. Given the diagnostic challenges of SSCD, the objective of our study is to evaluate diagnostic delays among patients with SSCD.

Method: Adults (>18 years old) with a final diagnosis of SSCD between December 2014 and August 2020 were included. Data were collected regarding patient demographics, presenting symptoms, time between symptom onset, presentation, correct diagnosis, and treatment.

Results: We identified 23 patients who were ultimately diagnosed with SSCD. Most were female (78%) with an average age of 43 years. The average time between symptom onset and presentation was 3.3 years. The most common symptoms were hearing loss (57%), autophony (52%), aural fullness (43%), and tinnitus (35%). On average, time from presentation to correct diagnosis of SSCD (confirmed with computed tomography and vestibular evoked myogenic potential testing) was 3.25 years. Patients saw an average of 3 providers for their symptoms, including multiple subspecialists. Prior to diagnosing SSCD, 12 patients (54%) were misdiagnosed with and underwent treatment for conditions including eustachian tube dysfunction (n = 4), benign paroxysmal positional vertigo (n = 2), Ménière's disease (n = 2), and otosclerosis (n = 1). The average time between SSCD diagnosis and treatment was 10 months, including transmastoid repair in 9 patients. Eleven patients (50%) were lost to follow-up after receiving their diagnosis.

Conclusion: There are evident delays in diagnosis, which may be attributed to delays in presentation and appropriate diagnostic workup. The present study suggests the need for improved awareness of SSCD among primary care providers and subspecialists. Close follow-up and thorough patient education may be necessary to build trust and prevent loss of follow-up, which was high in the present study.

Detection of Herpesvirus in Saliva and Tears in Bell's Palsy

Thais C. Pontes-Madruga (Presenter); Talita Rocchetti; Ana Tereza Zica; Dayanne Amorim; Leonardo Silva; Jose Ricardo Testa

Introduction: Bell's palsy continues to be considered an idiopathic condition, and this term possibly involves several

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factors or diseases manifesting peripheral facial palsy. This study aimed to detect the presence of herpes simplex virus type 1 (HSV-1), varicella zoster virus (VZV), and human herpesvirus type 6 (HHV-6) in the saliva and tears of patients with Bell's palsy, compare them with healthy controls, and correlate with the clinical and epidemiological parameters.

Method: This prospective study was conducted from June 2018 to October 2020 in a referral tertiary hospital. The sample was divided into 2 groups: cases ($n = 118$), patients with Bell's palsy with onset of 0 to 7 days, without the use of antiviral drugs, and controls ($n = 49$), individuals without facial palsy or active herpetic infection. Saliva and tears were collected from all participants and submitted to quantitative polymerase chain reaction (qPCR) for detection of HSV-1, VZV, and HHV-6. Viral incidence between the 2 groups were compared based on χ^2 test or Fisher exact test.

Results: HSV-1 was detected in 10 of 118 (8.5%) cases and 3 of 49 (6.1%) controls ($P = .76$), VZV was detected in 7 of 118 (5.9%) cases but no controls ($P = .08$), and HHV-6 was detected in 64 of 118 (54.2%) cases and 26 of 49 (53.1%) controls ($P = .89$). The Spearman correlation was significant between HHV-6 and age ($\rho = -0.17$; $P < .05$), and a relevant association was observed between HSV-1 and both tinnitus ($P = .029$) and higher facial palsy degree at first evaluation ($P = .017$).

Conclusion: The detection rates of HSV-1, VZV, and HHV-6 in the saliva and tears of patients with Bell's palsy did not significantly differ from those of healthy controls. Detection of HHV-6 correlated with younger age, whereas detection of HSV-1 was associated with higher facial palsy degree at first evaluation and tinnitus.

Developing Best Practices for Aural Rehabilitation in Chronic Otitis Media

Douglas D. Backous, MD (Presenter); Myrthe Hol; Byung Yoon Choi; Jaydip Ray; Rafael Jaramillo; Thomas Lenarz

Introduction: An international advisory board has been established to support an initiative to develop a clinical best practice pathway to treat hearing loss after surgical treatment of chronic otitis media and cholesteatoma. Developing clinical best practices begins with an exhaustive literature review and selection of outcomes measures to direct future research efforts.

Method: A comprehensive MEDLINE literature was conducted using keywords including *chronic otitis media*, *cholesteatoma*, *hearing loss*, *ossiculoplasty*, *osseointegration*, *aural rehabilitation*, *hearing restoration*, and *outcomes*. Data were accumulated to understand how hearing outcomes are reported after surgery for chronic otitis media with effusion and cholesteatoma and compared with the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS)–standardized guideline for reporting postoperative hearing. After a review of available hearing outcomes instruments, consensus voting among the advisory board selected the middle ear risk index, the Chronic Otitis Media Outcome Test 15, and an adapted version of the Client Service Receipt Inventory as currently

available instruments deemed most suitable for assessing hearing outcomes patients with chronic otitis media and cholesteatoma.

Results: No standardized pathway was identified for planning hearing restoration after surgery for chronic otitis media. The AAO-HNS hearing outcome standard was underutilized, and few studies measured patient outcomes or cost-effectiveness with standardized tools. We propose a middle ear index for assessing patients preoperatively. The Chronic Otitis Media Outcome Test 15 evaluates health-related quality of life before and after surgery, and the Client Service Receipt Inventory measures health care utilization and the impact of care on patients' economic status.

Conclusion: We present a current state of the literature and propose an evidence-based approach, including patient outcome and cost utility measures to establish a baseline for future development of evidenced-based clinical best practice care regarding hearing rehabilitation of patients with chronic otitis media and cholesteatoma.

Do Types of Temporal Bone Fracture Dictate Facial Nerve Outcomes?

Mackenzie J. Noonan (Presenter); Gauri Mankekar, MD, PhD

Introduction: Facial nerve injury is one of the complications of temporal bone fractures (TBFs). The aim of this study was to determine if patients with otic capsule involving (OCI)–TBF had poorer facial nerve outcomes compared with patients with otic capsule sparing (OCS)–TBF.

Method: We retrospectively reviewed electronic health records of 335 TBF patients presenting to our level I trauma care center over 10 years. Demographics, loss of consciousness, facial nerve palsy, OCI vs OCS on imaging studies, treatment given, and outcomes of facial palsy were analyzed.

Results: Fifteen of 335 patients had facial nerve deficits. Three had OCI and 12 had OCS-TBF. The mean age of patients was 25.7 (4–54) years, with 7 males and 8 females in the cohort. The most common cause was motor vehicle accident. Facial nerve deficits improved in 2 of 3 OCI-TBF patients and 10 of 12 OCS-TBF patients with conservative, nonoperative management. One patient with OCI underwent facial nerve decompression, with partial recovery. Facial nerve deficits did not improve in 2 patients with OCS-TBF.

Conclusion: Facial nerve deficits can occur with both OCS and OCI types of TBF. No statistical significance was noted in facial nerve outcomes in patients with OCI-TBF compared with patients with OCS-TBF.

Educational Quality of YouTube Cholesteatoma Surgery Videos: Areas for Improvement

Matthew J. Wu (Presenter); Renata M. Knoll, MD; Aaron K. Remenschneider, MD, MPH; Elliott D. Kozin, MD

Introduction: YouTube (YT) is a popular resource among trainees when preparing for surgical procedures. While surgical videos can provide realistic content, prior studies have

suggested that they may provide poor educational quality, and none have examined cholesteatoma surgery (CS) videos to date. Herein we aim to assess the quality of CS YT videos available for otolaryngology trainees.

Method: Using the YT search function, videos with operative footage were queried using CS-related terms. Excluded videos were non-English, patient testimonials and infographics, and medical presentations. Video content was scored using LAParoscopic surgery Video Educational GuidelineS (LAP-VEGaS). Surgeon country of origin, view and like counts, video age and length, and auditory commentary and subtitle presence were also recorded.

Results: A total of 74 CS videos were included. The mean view count, video age, and length were 16,141, 4.56 ± 3.15 years, and $14'33'' \pm 21'9''$, respectively. Some 27 (37.0%) videos originated from the United States. The mean LAP-VEGaS score was 9.6 ± 4.0 , with 33 (44.6%), 22 (29.7%), and 19 (25.7%) being categorized into medium, high, and low video quality, respectively. Overall, videos most commonly lacked graphic aids to highlight anatomy (71.6%), procedure outcomes (68.9%), and surgical positioning (48.6%). LAP-VEGaS scores were significantly greater in videos originating from the United States (12.4 vs 8 ; $P < .0001$) and with greater video length ($P = .02$). Video like count, view count, and age were not correlated with LAP-VEGaS scores.

Conclusion: While CS YT videos are readily accessible, most were medium quality based on LAP-VEGaS scores and may offer only moderate educational value. Our study identifies commonly missed video components that may increase future CS video instructional quality.

The Effect of Exosomal let-7b to the Auditory Mismatch Negativity

Ken Hayashi, MD, PhD (Presenter); Yuna Suzuki, MD; Fumiyuki Goto, MD, PhD; Yasuyuki Nomura, MD, PhD; Chisato Fujimoto, MD, PhD

Introduction: Our objective is to clarify the impact of exosomal (exo-) miRNA let-7b inducing hyperexcitability-induced auditory cell death to the mismatch negativity (MMN) reflecting an auditory memory traces in neural cells.

Method: Primary rat cortex neuronal cell cultures were prepared from embryonic day 18 (E18) Wistar rat brains. The neural network of primary neural cells was estimated on the high-density complementary meta-oxide-semiconductor-microelectrode arrays. The cell viability assay and Western blot analysis were performed in primary neural cell after exposure of exo-miRNA let-7b. The stimulation paradigm was applied for evaluating the deviance detection (DD) as an indicator of auditory MMN in neural cells. The stimulation selectivity of DD was evaluated by stimulus-specific adaptation index (SSAI), and the spontaneous burst firing was estimated by total spike rate (TSR).

Results: The cell viability after direct exposure of miRNA let-7b was decreased in a time-dependent manner. The expression of TLR7 was increased at 24 hours after exposure

of exo-miRNA let-7b in primary neural cells. This result indicates that exo-miRNA let-7b functions as a ligand of TLR7 in cells. Interestingly, SSAI was significantly decreased in the secondary response of DD in exo-miRNA let-7b-treated cells, and the detectability of DD giving an indication of auditory MMN was also significantly decreased. The intermittent spontaneous burst firing was confirmed by the increase of TSR in neural circuitry after exposure of exo-miRNA let-7b. These results indicate that exo-miRNA let-7b holds the potential to decrease auditory MMN and lead to the generation of the spontaneous burst firing in neural cells.

Conclusion: Our results suggest that exo-miRNA let-7b inducing hyperexcitability-induced auditory cell death through the interaction of TLR7 might decrease the auditory sensorial memory in cellular neural network.

Effectiveness of TympaHealth in Shortening Waiting Time for Wax Removal

Lisa Gurung (Presenter); Maral Rouhani; Arvind Singh

Introduction: Wax accumulation is an important cause of hearing loss that can be easily addressed to provide a positive impact on patients' quality of life. The patient referral pathway in the National Health Service in the United Kingdom for wax removal can be convoluted. Referrals for hearing aid fitting for presbycusis can be delayed due to impacted wax. Novel devices for visualization and wax removal are therefore much needed. TympaHealth is a new and innovative device designed to be an all-in-one hearing health assessment system capturing high-quality images and video clips, wax removal, and a screening hearing assessment.

Method: The use of the TympaHealth device was trialed in a busy London hospital from July 2020 to September 2020 in a prospective study of 21 patients. Audiologists underwent training to use the device. The primary outcome measure was length of time from referral to wax removal using the Tympahealth device vs a non-TympaHealth device, for example, a microscope. Secondary outcome measures were patient satisfaction, ease of use by clinicians, and effectiveness of wax removal.

Results: The average patient age was 71 years, with a male:female ratio of 7:12. The mean length of time from August 2019 to April 2020 from referral to wax removal was more than 270 days, whereas when using the TympaHealth device, the mean length of time was 0.76 days. There was a statistically significant reduction in waiting time using the TympaHealth device compared with the conventional method ($P < .001$). In 86% of cases, clinicians were able to completely remove the wax; in the remaining, referral to an ear, nose, and throat (ENT) clinician was necessary. One hundred percent of the patients would choose to have the procedure again in the future if required.

Conclusion: The TympaHealth device is an effective tool for wax removal that has been shown to be easily used by non-ENT clinicians and has reduced the patient referral pathway time, resulting in patients then undergoing audiometric testing and hearing aid fitting without delay.

Presentation schedule is subject to change. The Official Program Abstracts supplement does not reflect changes made after August 13, 2021.

Effects of Balloon Dilation on Eustachian Tube Compliance

Miriam S. Teixeira, MD (Presenter); Juliane M. Banks; J. Douglas Swarts, PhD; Ellen M. Mandel, MD; Cuneyt M. Alper, MD

Introduction: Compliance is a measure of the ability of an organ or tissue to distend in response to an applied force. Eustachian tube (ET) compliance can be determined by varying the airflow through the ET and measuring the passive resistance (RS) at 2 different points on the pressure curve. In this pilot study, we investigated the effects of ET balloon dilation (BDET) on the compliance and passive properties of the ET walls.

Method: Nine adult participants with at least 1 patent ventilation tube inserted for chronic otitis media with effusion had compliance testing pre- and postunilateral BDET by cycling ET flow rates between 15 and 30 mL/min 3 to 4 times during the forced response test. The Tubal Compliance Index (TCI) was calculated as the ratio of RS at 15 and 30 mL/min. The distribution of differences in TCI pre- and post-BDET were examined by repeated-measures analysis of variance ($\alpha = .05$).

Results: One ear of each of 9 participants (4 males, 9 White, 31.8 ± 9.5 years) was included in the analysis. There were TCI differences among the participants ($P = .06$) and across the sequence of compliance loops ($P = .04$). Although the TCI increased after BDET, the difference was not statistically significant ($P = .15$).

Conclusion: These preliminary results suggest that compliance studies employing larger sample sizes and different degrees of ET dysfunction may help elucidate the effects of BDET on ET passive properties.

Etiologies and Treatments of Auricular Perichondritis: A Systematic Review

Megh Shah (Presenter); Ariel Omiunu; Gregory L. Barinsky, PharmD; Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: Auricular perichondritis is an infection of the external ear, involving the cartilage and subcutaneous tissue, with sparing of the lobule. This study aims to review patient demographics, clinical characteristics, diagnostic methods, treatment, and long-term outcomes of patients with auricular perichondritis.

Method: A literature review following PRISMA guidelines was performed using PubMed, Scopus, CINAHL, and the Cochrane Library. A search of English-written articles from 1960 to 2020 was performed.

Results: In total, 37 case reports and 8 case series were included ($n = 75$). Most patients were female ($n = 45$, 60.0%). The mean age was 30.29 years (range, 2–83 years), with 23 patients younger than 18 years (30.7%). Ear piercing was the most common predisposing factor ($n = 33$, 44.0%). The mean duration of symptoms prior to diagnosis was 23.6 ± 64.1 days. Patients most commonly presented with otalgia ($n = 46$, 61.3%),

swelling ($n = 38$, 50.7%), erythema ($n = 25$, 33.3%), and otorrhea ($n = 14$, 18.7%). Bilateral ear involvement was reported in 5 patients (6.7%). *Pseudomonas aeruginosa* was the most common pathogen found in culture ($n = 37$, 66.1%). Treatment most commonly included incision and drainage (I&D) and wound debridement (70.6%). Some 23 patients (30.7%) had postoperative complications (eg, cartilage necrosis), of which 16 (69.6%) required repeat I&D or debridement. Complete resolution was reported in 30 (40.0%) patients, and deformities were found in 22 (29.3%) patients. Of the patients, 30.7% did not have outcomes reported or were lost to follow-up.

Conclusion: Auricular perichondritis requires prompt diagnosis and management to prevent complications and ear deformities. Treatment consisted mostly of I&D and wound debridement. Outcomes were generally reported as favorable.

Evaluating Preoperative Steroid Use and Hearing After Endolymphatic Sac Decompression

Christian R. Dondonan (Presenter); Jordan Grauer; Robert Hong, MD, PhD; Seilesh C. Babu, MD; Dennis Bojrab II, MD

Introduction: This study was conducted to evaluate the hearing preservation of patients who received endolymphatic sac decompression (ELSD) and to determine whether or not the use of preoperative steroids improved hearing preservation outcomes.

Method: The institutional review board of Ascension Providence Hospital approved this retrospective chart review of medical records from a tertiary neurotology referral center (Institutional Review Board No. 1612024-1). A total of 283 patients diagnosed with Ménière's disease (MD) between 2003 and 2019 who underwent ELSD were identified. Of that number, 175 patients received steroids and 113 patients did not receive steroids. Hearing was qualitatively measured using pure-tone average (PTA) and word recognition score (WRS). Hearing was quantitatively measured using the American Academy of Otolaryngology–Head and Neck Surgery hearing classification.

Results: The mean PTA and WRS for all patients ($n = 283$) worsened. The differences for both PTA and WRS were statistically significant ($P < .001$). When comparing the steroid ($n = 170$) and control ($n = 113$) groups, the measured differences for both PTA ($P = .961$) and WRS ($P = .745$) before and after ELSD were not statistically significant. The hearing classification remained at “B” for both groups and all patients overall before and after ELSD.

Conclusion: PTA and WRS in MD patients who received ELSD showed decreased hearing sensitivity and word recognition. Despite these statistically significant differences in hearing, however, the changes were so small that they were not clinically significant. There was no statistical difference between those who received steroids and those who did not receive steroids before ELSD.

Evaluation of Biomarkers for Cisplatin-Induced Ototoxicity

Charles J. Generotti (Presenter); Rui Ma; Daqing Li, MD

Introduction: Cisplatin is one of the most commonly used chemotherapy agents for solid tumors including squamous cell carcinoma. Cisplatin-induced ototoxicity has long been reported, yet the clinical diagnosis relies on audiometric testing. Unfortunately, once audiometric testing reveals abnormal hearing function, significant and irreversible inner ear damage may have already occurred with limited potential for therapeutic intervention. The current study aims to explore if specific biomarkers can be used for detecting cisplatin-induced ototoxicity prior to the clinical diagnosis.

Method: A mouse model with cisplatin-induced ototoxicity was used in combination with 65 human samples in this study beginning April 2018 with ongoing analysis of human samples. Several biomarkers, including prestin, Otolin-1, and HSP70, were selected for testing via enzyme-linked immunosorbent assay. Auditory brain stem response and inner ear morphology studies were performed for the current study. Inner ear perilymph samples were analyzed to assess the correlation between cisplatin concentration and ototoxicity.

Results: Serum prestin levels, but not Otolin-1 or HSP70, were significantly elevated in mice exposed to cisplatin prior to the onset of hearing loss when compared with control mice ($P = .036$), and the elevated levels correlate with hearing threshold changes ≥ 40 db at 32 kHz when compared with mice with 0- to 35-db changes ($P = .048$).

Conclusion: Prestin, but not Otolin-1 or HSP70, was significantly elevated prior to the onset of hearing loss and increased in the serum with more severe hearing damage, indicating that prestin may serve as an important biomarker and early indicator of cisplatin-induced ototoxicity in those who received cisplatin chemotherapy.

Extrusion of Cochlear Implants: A Review of the MAUDE Database

Saima Wase (Presenter); Sanjay Jinka; Anita S. Jeyakumar, MD, MS

Introduction: This review was conducted to compare the complication profile of cochlear implants with regard to extrusion between manufacturers.

Method: A review of the MAUDE database was conducted from January 1, 2010, to December 31, 2020. Cochlear implants were selected. Specific adverse events (AEs) were recorded as "extrusion" or "no extrusion." The categorized data were analyzed using a χ^2 test to determine a difference between 3 prominent cochlear implant manufacturers: Cochlear Limited (CLTD), MED-EL (ML), and Advanced Bionics (AB).

Results: A total of 31,587 cochlear implant AEs were reported. CLTD devices reported 15,953, ML reported 8266, and AB reported 7638. Of all AEs reported, CLTD had the highest incidence of reported device extrusions of 7.30%, compared with ML's incidence of 1.84% and AB's incidence of 6.54%. χ^2 Analysis demonstrated a statistically significant

difference in the incidence of device extrusion between CLTD, ML, and AB ($P < .05$).

Conclusion: Device extrusion is a known complication of cochlear implants. The results suggest that CLTD poses a potentially higher risk of extrusion compared with ML and AB ($P < .05$). Further study is required to decrease the risk of extrusion of cochlear implants.

Frequency Reallocation Based on Cochlear Place Frequencies in Cochlear Implants

Flavia Di Maro (Presenter); Marco Carner; Andrea Sacchetto; Davide Soloperto; Daniele Marchioni

Introduction: Otoplan® is software that allows us to estimate the cochlear duct length, the spatial position of the electrode array, and the subsequent cochlear place of stimulation in patients with cochlear implants. The aim of the study is to evaluate speech perception outcomes after a frequency reallocation performed through the creation of an anatomical-based map obtained with Otoplan®.

Method: Ten postlingually deafened patients who underwent cochlear implantation with MED-EL company devices from 2015 to 2019 in the tertiary referral center University Hospital of Verona have been included in a prospective study. The postoperative computed tomography scans were evaluated with Otoplan®, the position of the intracochlear electrodes was obtained, an anatomical mapping was carried out, and then it was submitted to the patients. All patients underwent tonal and speech audiometry before and after the reallocation and the audiological results were processed considering the speech recognition threshold (SRT), the speech awareness threshold (SAT), and the pure-tone average (PTA). An index of the mismatch between the frequency distributions of the 2 maps (default vs anatomical based) was obtained, and a correlation was sought between this parameter and the values of the difference of the audiological thresholds before and after the reallocation. Furthermore, the differences in PTA, SAT, and SRT values were considered before and after the frequency reallocation. The results were statistically processed using the software Stata with a significance value of $\alpha < .05$.

Results: The mean values of SRT were significantly lower ($P = .04$) after the reallocation on an anatomical basis. No significance was found in the correlation between the index and the difference of SRT, SAT, or PTA values. No difference was found between PTA ($P = .35$) or SAT ($P = .09$) values before and after the reallocation.

Conclusion: Our preliminary results demonstrated a better speech discrimination and a rapid adaptation in postlingually deafened patients who underwent cochlear implantation after the anatomical mapping with Otoplan® and subsequent frequency reallocation.

Fungal Necrotizing Otitis Externa: An Opportunity to be Malignant

José P. Barros-Carneiro, MD (Presenter); Nuno Dias-Silva, MD; Isa Eloi; Joana Gonçalves; Clara Silva; Luis Filipe Silva

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Introduction: Necrotizing otitis externa (NOE) is a severe, destructive infection that starts in the soft tissues of the external ear canal and extends to the cranial base (CB). It occurs classically in diabetic or immunocompromised (IC) patients, and its most frequent causative agent is *Pseudomonas aeruginosa* (PA). However, invasive infections by fungal agents have been reported with increasing frequency.

Method: This is a literature review of the last 10 years using the MEDLINE database and descriptions of 3 clinical cases of fungal NOE admitted to our department.

Results: A 60-year-old man, a 54-year-old woman, and a 67-year-old man were referred to our department with a history of headache, severe otalgia with otorrhea, and ipsilateral peripheral facial nerve palsy. All 3 patients had multiple diseases, with poorly controlled diabetes and end-stage renal disease standing out. Computed tomography scan and scintigram revealed osteomyelitis of the CB. They all started empiric anti-PA therapy, but none of them improved. A later culture for fungi revealed a different fungus in each one (*Aspergillus fumigatus*, *Candida albicans*, and *Candida parapsilosis*). Despite prolonged antifungal therapy, their condition did not improve. A surgical approach was tried: 1 of the patients had a remarkable clinical improvement, with almost complete resolution of pain and facial palsy; the other 2 remained stable with a bad prognosis.

Conclusion: NOE used to be a devastating disease. The use of empirical anti-PA regimens has significantly improved the prognosis of most of these patients. However, one has to be aware of fungal infections, which appear to be more frequent in the severely IC patient with uncontrolled diabetes. These opportunistic agents are bringing the “malignant” term back. An international NOE guideline is missing.

Galvanic VEMPs Predict the Prognosis of Sudden Deafness with Vertigo

Chih-Ming Chang (Presenter)

Introduction: To define the severity of sudden deafness and to predict prognosis, galvanic vestibular-evoked myogenic potentials (VEMPs) are added to the inner ear test battery.

Method: A total of 30 patients who had unilateral severe (71–90 dB HL) to profound (>90 dB HL) sudden deafness and initial complaint of vertigo were enrolled in this retrospective study. Mean hearing level was calculated by averaging the audiometric thresholds at 500 Hz, 1000 Hz, 2000 Hz, and 3000 Hz. The diagnosis of sudden deafness was based on sensorineural hearing loss of at least 30 dB HL over at least 3 contiguous audiometric frequencies within 3 days. Clinical information, including gender, age, presence of tinnitus, delay of treatment, and medical history of hypertension and diabetes mellitus were recorded based on a chart review. All patients underwent pure-tone audiometry, ACS-cVEMP, BCV-oVEMP, GVS-cVEMP, GVS-oVEMP, and the caloric test before treatment with orally administered steroid (prednisolone 1 mg/kg/d) for 7 consecutive days, tapered over the following 7-day period. The hearing outcomes, response rates,

and characteristic parameters of VEMP tests, namely, p13, n23, nI, pI latencies, p13-n23, and nI-pI amplitude, were further compared and analyzed.

Results: In affected ears, the rates of abnormal acoustic cVEMPs, vibratory oVEMPs, galvanic cVEMPs, and galvanic oVEMPs were 60%, 47%, 37%, and 20%, respectively. The improvement in the hearing of the affected ear was specified as good recovery or poor recovery. The normal galvanic VEMP group had a significant higher rate of good recovery than the abnormal galvanic VEMP group did (87% vs 27%; $P = .003$).

Conclusion: Patients with unilateral severe to profound sudden deafness and accompanying vertigo who have normal galvanic VEMPs have a higher likelihood of hearing recovery than those who have abnormal galvanic VEMPs.

Gene Panels in the Diagnosis of Hearing Loss in Adults

Patricia Corriols Noval (Presenter);
Eugenia Carmela López Simón; Minerva Rodríguez Martín;
Ramón Cobo Díaz; Belen Salvatierra Vicario

Introduction: Genetic hearing loss is a challenge due to incomplete penetrance and variable expressiveness. For this reason, it can slip past, especially when it starts in adulthood. Genetic study is a powerful tool to achieve an etiological diagnosis, providing individualized medicine, offering genetic counseling, and predicting the prognosis of hearing loss and even unmasking syndromes that had gone unnoticed to date.

Method: We present the case of a 60-year-old woman who consulted the otolaryngology department for progressive hearing loss for 12 years, without other associated symptoms. She had been evaluated in ophthalmology and traumatology departments for retinal detachment and early osteoarthritis. Pure-tone audiometry showed severe bilateral and symmetric sensorineural hearing loss. Given the age of the patient and the profile and severity of the audiometry, a genetic study was requested, consisting of a panel of 189 genes related to hearing loss (OTOGenics panel).

Results: The study identifies c.816+1cg>A in heterozygous in COL2A1 that justified the audiological phenotype of the patient. This pathogenic variant may appear isolated or related to Stickler syndrome, which is characterized by the presence of craniofacial malformations, ophthalmological and joint conditions, and deafness. Taking into account that the patient had presented retinal detachment at 40 years of age and total hip replacement at 59 years, the clinical context fitted the etiology of Stickler syndrome, although the lack of craniofacial malformations (due to variable expressiveness) had concealed the diagnosis prior to the genetic study.

Conclusion: Currently, next-generation sequencing techniques allow a simultaneous analysis of hundreds of genes related to hearing loss that can be lumped together in gene panels, lowering costs and time. Gene panels constitute the test with the highest diagnostic rentability for unknown hearing loss. Genetic diagnosis provides personalized, predictive, and

preventive medicine, contributing to detecting “hidden” syndromes in adults, which have been slipping past clinicians.

Generation of Novel Surgeon-Focused Imaging Platforms for Otologic Surgical Planning

Samuel R. Barber, MD (Presenter); Geoffrey E. Watson; Nicholas A. Dewyer, MD; Francis X. Creighton, MD; Elliott D. Kozin, MD

Introduction: Traditional preoperative planning for otologic surgery involves review of standard 2-dimensional (2D)-reformatted views. Three-dimensional (3D) reconstructions can be generated from radiology workstations but require additional time and expertise. Current novel virtual surgical planning (VSP) systems have limited features, are complicated, and are costly. Herein, we devise a novel medical imaging app that facilitates streamlined workflow across desktop and virtual reality (VR) platforms.

Method: A novel app was developed in Unreal Engine 4.0 (UE). A graphical user interface (GUI) was designed to display standard 2D views of image series using MHD data, C++, and visual scripting. An open-source plug-in performed volume rendering via raymarching for 3D reconstructions in real time. A clipping tool dynamically cropped images to highlight regions. In VR, the volume render and clipping tool were positionally tracked with controllers. Outcomes measured successful conversion and rendering of MHD data, frame rate, and stability.

Results: The UE app was compiled on PC and successfully run for desktop and VR. Axial computed tomography temporal bone series were converted to gray-scale 16-bit volumes with $512 \times 512 \times 207$ matrix and 0.62-mm spacing. In desktop mode, 2D and 3D views were manipulated for slice, rotation, and cropping using the GUI. In VR mode, users manipulated the direct volume render position with one controller, while the other controller dynamically cropped regions of interest in any plane in real time. Performance showed 98.23 frames per second in desktop and 90 Hz in VR without crashes.

Conclusion: A surgeon-focused medical imaging app was developed specifically tailored to otologic VSP. This software targeted for busy surgeons has the potential to improve preoperative workflow. Cross-platform compatibility improves user experience in a single application for desktop and VR device capabilities. Future iterations will include support for mobile devices and manual segmentation to highlight structures at risk.

Global Incidence of Sporadic Vestibular Schwannoma: A Systematic Review

John P. Marinelli, MD (Presenter); Cynthia Beeler; Matthew L. Carlson, MD; Per Caye-Thomasen, MD, DMSc; Samuel Spear, MD; Isaac Erbele, MD

Introduction: Ubiquitous throughout the literature and during patient counseling, sporadic vestibular schwannoma is often quoted to affect about “1 per 100,000” people. Yet, several reports from distinct international populations suggest

that the incidence is likely much higher. The objective of the current work was to systematically characterize the global incidence of sporadic vestibular schwannoma.

Method: Scopus, Embase, and PubMed were searched from January 2010 through August 2020 for population-based studies reporting the incidence of sporadic vestibular schwannoma. Language inclusion criteria required reports to be published in either Chinese, English, German, Italian, or Spanish. The protocol was registered with PROSPERO prior to commencement of data collection. PRISMA guidelines for transparent reporting of systematic reviews were followed.

Results: Among 424 unique citations, four population-based studies from Denmark, the Netherlands, Taiwan, and the United States met inclusion criteria. Across all studies, most recent incidence rates of sporadic vestibular schwannoma among all ages ranged between 3.0 and 5.2 per 100,000 person-years. Highest incidence rates were reported among patients aged ≥ 70 years, peaking at 20.6 per 100,000 person-years. Trend data demonstrated an increasing incidence from 2010 to 2020. One study from the United States reported the incidence of asymptomatic, incidentally diagnosed tumors at a rate of 1.3 per 100,000 person-years from 2012 to 2016.

Conclusion: Recent international incidence rates of sporadic vestibular schwannoma exceed the commonly quoted “1 per 100,000” figure by up to 5-fold among all ages and by up to 20-fold among age groups at highest risk. Based on these incidence rates, the chance of developing a sporadic vestibular schwannoma throughout a person’s lifetime likely exceeds 1 in 500.

Health Care Utilization Analysis of Cranioplasty Techniques Following Vestibular Schwannoma Surgery

Pedrom C. Sioshansi, MD (Presenter); Seilesh C. Babu, MD

Introduction: The translabyrinthine approach to tumor resection is an invaluable technique for the removal of vestibular schwannomas. Traditional closure and cranioplasty techniques have used fat grafts to obliterate the posterior fossa and mastoid defects to prevent cerebrospinal fluid (CSF) leak. This requires a separate abdominal incision for fat graft harvest, which increases operative time, risk of complication, and postoperative discomfort, possibly requiring additional opioid analgesics. Some of these drawbacks may be mitigated by use of hydroxyapatite cement in lieu of abdominal fat. This study aims to assess postoperative differences between cranioplasty using abdominal fat graft (AFG) vs hydroxyapatite cement (HAC).

Method: A retrospective study of 60 consecutive translabyrinthine acoustic neuroma procedures was performed. Thirty consecutive HAC patients and 30 matched AFG patients were assessed for operative closure time, postoperative patient pain ratings, narcotic usage, inpatient length of stay, and complication rates.

Results: Patients who underwent HAC cranioplasty had shorter operative closure times (54 minutes vs 75 minutes,

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$P < .001$), lower postoperative pain scores, and less postoperative narcotic usage when compared with those who received AFG closure ($P < .05$). Postoperative CSF leaks in both groups and skin reactions in AFG closure patients were infrequent. There was no difference in length of stay.

Conclusion: HAC cranioplasty is a safe technique comparable with AFG closure following translabyrinthine surgery which can potentially decrease operative time, postoperative pain, and narcotic usage.

Human Otopathology of Lupus Reveals Middle and Inner Ear Vasculopathy

Melissa Castillo-Bustamante (Presenter); Prithwjit Roychowdhury; Dhrumi Gandhi; Elliott D. Kozin, MD; Aaron K. Remenschneider, MD, MPH

Introduction: Systemic lupus erythematosus (SLE) is a chronic autoimmune disease that affects several organs in the body. Otolgic symptoms have previously been described, but their etiology are unknown. Herein we describe an otopathology case of a young woman diagnosed with severe SLE.

Method: Qualitative middle ear and quantitative assessment of cochlear neurons (SGN), hair cells (HC), and stria vascularis (SV) was performed.

Results: Review of the national temporal bone registry revealed 15 cases of patients with SLE. A 13-year-old girl presented with fever, bitemporal headache, and oral-genital ulcerations and was found to have a positive antinuclear antibody titer. She developed severe vertigo prior to a rapid health deterioration over the course of following 19 months. No vestibular or audiologic assessment was available. At the age 15 years, she died of a cerebrovascular accident secondary to large-vessel vasculopathy, confirmed radiographically. Her temporal bones were harvested at 2 hours postmortem. The right ear showed degenerative fibrillar changes with osteocytes in the cochlea, posterior semicircular canal, and vestibule. Total occlusion of the lumen of the internal carotid artery as well as vasa nervorum of the facial nerve was present. Severe HC loss and moderate SV atrophy in the basal turn with wall thickening of the basal, middle, and apical turns due to occlusion of the vessels at the middle turn was observed. The SGN number was decreased (48%) compared with controls. The left ear was notable for inflammatory changes in the middle ear as well as well-organized granulomas in the facial nerve. Similar HC, SV, and SGN findings as the right ear were observed.

Conclusion: Cochleovestibular dysfunction in SLE is likely due to SV and HC degeneration secondary to small-vessel vasculitis.

Impact of Insurance on Outcomes in Patients Undergoing Inpatient Tympanoplasty

Yash M. Shah (Presenter); Sudeepti Vedula; Vivienne Qie; Christina H. Fang, MD; Robert Jyung, MD; Jean Anderson Eloy, MD

Introduction: The goal of this study was to explore how income disparities may affect length of stay (LOS) and hospital charges of patients undergoing inpatient tympanoplasty.

Method: The Nationwide Inpatient Sample database was used to identify patients who underwent tympanoplasty from 2012 to 2017. Relevant demographics were analyzed. Logistic regression analyses were performed to examine (1) LOS and (2) total hospital charges based on varying demographics, income level, and insurance type (defined by government vs private).

Results: A total of 4,100 inpatient tympanoplasty cases were identified. The majority of these patients were male (53.8%), White (67.2%) and underwent surgery at an urban teaching hospital (87.2%). Many patients had government insurance (54.9%) and lower income status (defined by an annual income less than the median of \$51,000) (52.0%). Having a private insurance carrier was found to be predictive of a LOS of less than two days (OR 0.707, 95% CI, 0.598–0.836, $P < .001$) when compared with patients with government insurance. Similarly, when looking at predictors of total hospital charges, having private insurance was associated with total charges of less than \$41,000 (OR 0.735, 95% CI 0.625–0.865, $P < 0.001$).

Conclusion: Patients with private insurance who underwent inpatient tympanoplasty are more likely to have shorter hospital stays and hospital charges. These findings depict the impact of income and insurance status disparities on health care cost within otolaryngology.

Implementation and Barriers to Same-Day Patient Consultation and Cochlear Implantation

Ankita Patro, MD (Presenter); David S. Haynes, MD; Elizabeth L. Perkins, MD

Introduction: A patient-centered health care delivery model, same-day cochlear implant (SDCI) evaluation, and surgery were developed to reduce travel burden and referral-to-surgery time at a high-volume CI center. We aim to assess the program's efficacy in improving patient experience.

Method: Between January 2019 and December 2020, potential CI candidates living beyond 200 miles from our center were offered the SDCI program. Education materials and communication with the surgeon were provided via telephone, email, and/or telemedicine. After confirming interest in proceeding, patients arrived for in-person consultation, imaging studies, and outpatient CI surgery in one visit. A follow-up survey was administered. Outcomes included preoperative hearing, referral-to-surgery time, travel burden, and patient satisfaction.

Results: Of the 30 patients who qualified, 11 patients were successfully contacted regarding the same-day program: 7 underwent CI; 1 enrolled but did not meet criteria; and 3 declined due to coronavirus and/or active medical conditions and did not pursue a CI. For the 8 patients who underwent SDCI, the mean age was 77 years, and the average preoperative

CNC score was 27% in the implanted ear. Mean referral-to-surgery time was 123 days and, after accounting for cancellations due to coronavirus, was 62 days. Average travel distance to institution was 226 miles. Of 5 patients who completed the follow-up survey, none felt rushed for surgery, and average program experience was rated 8.8 of 10. The net promoter score was positive (+60), supporting high favorability among patients. Barriers to program expansion included patient recruitment and education, surgery scheduling, and the coronavirus pandemic.

Conclusion: No patients declined the SDCI program to pursue traditional CI evaluation, and all patients were satisfied with their experience. The SDCI program is a feasible and successful model that overcomes barriers to implantation, including travel burden, and improves access to care. Patient-centered education materials may increase recruitment and preparedness for surgery.

The Importance of MRI in Sudden Deafness: Retrospective Study

Isa Eloi, MD (Presenter); Ana beatriz Ramada, MD; Joana Gonçalves, MD; Nuno Dias-Silva, MD; Margarida Amorim, MD; João Carlos Ribeiro, PhD

Introduction: Sudden hearing loss is defined as a sensorineural hearing loss with a sudden appearance of at least (\geq) 30 dB in 3 consecutive frequencies. It is estimated that only 10% to 15% of patients have an etiology at the time of diagnosis. Magnetic resonance imaging (MRI) is the imaging exam of choice for excluding retrocochlear lesions and for studying the status of the fluids in the labyrinth. The aim of this study is analyze MRI anomalies in patients patients with sudden sensorineural hearing loss.

Method: Retrospective observational study of patients with sudden sensorineural deafness (SSNS) treated at the ENT Service of the Hospital and University Center of Coimbra between 2017 and 2019. Some 54 patients diagnosed with SSNS were analyzed and evaluated for comorbidities, vestibular symptoms, degree of deafness, treatment, MRI changes, and prognosis; 17 patients were excluded because of lack of information in clinical journals.

Results: The average age at diagnosis in our sample was 53.9 years with 70.3% male. In the studied population, 45.9% had cardiovascular risk factors. Some 24 patients showed changes in MRI—43.2% changes directly related to the disease (10.8% vestibular neurinoma). The treatment instituted consisted of oral corticotherapy and in 5 cases hyperbaric oxygen therapy. There was a total recovery of hearing in 40.5% of our patients, with 80% of patients with MRI changes directly related to SSNS having no hearing recovery ($P < .05$). Vestibular symptoms as a way of presenting the disease were present in 35.1% of the patients, and of these, only 23.1% had complete hearing recovery ($P = .51$).

Conclusion: MRI abnormalities compatible with vestibular neurinoma, intralabyrinthine hemorrhage, or labyrinthitis are related to a worse prognosis of the disease. The total recovery of hearing does not exclude the need for MRI to exclude vestibular shwannoma.

Income Disparities in Patients Undergoing Mastoidectomy

Juhi Mehta (Presenter); Sudeepti Vedula; Meredith Young; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: The impact of income disparity on patient outcomes has not been well described in the otolaryngology literature. This study aims to describe the impact of income disparity on length of stay and total hospital charges following inpatient mastoidectomy.

Method: The Nationwide Inpatient Sample was used to identify patients who underwent mastoidectomy between 2012 and 2017. Patients were divided into 2 cohorts based on the median annual income: low income cohort ($=\$51,000$). Multivariate analyses were performed to compare age, gender, race, payer status, season, bed size, and hospital type and region of these cohorts. Independent *t* tests were used to assess the relationship between income status and both, total charges and length of stay (LOS).

Results: A total of 9600 patients who underwent inpatient mastoidectomy were included. Of these, 54.3% ($n = 5210$) had low-income status and 45.7% had high-income status. Male gender (54.3%), White race (72.0%), and surgery performed in the South (28.2%) were more common in the high-income cohort when compared with the low-income cohort. Patient stratified in the higher-income group had statistically significant increased total hospital charges ($\$106,938.05$ vs $\$99,352.55$, $P = .002$). There was no significant difference in mean LOS between the 2 cohorts.

Conclusion: Patients with high-income status who underwent inpatient mastoidectomy had higher total hospital charges. There was no significant difference in LOS. The underlying reasons for these findings need to be elucidated in further studies.

Inner Ear Conductive Hearing Loss

Bulent Mamikoglu (Presenter)

Introduction: Schuknecht first used the term *inner ear conductive hearing loss* to describe hearing loss observed in a patient with cochlear endolymphatic hydrops. Today, the most commonly recognized inner ear conductive/mixed loss pathology is superior semicircular canal dehiscence (SSCD), where conductive hearing loss is explained according to the third window phenomenon. It is proposed that a dehiscence of the bone generates a pressure-relief point that is referred to as a “third window.” Part of the sound energy entering the inner ear at the oval window is diverted toward the dehiscence, thus accounting for the conductive hearing loss. However, in most patients after SSCD plugging, hearing tends to improve only modestly around 10 db, and complete closure of the air–bone gap is rarely achieved. Another example is development of air–bone gap after hearing-preservation cochlear implantation.

Method: Navier–Stokes equations are used to explain the inner ear mechanics. Barany’s experiments wave propagation

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was based on passive cochlea, but active cochlea has different features. Patients with idiopathic increased hypertension are tested in different head positions.

Results: The third window theory does not account perilymphatic pressure. The alternation of perilymph pressure (head up or supine positions) has significant effects on hair cell mechanics and thus alters cochlear microphonics. Although wave propagation through bone is retained, air conduction is attenuated due to altered outer cell function.

Conclusion: Relative perilymphatic pressure is very important in hearing mechanics. When this is accounted for, our understanding of the air–bone gap in idiopathic increased hypertension, enlarged vestibular aqueduct, and SSCD after hearing-preservation cochlear implantation will significantly improve and will lead us to alternative methods of management.

Inner Ear Drug Delivery With Dexamethasone-Infused and -Coated Microneedles

Torin P. Thielhelm (Presenter); Stefania Goncalves, MD; Devon Pawley; Christine T. Dinh, MD; Sylvia Daunert, PhD; Fred Telischi, MD

Introduction: Drug delivery to the inner ear is difficult because of inherent barriers to molecular transportation within the cochlear anatomy. We describe the use of biodegradable, drug-infused microneedles to pierce the round window membrane (RWM) and deliver drugs to the inner ear at a consistent rate and dose.

Method: Microneedles composed of poly lactic-co-glycolic acid copolymer dissolved in dimethyl sulfoxide were prepared in a custom mold along with either FM1-43, a dye that inhibits the mechanotransducer channel, or the corticosteroid dexamethasone (DXM). Organ of Corti explants from rat pups were exposed to DXM microneedles, and viable hair cell (HC) counts were determined with fluorescent microscopy, providing an ototoxicity assessment. Then, FM1-43 microneedles were inserted into the scala tympani of adult rats; after 1 week, cochleae were harvested and analyzed with confocal microscopy to visualize intracochlear drug release. Next, DXM microneedles were inserted into the scala tympani of adult rats through the RWM, and hearing was assessed by recording auditory brainstem responses (ABRs) to pure-tone stimuli (1, 4, 8, 16, and 32 kHz) at baseline and at postoperative days 3, 7, 14, 21, and 28; after 28 days, cochleae were harvested and analyzed with confocal microscopy.

Results: Ototoxicity assessment in vitro revealed fewer HC losses in the DXM-coated and -infused microneedle group as compared with the noncoated group and a similar protective effect when compared with the DXM solution. FM1-43 in vivo studies established that the microneedle releases drug into the perilymph within 1 week of insertion. ABR data revealed that insertion of the microneedle causes an initial increase in hearing thresholds at higher frequencies (16 and 32 kHz), which return to baseline levels over the course of 28 days.

Conclusion: In vitro results suggest that biopolymer microneedles can deliver drugs to the scala tympani and prevent HC loss from ototoxic insults. In vivo data demonstrate that these micro-needles are safe for insertion within the inner ear and that DXM-infused and -coated microneedles can have protective effects.

Inner Ear FLAIR Changes After Stereotactic Radiosurgery for Vestibular Schwannoma

Nathan C. Tu, MD (Presenter); Robert Conway; Katrina Minutello; Dennis Bojrab II, MD; Seilesh C. Babu, MD

Introduction: Inner ear fluid-attenuated inversion recovery (FLAIR) magnetic resonance imaging (MRI) signal intensity has been shown to be abnormally elevated in vestibular schwannoma (VS) patients. This is the first study to evaluate inner ear FLAIR signal changes after stereotactic radiosurgery (SRS) for VS.

Method: A retrospective chart review was performed of patients undergoing SRS for VS from August 2009 to December 2017 at a tertiary referral center. Inclusion criteria included available baseline and post-SRS audiograms and FLAIR sequence acquisition. The primary outcome measurement was the FLAIR signal intensities of the affected cochlea and vestibule, which were each measured using a hand-drawn region-of-interest technique and normalized to the contralateral inner ear. Independent variables included time from SRS to magnetic resonance imaging acquisition, baseline and post-SRS pure-tone average, and word recognition score (WRS).

Results: Eighteen patients were included in this study. The average baseline and initial post-SRS cochlear FLAIR signal ratio was 1.63 and 1.94 ($P = .06$, paired t test), respectively, with an average percentage change of 17% (range, 54% to 134%). The average baseline and initial post-SRS vestibular FLAIR signal ratio was 1.85 and 2.14 ($P = .13$, paired t test), respectively, with an average percentage change of 21% (range, 32% to 131%). Notably, there were 13 patients who at baseline WRS greater than 50%. Nine of 13 (69%) maintained WRS greater than 50% at the first post-SRS audiological assessment. When comparing those who maintained WRS greater than 50% and those who did not, there was no statistically significant difference in cochlear FLAIR (1.92 vs 1.80, $P = .7$), vestibular FLAIR (1.78 vs 2.30, $P = .3$), or percentage change from baseline in each of these measures.

Conclusion: In patients undergoing SRS for VS, inner ear FLAIR signal increased after intervention, although it did not reach statistical significance. There was no difference in inner ear FLAIR signal changes between patients who had preserved hearing and those who did not.

Intra- and Postoperative Measures of Auditory Function Using Aim System

Piotr H. Skarzynski, MD, PhD, MSc (Presenter); Paulina Hawryluk; Malgorzata Karpowicz; Malgorzata Talarek; Katarzyna Beata Cywka

Introduction: Cochlear implants (CIs) are currently the standard of care for patients with significant sensorineural hearing loss and poor speech understanding. Currently, many CI recipients have significant residual low-frequency hearing in the ear to be implanted. Careful surgical approaches may preserve this hearing. A clinically relevant result will be taken into account: hearing preservation. The aim of this study is to determine the degree of benefit associated with the use of real-time, acoustically evoked cochlear potentials during a CI placement procedure as compared with the standard technique of inserting an electrode beam into the cochlea.

Method: The study was attended by 28 people aged 20 to 76 years. The patients were qualified for the Advance Bionics cochlear implantation procedure, meeting the normal requirements for a CI application. The operation of the cochlear implantation took place according to the modified procedure, which is currently used in patients not participating in the study. The study consisted of intraoperative ECoChG measurement during insertion of the electrode beam into the cochlea and subsequent postoperative visits.

Results: Preliminary data analysis showed that changes in the ECoChG signal during CI electrode insertion are correlated with outcomes of hearing preservation as indicated by postoperative audiogram. Participants randomized to “ECoChG audible response on” demonstrated significantly greater rates of hearing preservation compared with those randomized to “ECoChG audible response off.” Furthermore, changes in the ECoChG signal during CI electrode insertion were correlated with insertion position.

Conclusion: Use of real-time ECoChG feedback during CI surgery gives the surgeon an opportunity to make subtle adjustments to insertion parameters such as the angle of insertion or speed of insertion. Such modifications help to protect delicate anatomy within the cochlea that is related to hearing and speech understanding outcomes. The surgeon can obtain real-time feedback regarding the status of intracochlear trauma to minimized cochlear damage.

Intralabyrinthine Congenital Cholesteatoma: Case Report & Review of the Literature

Tyler R. Halle, MD (Presenter); Esther Vivas

Introduction: Intralabyrinthine congenital cholesteatoma is defined by extensive invasion of the labyrinth with comparatively little spread within the middle ear and/or mastoid seen in an ear with normal tympanic membrane (TM), no history of TM perforation, and no history of otorrhea or prior otic procedures. The underlying pathogenesis is poorly understood.

Method: We present a case report describing the the second reported patient with intralabyrinthine congenital cholesteatoma and the first reported patient with Marfan syndrome and congenital cholesteatoma.

Results: A 32-year-old male presented with severe acute vertigo and unilateral hearing loss. History was notable for Marfan syndrome and absence of prior ear disease or injury. Audiogram confirmed a dead ear. Imaging revealed a small amount of soft tissue in the middle ear with erosion of the otic

capsule and pneumolabyrinth. The patient underwent canal wall down mastoidectomy, complete labyrinthectomy, and facial nerve decompression and transposition. Cholesteatoma completely filled all semicircular canals and the vestibule with extension into the middle ear through a dehiscence in the lateral semicircular canal. Postoperatively, the patient had no facial weakness or vestibular symptoms. Pathology confirmed cholesteatoma.

Conclusion: Congenital intralabyrinthine cholesteatoma is an extremely uncommon subtype of congenital cholesteatoma. Preservation of audiovestibular function is likely impossible in most cases and the primary goal of surgery should be to create a safe ear. There is no known association between Marfan syndrome and cholesteatoma (congenital or acquired), but patients with Marfan syndrome do appear to have a higher incidence of hearing loss than the general population.

Intralabyrinthine Hemorrhage: Case Report and Literature Review

Nuno Dias-Silva, MD (Presenter); Joana Gonçalves; Tiago Lourenço Coelho; Isa Eloi; Jorge Migueis; Luis Filipe Silva

Introduction: Intralabyrinthine hemorrhage (IH) is a rare cause of acute vestibulocochlear deficit, manifested by sudden unilateral neurosensory deafness associated with rotatory vertigo. The causal agents are traumatic or surgical injuries, use of anticoagulants, autoimmune diseases, hematological cancers, and vascular injury induced by radiation therapy.

Method: We perform a literature review and description of a clinical case of a 66-year-old female patient who came to the emergency room presenting with sudden vertigo associated with right hearing loss and vertical binocular diplopia. She had a personal history of Churg Strauss vasculitis. The main objective signs were spontaneous grade III left nystagmus, positive right head impulse test, and tuning fork tests compatible with right neurosensory deafness. Brain computed tomography was normal. In T1 and fluid-attenuated inversion recovery (FLAIR) sequences, magnetic resonance imaging (MRI; after 48 hours) showed spontaneous hyperintensity in the cochlea, vestibule, and semicircular canals of the right ear, compatible with IH. The audiometric evaluation showed right cophosis. Analytically, eosinophilia was observed. Corticotherapy and vestibular rehabilitation were performed.

Results: Diagnosis of IH involves screening for differential diagnoses with a similar clinical picture, namely, labyrinthitis, vestibular neuritis, Ménière's disease, or ischemic damage to the internal auditory artery. In our case, the postulated diagnostic hypotheses were IH, labyrinthitis, and ischemic injury. The patient had cardiovascular risk factors, with Churg Strauss vasculitis being associated with central ischemic vascular events. MRI is the most sensitive diagnostic exam, particularly at T1 and FLAIR, through spontaneous hyperintensity of the vestibulocochlear structures signal, without an increase after contrast injection. Mechanistically intralabyrinthine hemorrhage causes changes in hydrostatic pressure and ischemia, impairing cochlear function and nerve stimulation. The treatment is controversial.

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Conclusion: The vestibular symptoms improved, maintaining right copiosis, corroborating the poor cochlear prognosis described in the literature.

Intraoperative Audiometry During Stapedectomy Under Monitored Anesthesia Care

Mana Espahbodi (Presenter); Marc Drake; Jad Jabbour; Steven Harvey

Introduction: Intraoperative audiometry during monitored anesthesia care has been described in the literature. However, the outcome of this technique has not been reported in a large series.

Method: A retrospective chart review was performed of 152 patients who underwent stapedectomy under monitored anesthesia care from June 2004 to February 2011 at a community hospital. Intraoperatively, a portable air conduction audiometer with an over-the-ear microphone in a sterile sleeve was used to measure air conduction hearing thresholds at 500 Hz, 1000 Hz, 2000 Hz, and 3000 Hz both before and after stapedectomy.

Results: Of the subjects, 64% (97/152) were female. The median age at time of procedure was 47.16 (interquartile range 17) years. Preoperative air conduction hearing thresholds at 500 Hz, 1000 Hz, and 2000 Hz significantly decreased after stapedectomy ($P < .001$). There was a statistically significant increase in the air conduction hearing threshold at 3000 Hz after stapedectomy (median of 55 dB to 45 dB, $P = .022$). Pure-tone average significantly decreased from a median of 50 dB to 39 dB after stapedectomy ($P < .001$). In 2.6% (4/152) of subjects, the prosthesis size was changed as a result of intraoperative audiometry results. After the change in prosthesis size in these 4 subjects, the air conduction hearing threshold decreased from 40 dB to 37.5 dB at 500 Hz and from 42.5 dB to 40 dB at 1000 Hz ($P > .05$).

Conclusion: Intraoperative audiometry is a reliable tool for quantifying improvement in hearing during stapedectomy under monitored anesthesia care. Prosthesis size was adjusted based on unfavorable audiometry results in less than 3% of subjects and resulted in an improvement in air conduction hearing thresholds at 500 Hz and 1000 Hz; however, this change was not statistically significant.

Investigating Bone Density Changes of the Cochlea After Radiation Treatment

Lindsay C. Boven, MD (Presenter); Payam Entezami; Atefeh Geimadi; Hugo Cuellar-Saenz; Gauri Mankekar

Introduction: Radiotherapy (RT) is used to treat 80% of patients with head and neck cancer. Sensorineural hearing loss due to cochlea toxicity has been established in patients undergoing chemotherapy; however, it is not well studied in patients treated with RT. This study aims to clinically characterize changes in cochlea bone density shown on computed tomography (CT) imaging before and after RT. We hypothesize that CT imaging will show cochlea bone density loss after RT and greater bone loss with closer proximity of treatment site to the cochlea.

Method: A retrospective chart review was conducted on 12 patients aged 58 to 84 years at a tertiary care center over 6 months. Patients who met the following criteria were selected: diagnosis of head and neck cancer above the larynx, primary RT or surgery with adjuvant RT, no history of chemotherapy, completion of RT with no breaks, and availability of CT imaging before and after RT. All post imaging was obtained at 3 months after RT end date. Two radiologists blindly measured the Hounsfield units (HU) of the cochlear capsule on axial views in front of the basal turn of the bilateral cochleae on pre/post RT scans. A range of interest was used to measure the HU using Vitrea View 7.7.76.1 (Vital Images, Inc; Minnetonka, Minnesota, USA).

Results: Of patients who underwent RT, 72% showed a significant drop in postradiation HU on the ipsilateral side of treatment ($P < .001$). In addition, 36% of these patients experienced a significant drop on the contralateral side of treatment as well, though this was less significant ($P = .04$). Of the patients who dropped HU after RT, 50% had received additional ipsilateral neck irradiation due to nodal disease. Some 50% of patients had high-grade cancer (at least T3). The greatest cochlea bone density reductions were seen with external ear canal, floor of mouth, and tongue carcinomas. There was no significant correlation between bone loss and RT dose.

Conclusion: By clinically detecting cochlea bone density loss on CT imaging after RT, we can better counsel our patients on how RT and type of primary cancer correlate with structural inner ear changes and hearing loss.

Investigating Infection, Meningitis, and CSF leaks in Cochlear Implants

Sanjay Jinka (Presenter); Saima Wase; Anita S. Jeyakumar, MD, MS

Introduction: Our goal was to determine the complication profile for cochlear implants in regard to infection, meningitis, and cerebrospinal fluid (CSF) leaks.

Method: MAUDE adverse event reports from January 1, 2010, to November 30, 2020, were compiled. Only cochlear implant reports were analyzed. Reports were searched for mention of “infection;” flagged reports were cross referenced with search terms such as “no infection present” to minimize false positives. A similar method was used to determine if reports included presence of meningitis and CSF leak. The categorized data were then evaluated with chi-squared tests to determine if a difference in complication incidence existed between 3 prominent manufacturers: Cochlear Limited (CLTD), MED-EL (ML), and Advanced Bionics (AB).

Results: The study analyzed 31,587 adverse event reports; 15,953 events were for CLTD devices, 8266 for ML, and 7638 for AB. Chi-squared analysis showed a statistically significant ($P < .05$) difference existed in the incidence (P value) of meningitis (0.01), infection (0.00), and CSF leak (0.00) between the 3 manufacturers. CLTD devices had the highest rate of infection (15.5%) and ML the lowest (3.23%). ML devices, however, had the highest rate of meningitis (1.00%) and AB

the lowest (0.59%). CSF leak incidence was highest for AB (1.10%) and lowest for ML (0.29%).

Conclusion: Significant ($P < .05$) differences in MAUDE reports of meningitis, CSF leak, and infection do exist between the 3 prominent manufacturers of cochlear implants. The database does not delineate vaccination status, surgical technique, or patient demographic information. Further study is necessary to understand ways to minimize these complications.

Labyrinthine Fistula in Cholesteatoma and Its Management

Surendra Baghel (Presenter); Amit K. Keshri, MS;
Ravisankar Manogaran; Rajat Jain

Introduction: Labyrinthine fistula is a known complication of cholesteatoma, and its management is controversial. The purposes of our study are (1) investigating the role of clinical features and high-resolution computed tomography (HRCT) temporal bone in the preoperative diagnosis of labyrinthine fistula, (2) investigating the impact of fistula grade on postoperative hearing, and (3) comparing different management techniques (single stage or two stage; canal wall-up mastoidectomy or canal wall-down mastoidectomy).

Method: This retrospective study was conducted in 20 patients of labyrinthine fistula of 149 cholesteatoma patients who underwent surgery for cholesteatoma in a tertiary care hospital between February 2015 to January 2020. Data were collected for preoperative clinical signs and symptoms, HRCT temporal bone 0.5-mm cuts (both axial and coronal), intraoperative fistula grade, site and surgical technique, and pre- and postoperative audiometric outcomes.

Results: Preoperative HRCT temporal predicted fistula in 15 (75%) patients. Postoperatively, 4 (20%) patients showed improvement, 13 (65%) showed no change, and 3 (15%) showed deterioration in sensorineural hearing. In stage I labyrinthine fistula ($n = 15$), 14 (93.33%) patients showed no change or improvement and 1 (6.67%) showed worsening. In stage II labyrinthine fistula ($n = 4$), 3 (75%) patients showed no change or improvement and 1 (25%) showed worsening. In stage III labyrinthine fistula ($n = 1$), 1 (100%) patient showed worsening of hearing. There was a statistically significant relationship between grade of labyrinthine fistula and the postoperative hearing outcome ($P = .036$).

Conclusion: Clinical signs and symptoms of labyrinthine fistula are not diagnostic preoperatively. HRCT temporal bone is mandatory in making the diagnosis of labyrinthine fistula preoperatively. Choice of surgery between canal wall-up or canal wall-down mastoidectomy is independent of the type of fistula. Although there is an inverse correlation between fistula grade and postoperative sensorineural hearing outcome, the overall preservation of hearing is good.

Long-term Results of Cochlear Implantation for Mitochondrial Gene Mutations Deafness

Akinori Kashio, MD, PhD (Presenter); Kai Kanemoto, MD;
Erika Ogata, PhD; Yusuke Akamatsu, PhD;
Tatsuya Yamasoba, MD, PhD

Introduction: Clinical evidence demonstrating the effectiveness of cochlear implantation (CI) for hearing loss with mitochondrial gene mutations is limited because the most reports have only described short-term postoperative speech perception, which may not reflect the limitations of CI caused by progressive retrocochlear dysfunction. This study aims to investigate long-term speech perception after CI in patients with severe to profound hearing loss associated with mitochondrial gene mutations.

Method: A retrospective chart review was performed on patients who had undergone CI at the Department of Otolaryngology and Head and Neck Surgery at the University of Tokyo Hospital. We extracted data on causative mutation, clinical type, clinical course, perioperative complications, and short-term and long-term postoperative speech perception.

Results: Nine patients with mitochondrial gene mutations underwent CI. The mean observation period was 5.8 ± 4.1 years (range 1–13 years), and 7 patients were followed up for more than 3 years. During long-term follow-up, 2 of 7 patients exhibited deterioration of speech perception. Because no acute progression of cognitive decline was observed in conjunction with the gradual decline of speech perception, retrocochlear dysfunction was suspected as the cause of the deterioration of speech perception.

Conclusion: Retrocochlear dysfunction could be involved in deterioration of speech perception after CI for hearing loss associated with mitochondrial gene mutations.

Low BMI as a Risk Factor for Patulous Eustachian Tube

Rachel Kominsky, MD (Presenter); Claudia Cabrera;
Clare Richardson; Brian D'Anza

Introduction: Patulous eustachian tube (pET) can be a difficult condition to diagnose and treat due to the lack of specificity of its presenting symptoms. It is characterized primarily by the symptom of autophony in a patient for which no other diagnosis has been identified. While there has been some investigation of pET in relation to rapid weight loss, there has been no characterization of pET in relation to low body mass index (BMI). The purpose of this case series is to describe patient presentation of pET specifically in relation to patient BMI both in the setting of and absence of rapid weight loss.

Method: This is a retrospective case series of 5 patients over 2 years. The patients' demographic information, medical comorbidities, BMI, presenting symptoms, prior treatment, definitive treatment, and outcomes were reviewed.

Results: All patients with patulous eustachian tube were female, between the ages of 46 and 68 years. The mean BMI at time of presentation was 21.8, with 2 patients having undergone rapid weight loss, 1 subsequent to bariatric surgery. All patients had undergone prior unsuccessful treatment for their symptoms, and 4 of 5 patients had a complete resolution of symptoms with endoscopic peritubal injection or obliteration.

Conclusion: pET is a challenging condition to diagnose and treat. While rapid weight loss and bariatric surgery have been described in the literature as associated with the development

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of pET, we suggest that low BMI irrespective of rapid weight loss may also be a risk factor for patulous eustachian tube. We recommend that further research is done to investigate this relationship.

Malignant Transformation of Cerebellopontine Angle Melanocytoma Originating from Vestibulocochlear Region

Talha Ghazi, MD (Presenter); Erika Walsh; Pedrom C. Sioshansi, MD; Michael J. Brenner, MD; Seilesh C. Babu, MD

Introduction: This is the first case of diagnosis and treatment of a melanocytoma originating from the vestibulocochlear region, extending into the cerebellopontine angle (CPA), and transforming into a melanoma postoperation. This study will discuss implications of this origin and our specific case.

Method: In 2019 a case presented of a 52-year-old man with left-sided hearing loss. The patient presented in the clinic and hospital. Melanocytoma originating from vestibulocochlear region was found. Interventions include diagnostic evaluation and transtemporal translabyrinthine resection of tumor, after which mass recurred as melanoma. The main outcome measure was a case report.

Results: A 52-year-old male patient presented with left-sided hearing loss and imbalance. Magnetic resonance imaging (MRI) showed precontrast hyperintense T1-enhancing cochlea and vestibule. Four years later, the patient presented with sudden left-side facial paralysis. MRI showed T1-enhanced left-sided vestibulocochlear mass extending into the CPA. The mass was resected via left transtemporal translabyrinthine resection and sent for histology, revealing intermediate-grade melanocytoma. Later histology of repeat resection resulted in diagnostic differences between melanoma and melanocytoma among academic institutions. Histological and clinical evidence favored that there was malignant transformation of the melanocytoma into melanoma due to the presence of necrosis, increased mitotic activity, and pleomorphism in the biopsy of the second case.

Conclusion: This case is the first reported presentation, diagnosis, and treatment of a melanocytoma that may have originated from the vestibulocochlear area and the first case of malignant transformation of a melanocytoma found in the CPA. When compared with cases of malignant transformation of intracranial meningeal melanocytoma, our case shows the most rapid recurrence time of 3 weeks. This study yields insight for diagnosis in the future of similar etiology, while confirming the elusiveness of the diagnosis. It also sheds light on how low-grade melanotic tumors can play a role in hearing loss, vestibular symptoms, and CPA syndrome.

Management of BPPV: A National Mexican Survey

Erika Celis-Aguilar, MD (Presenter); Francelia Torres-Gerardo; Alejandra Isabel Espinoza-Valdez; Monica Rodriguez-Valero; Mariana Terrazas-Rubio

Introduction: Benign paroxysmal positional vertigo (BPPV) is a common and treatable peripheral vestibular disorder.

Unfortunately, there is no information on BPPV treatment in Mexico. The objective was to determine management practices of BPPV in Mexico.

Method: An anonymous multicenter online survey to Mexican neurotologists was carried out from October to December 2020. Google forms software, Microsoft Excel and IBM SPSS Statistics version 21 were used. Categorical variables were described with frequencies and percentages.

Results: Forty responses were obtained, subjects were between 40 to 49 years old (42.5%). Mexican neurotologists preferred the Epley maneuver (75%) to treat posterior canal BPPV; 45% performed a single maneuver at each visit, and only 15% combined maneuvers. Barbecue maneuver (47.5%) was the most used maneuver for the horizontal canal geotropic variety and Gufoni (40%) for the apogeotropic variety. Yacovino maneuver was performed by 55% of neurotologists for superior canal BPPV. Pharmacological treatment was generally not indicated (55%) before the maneuver. Sleeping in a semi-Fowler position was recommended by 82.5% of participants. Refractory BPPV was treated by 40% of neurotologists with Brandt Daroff exercises until no further nystagmus was evident; 47.5% of subjects indicated in these cases an electro-nystagmography and 32.5% performed a magnetic resonance imaging. Only 25% of participants indicated or performed surgical treatment for BPPV.

Conclusion: Mexican neurotologists preferred a single Epley maneuver for posterior canal BPPV, Barbecue for geotropic horizontal canal BPPV, and Gufoni for apogeotropic variant. Refractory BPPV was generally treated with Brandt Daroff. A low percentage of neurotologists perform surgical treatment.

Mastoid Obliteration Using Bioactive Glass: Our Experience

Nazrin Hameed, MD (Presenter); Anand Velusamy, MD; Aishwarya Anand, MD

Introduction: We aim to evaluate the surgical outcome of cavity obliteration with bioactive glass in patients with cholesteatoma undergoing canal wall-down mastoidectomy with reconstruction of canal wall; recognize the presence of postoperative complications such as wound infection, posterior canal wall bulge, and residual perforation; and evaluate the safety of bioglass. This is a prospective study carried out over 3 years; due to COVID-19, we could not enroll enough patients and follow them up for an adequate period of time.

Methods: A prospective study was conducted over a period of 3 years on 25 patients who underwent mastoid obliteration with bioactive glass following canal wall-down mastoidectomy for cholesteatoma. The primary outcome measure was the presence of a dry, low-maintenance mastoid cavity that was free of infection, assessed and graded according to the grading system by Merchant et al at the end of 1 month and 6 months, postoperatively. Secondary outcome measures included presence of postoperative complications such as wound infection, posterior canal wall bulge, and residual perforation.

Results: Of the 25 patients included in this study, at the end of 1 month, 60% had a completely dry ear and 28% had grade

1 and 12% had grade 2 otorrhea. At the end of 6 months, 72% had a completely dry ear, while 20% had grade 1 and 8% had grade 2 otorrhea. There were no cases with grade 3 otorrhea during the entire follow-up period. Postoperative complication of a posterior canal bulge was noted in 2 patients (8%), and only 1 patient (4%) had a residual perforation.

Conclusion: Mastoid cavity obliteration with bioactive glass is an effective technique to avoid cavity problems.

Meclizine Use in Adults With Vestibular Disorders With Hip Fractures

Steven D. Curry, MD, MPH (Presenter);
Alessandro Carotenuto, MD; Ye Huang; Dennis J. Maar;
Devin A. DeLuna; Jonathan L. Hatch, MD

Introduction: Medications commonly used to treat vestibular disorders, including meclizine, are themselves potentially inappropriate for use in older adults due to risk associated with polypharmacy, drug interactions, and adverse drug reactions. The purpose of this study was to examine the risk factors for hip fracture in patients with vestibular disorders and the association between meclizine use and hip fracture in patients with vestibular disorders.

Method: A retrospective review of adults with hip fracture due to ground-level fall based on ICD-10 code S72 from January 2013 to December 2019 at a tertiary academic medical center who had previously been diagnosed with a vestibular disorder based on ICD-10 codes H81–83, A88.1, and R42. Patient charts were reviewed to verify diagnoses, and demographic and clinical data were extracted related to hip fracture and meclizine use.

Results: A total of 201 patients were identified who met the inclusion criteria. The average age at the time of hip fracture was 78.8 years, and most were female (64.7%). Most patients were diagnosed with dizziness (60.2%) or vertigo (23.9%). Those with a specific peripheral vestibular disorder included benign paroxysmal positional vertigo (BPPV) in 13.4% and Ménière's disease in 2.5%. Overall, meclizine was prescribed to 38.3% of patients, including 29.9% of patients prior to hip fracture. Meclizine was prescribed to 66.7% of patients with BPPV. Patients were seen for vestibular symptoms 0.67 ± 2.51 years prior to hip fracture, and 98 patients (48.8%) presented with vestibular concerns within 1 year prior.

Conclusion: Multifactorial interventions to prevent hip fractures in older adults have been recommended; however, this study suggests that symptomatic treatment with meclizine use was common among patients diagnosed with dizziness, vertigo, or BPPV prior to hip fracture. Patients were frequently diagnosed with dizziness or vertigo rather than more specific causes being identified.

Melanocytic Tumor of the Cerebellopontine Angle

Nathan Cass, MD (Presenter); Miriam Smetak;
Elizabeth L. Perkins, MD; Matthew O'Malley;
Lola Chambless; Kareem Tawfik

Introduction: We present a case of melanocytic tumor of the cerebellopontine angle.

Method: A single patient case review is presented from a tertiary referral center.

Results: An obese 33-year-old woman was incidentally found to have a 4.5-cm, irregularly-shaped cerebellopontine angle mass, compressing the brainstem and cerebellum and extending into the jugular foramen. She was found to have disequilibrium, absence of right-sided hearing, and morning headaches. She underwent retrosigmoid approach for resection. The tumor was noted to be black in color, very vascular, and adherent to the brainstem. Subtotal resection was performed, leaving the jugular foramen component to protect the lower cranial nerves, with preservation of normal facial nerve function. She recovered well and was discharged home. Pathologic analysis demonstrated lesional cells staining diffusely positive for HMB45, Melan-A, S100, and SOX10. Ki67 demonstrated focal mild-moderate increased proliferation. Few mitotic figures were present. The diagnosis was primary melanocytic neoplasm of the central nervous system, intermediate grade; the lesion was unable to be more distinctly characterized. The differential diagnosis includes primary meningeal melanocytoma, melanocytic schwannoma, and malignant melanoma.

Conclusion: Primary melanocytic tumors of the intracranial cavity are rare, and optimal treatment is unknown. The differential diagnosis includes primary meningeal melanocytoma, melanocytic schwannoma, and malignant melanoma. In the present case, a 33-year-old woman presented with a 4.5-cm cerebellopontine angle melanocytic tumor with brainstem compression and underwent retrosigmoid approach for subtotal resection, leaving the portion within the jugular foramen. Pathologic analysis was inconclusive in this case. The tumor will be closely monitored with serial imaging and treatment will be based on behavior.

Non Syndromic Sensorineural Hearing Loss in Khasi Clan From India

Abhijeet Bhatia (Presenter); Star Pala; Goutam Polley;
Banrida Langstieh; Barilin Dkhar; Pranjal Phukan

Introduction: Mitochondrial genetic defects, resulting in maternal inheritance have been rarely reported from India. The Nongsteng clan from Dymmiew-Massar villages in Meghalaya, India, reported a high incidence of inherited hearing loss.

Method: This case-control study was conducted between November 2017 at March 2020. Villagers from Dymmiew and Massar villages in East Khasi Hills district of Meghalaya, India, were administered a questionnaire to estimate the extent of the presence of hearing loss in the villages. The participants in the questionnaire were then divided in 3 groups: Nongsteng with hearing loss (NHL), Nongsteng without hearing loss (NNH), and other clans (OC). The volunteering villagers were subjected to an investigation protocol for comprehensive assessment of the disorder in the office setting, consisting of

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otolaryngological as well as systemic evaluation, which included pure-tone audiometry and speech assessment. The genealogy was then prepared for the Nongsten clan.

Results: Of 513 participants who were administered the questionnaire, 54 (n = 63) participants from NHL reported hearing loss, in contrast to 10 (n = 64) for NNH and 4 (n = 386) for OC. Some 76 participants volunteered for a comprehensive investigative protocol. Among these, sensorineural hearing loss was detected in 96% from NHL, 24% from NNH, and 50% from OC. Hearing loss was bilateral, moderately severe to profound in 42 (93%) participants from NHL. In contrast, only 1 participant from OC and none from NNH had moderately severe to profound SNHL. The age at onset of hearing loss was 10.1 ± 9.9 years among the NHL group. The genealogy chart with 8 generations and 120 members from NHL clan revealed exclusively maternal inheritance of hearing loss, which was noticed from the third generation onwards. No syndromic or aminoglycoside association aminoglycosides was present.

Conclusion: The lineage of the Nongsteng clan with hearing loss shows non syndromic bilateral moderately severe to profound sensorineural hearing loss with variable age of onset, with a maternal inheritance, indicating mitochondrial inheritance.

OTOPLAN-Based Study of Electrode Position in Transcanal Veria Technique

Kranti Bhavana, MS, DNB (Presenter); Sailaja Timmaraju; Vijay Kumar

Introduction: Various studies have described electrode insertions through the round window membrane in a posterior tympanotomy technique; however, there is a dearth of studies that compare the electrode position and placement in both round window and cochleostomy approach through the transcanal Veria approach.

Method: This retrospective study was done on patients having bilateral, severe to profound, sensorineural hearing loss who underwent cochlear implantation surgery. Patients who were selected through a simple random sampling method fell in the age range of 2 to 15 years. Our primary objectives were (1) to perform, using OTOPLAN software, a postoperative evaluation of intracochlear electrode position following both round window and cochleostomy insertion in transcanal Veria technique; (2) to study the parameters of electrode position (angle/depth of insertion, scala tympani insertion, etc) following round window insertion and cochleostomy insertion in transcanal Veria technique; and (3) to look for any significant difference in intracochlear electrode position in 2 different insertion routes. Postoperative computed tomography scans were analyzed for the following parameters: (1) cochlear parameters, (2) scalar placement of electrode, and (3) angle of insertion (AID) of the electrode.

Results: The average cochlear duct length was found to be 39.03 mm. The average AID in patients with the standard electrode array was found to be 660° , with a minimum AID of 581° and a maximum AID of 773° . There was no significant difference in AID between the 2 groups. No kinking or bending of electrodes was seen in either of the 2 groups.

Conclusion: Surgeons operating using the transcanal Veria technique for cochlear implantation have traditionally used the cochleostomy approach to introduce the cochlear electrode, fearing kinking and bending of electrodes if the round window approach was used. This study refutes this concept as there was no kinking or bending of the electrode in the round window insertion group. There was no significant difference in AID in either group.

Petrous Apex Meningocele With Left Trigeminal Neuropathy and Pseudotumor Cerebri

Emily Gall, MD (Presenter); Carl Heilman; Max Shutran; Kathryn Noonan, MD; Jonathon Sillman

Introduction: The purpose of this report is to describe the presentation and management of a case of petrous apex meningocele and to suggest a schema of imaging, evaluation, and management based on review of the current literature.

Method: This is a retrospective case report and literature review. A chart review of the case in question was performed and a literature review was conducted.

Results: The patient presented with a 3-month history of left facial numbness, paresthesias, and worsening bruxism, as well as a 2-month history of imbalance and transient vertigo. She had mild left-sided conductive hearing loss and a 10-year history of left-sided pulsatile tinnitus, worse with Valsalva, and autophony. Computed tomography and magnetic resonance imaging revealed a fluid-filled lesion within the left petrous apex, contiguous with Meckel's cave and causing distortion of the trigeminal nerve. This was suspected to be a meningocele secondary to idiopathic intracranial hypertension associated with a history of morbid obesity. She underwent left anterior transpetrosal approach for repair of a petrous apex meningocele. A diagnostic lumbar puncture in the operating room revealed an opening pressure of 34 cm H₂O. Postoperatively, the patient's vertigo and left facial numbness improved. The pathophysiology and manifestations of petrous apex meningocele are reviewed, and a discussion of the optimal evaluation and management of this entity is presented.

Conclusion: Petrous apex meningoceles are uncommon and often asymptomatic. Surgical intervention is indicated when symptoms are clearly associated with the lesion.

Petrous Apicitis: A Systematic Review and Case Presentation

Mayand Vakil, MD (Presenter); Guy Talmor, MD; Chris Tseng; Peter Svider, MD; Yu-Lan Ying, MD; Jean Anderson Eloy, MD

Introduction: Petrous apicitis (PA) is a rare but dangerous complication of acute otitis media (AOM). We systematically reviewed the existing literature on PA to characterize clinical presentation, diagnosis, management, and outcomes in the antibiotic era.

Method: A comprehensive search from 1983 to June 1, 2020, of PubMed, MEDLINE, Cochrane Library, and Embase

databases was conducted. Studies with clinical data regarding patients with PA were included. Non-English literature or studies with insufficient individual patient data were excluded. Some 67 studies were reviewed, with a total of 134 patients.

Results: The mean age of presentation was 33 years, of which 55.2% of patients were male. Recent AOM was reported in 78 patients (58.2%). Only 3 patients (2.2%) were immunocompromised, and 8 (6.0%) had a history of diabetes. Gradenigo's triad of abducens palsy, otorrhea, and retro-orbital pain was reported in 28 patients (20.9%); however, these presenting symptoms were common individually (51.5%, 48.5%, and 64.2%, respectively). Hearing loss (35.8%), facial weakness (17.9%), and vertigo (7.5%) were also reported. The most common pathogen was *Pseudomonas* (34.2%), followed by *Streptococcus* and *Staphylococcus*. All 134 patients underwent imaging, with computed tomography being the most frequent used modality (56.0%). Nearly all patients received antibiotic therapy (95.6%), with 91 (67.9%) undergoing surgery ranging from myringotomy (26.9%) to petrousectomy (25.4%). Some 59 patients (67.8%) had complete resolution of symptoms, and 23 patients (26.4%) resolved the infection, but with residual deficits. Five patients (5.7%) died due to complications related to PA. Mean follow-up was 11.0 months.

Conclusion: PA has a variable presentation with potential for severe morbidity. Appropriate medical management with surgical drainage can avoid long-term sequelae.

Pontine Tegmental Cap Dysplasia, a Cause of Sensorineural Hearing Loss

Thomas C. Flowers, MD, MPH (Presenter);
Andrew Steven; Adam Master

Introduction: Pontine tegmental cap dysplasia (PTCD) is a rare congenital malformation of the brainstem first described in 2007. It consists of hypoplasia of the pons with aberrant fibers along the tegmental surface of the ventricle. This can result in palsies of cranial nerves V, VII, and VIII. We present a case of a patient with a history of a diffuse hypotonia, feeding difficulties, and bilateral profound sensorineural hearing loss, which was eventually found to be secondary to PTCD. Prior to presentation, the patient had an extensive neurologic and genetics evaluation, which included a magnetic resonance imaging (MRI) of the brain. The diagnosis remained undetermined, however, until subsequent dedicated temporal bone imaging revealed the diagnosis.

Method: This is a case report study of a rare cause of bilateral sensorineural hearing loss.

Results: A 5-month-old patient was referred to the pediatric otolaryngology clinic for evaluation for a failed newborn hearing screening. She was also being evaluated by neurology for hypotonia. Her parents reported that she had a normal MRI of the brain previously. Sedated ABR was consistent with bilateral profound hearing loss. She was subsequently fitted for hearing aids, but her parents noted little benefit. She was referred to neurotology for possible cochlear implantation. At

that time, the MRI of the brain was reviewed but noted a poor view of the cochlear nerves bilaterally. Dedicated computed tomography and MRI imaging of the temporal bones was done. This demonstrated flattening of the ventral pons with "cap-like" dorsal bulging of the upper pons. The vestibulocochlear nerves could not be identified bilaterally. In addition, the right facial nerve was noted to have a separate labyrinthine canal. This spectrum of findings was consistent with PTCD.

Conclusion: PTCD is a rare cause of sensorineural hearing loss. This patient had a workup over the course of 4 months before her diagnosis was finally revealed. This case demonstrates the importance of obtaining dedicated temporal bone imaging prior to cochlear implantation in cases of congenital hearing loss.

Postoperative Pain After Endoscopic Otologic Surgery: Systematic Review & Meta-analysis

Sara Toulouie (Presenter); Nikolas Block-Wheeler, MD, MS;
Alexander Rivero, MD

Introduction: Endoscopic ear surgery (EES) provides enhanced visualization when compared with microscopic ear surgery (MES), and equivalent outcomes including procedural safety, audiometry, and others have been previously reported. We hypothesize that EES leads to improved postoperative pain when compared with a traditional microscopic approach.

Method: A systematic review of PubMed, Ovid MEDLINE, Scopus, Web of Science, and Cochrane Central databases was conducted for studies published from 2000 to 2019. Article selection and screening followed standard PRISMA guidelines. Two investigators independently reviewed all manuscripts and performed quality assessment and quantitative meta-analysis using validated tools. Inclusion criteria were English-language studies and those containing original data on postoperative pain following EES and MES.

Results: Of the 157 abstracts identified, 13 studies fulfilled eligibility: 7 retrospective studies, 5 randomized control trials, and 1 case series. Studies included surgery for cholesteatoma (2), tympanoplasty/myringoplasty (6), and stapedotomy (5). Postoperative pain was quantitatively described using a variety of numerical pain scores: numerical rating scale (NRS), visual analog scale (VAS), 3 grades. Meta-analysis was performed on 10 studies and demonstrated a standard mean difference of postoperative pain improvement of -1.56 (95% CI, -2.36 to -0.76) and 0.2 (95% CI, 0.09 to 0.45) in EES for the NRS/VAS and 3 grades scores, respectively. Additional qualitative strengths recognized by EES included significant improvements in postoperative air conduction, graft success rate, taste sensation, and operating times. Quality assessment indicated a low to moderate risk of bias for all studies.

Conclusion: EES remains a reliable alternative to traditional microscopic interventions. Meta-analysis confirms that EES results in significantly less postoperative pain when compared with MES. This burgeoning surgical approach should be

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considered in the armamentarium of otologic surgeons to allow for improved outcomes.

Predicting Facial Nerve Recovery After Lateral Skull Base Surgery

Jacob Kahane (Presenter); Laura Hetzler; Sara Macdowell; Moises Arriaga

Introduction: Facial paralysis is a frequent and often devastating result of lateral skull base surgery. In this study, we attempt to predict which patients will recover function in the setting of an intact facial nerve.

Method: We conducted a retrospective chart review of patients undergoing vestibular schwannoma surgery from 2015 to 2019 within a tertiary care academic otolaryngology department. Patients met inclusion criteria if they had a House–Brackmann score of 1 preoperatively and 6 postoperatively with an intact facial nerve. Primary outcome measures were 6-month and 1-year postoperative House–Brackmann scores. In addition, this subset of patients was compared with those undergoing dynamic facial reanimation in the setting of nerve transection.

Results: Fourteen patients met inclusion criteria. The mean House–Brackmann score at 6 months postoperatively was 4.8 and at 1 year was 3.7. A decrease in House–Brackmann score of 2 points at 6 months was 100% sensitive and 86% specific in predicting a 1 year score of 3 or below, indicating complete eye closure. The presence of synkinesis at 6 months postoperatively was 83% sensitive and 100% specific for predicting a House–Brackmann score of 4 or greater at 1 year. Finally, the mean House–Brackmann score of patients 1 year after undergoing dynamic facial nerve reanimation due to nerve transection was 3.9. This was significantly lower than the mean scores of those patients with synkinesis at 6 months (5.85) and those who failed to improve by 2 points or more at 6 months (5.33).

Conclusion: The management of facial paralysis in the setting of an intact nerve after skull base surgery has been controversial. Prior studies have shown that failure to improve within 1 year postoperatively points to a poor prognosis and is an indication for facial reanimation. Quality of life of patients with facial paralysis is poor, and the 1-year waiting period adds significant challenges and morbidity. We present findings indicating that failure to improve House–Brackmann score by 2 points, or the presence of synkinesis, at 6 months postoperatively portends a poorer prognosis.

Predictive Patient Factors for Poor Outcomes Following Stapedotomy for Otosclerosis

Shivam D. Patel (Presenter); Robert A. Saadi, MD; Jeffrey Liaw, MD; Huseyin Isildak, MD

Introduction: In patients undergoing stapedotomy for otosclerosis, smoking has been theorized to increase the risk of incus necrosis and prosthesis failure due to local vasoconstriction. Although smoking has been shown to be a risk factor for tympanoplasty, postoperative outcomes relative to smoking

history have not been well-studied in the context of middle ear surgery for otosclerosis.

Method: A retrospective study was conducted of 107 patients with otosclerosis who underwent stapedotomy between 2013 and 2020. All patients underwent stapedotomy with perichondrial graft and bucket handle prosthesis for ossicular chain reconstruction with temporalis fascia graft. Demographics, comorbidities, and smoking history were obtained. Preoperative and postoperative audiogram data, including air–bone gap (ABG), and complications were collected. Data were analyzed using *t* test and Fischer exact test for continuous and categorical variables, respectively.

Results: There were a total of 107 patients. The 2 comparison groups included patients with a recent or active smoking history (29.9%) and nonsmokers (70.1%). The average ABG gain at 3 months postoperatively for all patients was 20.2 dB. Across all patients, intraoperative and postoperative complications were 3.74% and 13.1%, respectively. Age was the only significant predictor of ABG gain at 3 months in this model ($P = .027$). The average ABG gain at 3 months was not significantly different between those with and without smoking history, respectively (19.7 vs 23.9, $P = .13$). There was not a significant difference observed between smokers and nonsmokers with respect to intraoperative and postoperative complication rates. Multivariate analysis including demographic data and comorbidities is pending.

Conclusion: Although a history of smoking has been implicated in poor hearing outcomes in middle ear surgery, our results suggest that smoking may not impact the incidence of postoperative complications or lead to worse hearing outcomes in patients undergoing stapedotomy with bucket handle prosthesis for otosclerosis.

Preliminary Characterization of Ear Microbiota in Chronic Otitis Externa

Alexandra T. Bourdillon (Presenter); Amanda Zhou; Mytien Nguyen; Douglas Hildrew; Noah Palm; Heather Edwards

Introduction: Increasing evidence implicates host–microbiome interactions in a variety of inflammation-driven conditions in otolaryngology, including otitis media. To date, no human clinical studies exist in the context of chronic otitis externa (COE).

Method: Bilateral ears were sampled with sterile swabs from 26 patients with COE who met inclusion criteria from July to December 2019. Asymptomatic ears from the same patient served as individual controls. Labeled samples were processed using standardized 16S rRNA extraction and sequencing protocol to profile ear bacterial species. Sequencing reads were aligned, classified, and assigned to bacteria taxa using QIIME2. All 52 samples met quality thresholds. One outlier sample (and its pair) measured by UniFrac distance was excluded. Bacterial community richness and species abundance were examined for correlations with various patient demographic and clinical parameters.

Results: No significant differences in phylogenetic diversity or distribution was observed between symptomatic COE and asymptomatic ears, even after controlling for individuals. Fusobacteria were differentially abundant in control samples. Bacterial community composition in otorrhea ears varied significantly across individuals, which may potentiate differences between COE and control samples. Notably, ear microbiota composition and diversity were significantly influenced by clinical parameters such as smoking history, diabetes mellitus, autoimmune disease, and otalgia.

Conclusion: Shifts in ear microbiota profiles may be associated with patient behaviors or clinical features such as otorrhea and immunological diseases. Further studies are requisite to potentially identify key microbial players in symptomatic COE development and progression. This understanding will inform novel treatments to modulate ear microbiota for the prevention or management of COE.

Primary External Auditory Canal Cholesteatoma: Pathogenesis Theories

Emma J. Djabali, MS (Presenter); Rex Haberman, MD

Introduction: External auditory canal cholesteatomas (EACC) are thought to occur either primarily or secondarily to congenital defects, surgery, trauma, inflammation, canal narrowing/obstruction, radiation, or tumor. This systematic review aims to examine the theories of the pathogenesis of primary EACC.

Method: We considered all published medical literature on the pathophysiology of primary EACC. One author conducted a systematic review using the PubMed-NCBI, Embase, and Web of Science databases.

Results: The search strategy identified a total of 745 papers, and 17 publications were included in this study. Primary EACCs are hypothesized to arise via 4 main mechanisms. A first and most widely referenced theory involves reduced migration velocity of the epithelial cells lining the EAC. It emerged from a study by Makino et al in 1986, which was contested in 2008 by a control study by Bonding et al showing normal migration patterns in ears with EACCs. Smoking has been demonstrated to be a risk factor for EACC, leading to hypoxia-induced uncontrolled angiogenesis being suggested as a possible theory. A third theory involves inflammation-induced excessive keratinocyte proliferation. Finally, it has been proposed that underlying osteitis may cause the development of EACC. Local inflammation is often mentioned as an underlying process in primary EACCs, suggesting that these are in fact secondary to an inflammatory process. For example, chronic use of cotton-tipped applicators is a potential risk factor for primary EACC, implying these are actually secondary to repeated microtrauma as opposed to true primary EACCs.

Conclusion: Significant debate about the underlying pathogenesis of EACC remains. We propose that the established EACC classification of primary vs secondary is potentially misleading. Primary EACCs likely occur as a postinflammatory process secondary to an unelucidated inciting event. Further research is needed to clarify the pathogenesis of

primary EACC. We plan on conducting a retrospective study of all patients with EACC treated at 1 tertiary care center to examine possible underlying causes.

Properties of Surviving Hair Cells in Damaged Mouse Balance Organ

Grace Kim (Presenter); Tian Wang; Zahra Sayyid; Jessica Fuhrman; Sherri Jones; Alan Cheng

Introduction: Sensory hair cells are required by the vestibular system to detect head motion. Prior studies examining vestibular stimuli evoked potential (VsEP), a brainstem response as a result of a linear acceleration exerted on the head, have shown limited recovery after damage concurrent with cell regeneration. Here, we fate-mapped hair cells prior to hair cell ablation and characterized these “surviving hair cells” in the context of VsEP thresholds.

Method: We injected P1 Atoh1-CreERT2; Rosa26tdTomato; Pou4f3-DTR mice with tamoxifen and diphtheria toxin using Atoh1-CreERT2; Rosa26tdTomato mice as control. Animals underwent VsEP testing at P15 and P30 prior to tissue harvest at P30. Antibodies against osteopontin (type I) and annexin A4 (type II) were used to determine hair cell subtype, and Tuj1 was used to identify neurites. Presynaptic (CTBP2) and postsynaptic (Homer) markers were used to quantify colocalized basolateral synapses. The apical bundles were labeled with phalloidin and categorized as long, short, or absent. Animals with and without VsEP recovery were separately analyzed.

Results: Some 57% of damaged mice had VsEP recovery at P30 ($P < .001$). About 18% of the fate-mapped hair cells survived at P30 in the recovery group, while 5% survived in the nonrecovery group. Surviving hair cells consisted of both type I and II hair cell subtypes (~50% each) in both the recovery and nonrecovery groups. In contrast to the nonrecovery cohort, the recovery group had significantly more surviving type I hair cells with calyces and more surviving type II hair cells with increased number of colocalized pre- and postsynaptic markers. This contrasts with regenerating hair cells, which are primarily type II hair cells. In addition, the recovery group had significantly more surviving hair cells with long apical bundles than the nonrecovery group did ($P < .001$).

Conclusion: Surviving hair cells consist of both type I and II hair cells, a subset of which displayed increased calyceal innervation, synaptic colocalization, and long apical bundles in the recovery cohort.

A Prospective Evaluation of MicroRNAs as a Ménière's Disease Biomarker

Madeleine St. Peter (Presenter); Matthew Shew; Helena Wichova; Hinrich Staecker

Introduction: Ménière's disease is a debilitating inner ear disorder characterized by vertigo, sensorineural hearing loss, and tinnitus. The clinical presentation of Ménière's disease is variable, and more precise diagnostic tools are needed. Cluster

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analysis has suggested there are at least 5 different categories of Ménière's disease, and multiple different genes have been implicated. At this point in time, the diagnosis is made purely on the clinical presence of sensorineural hearing loss, attacks of vertigo, and fluctuating aural symptoms. Previous studies performed in our lab have identified microRNAs differentially expressed in the perilymph and serum of patients with active Ménière's disease.

Method: This was a prospective single-center study. Patients with active Ménière's disease and age-matched control patients were enrolled. Evaluation of serum microRNA expression was compared with hearing level and reported unilateral or bilateral disease activity. The presence of concurrent autoimmune disease or migraines were noted.

Results: MicroRNA expression in serum could be correlated to the diagnosis of Ménière's disease. There was variance in the expression level of microRNA-1299.

Conclusion: The development of reliable biomarkers for Ménière's disease will lead to better classification of the subgroups of Ménière's disease, leading to the development of novel treatments.

Rates of Discontinuation and Nonpublication in Otology Clinical Trials

Trevor Torgerson (Presenter); Austin L. Johnson; Savannah Nicks; Ben Heigle; Patrick Buchanan; Matt Vassar

Introduction: Otology clinical trials are a critical component of otolaryngology research as they are used to guide clinical decision making. For this reason, the extent of nonpublication and discontinuation of otology randomized controlled trials (RCTs) is of great interest. Here, we quantify the extent of nonpublication and discontinuation in otologic clinical trials.

Method: A search was conducted on November 2, 2020, on Clinicaltrials.gov using keywords relevant to otologic disorders or interventions. The search resulted in a sample of trials that were used to identify the completion and publication status of each otologic clinical trial. If a reason for discontinuation or a publication could not be identified, the primary investigator was contacted to determine the rationale for discontinuation or nonpublication.

Results: Our sample included 140 RCTs, of which 93 were completed (66%) and 47 (34%) were discontinued. The most commonly listed reasons for trial discontinuation were insufficient participant enrollment and negative efficacy from a similar trial; however, 33 RCTs (70%) did not list a reason for discontinuation. A total of 71 (51%) of the 140 included RCTs were published, and 69 (69/140; 49%) did not reach publication. There were a total of 78,050 participants enrolled (median 73; interquartile range 30.5–205; range 0–55,779), with 4899 (6%) participants (median 54.5; interquartile range, 11.3–167.5; range 0–821) enrolled in discontinued studies and 12,360 (16%) participants (median 80; interquartile range 27–220; range 0–990) enrolled in trials that never reached publication.

Conclusion: We found nearly one-third of included otologic clinical trials were discontinued, and half of these trials never

reached publication. In addition, almost 5000 patients were enrolled in discontinued trials and more than 10,000 were enrolled in trials that never reached publication, potentially subjecting these patients to harmful interventions without any benefit to the otology literature. This high degree of discontinuation and nonpublication in otologic clinical trials is of great concern and should be further evaluated.

Reconstruction of a Temporal Bone Defect With Concurrent Facial Reanimation

Sean P. Holmes, MD (Presenter);
Cherie-Ann O. Nathan, MD; Peter Horwich; Brent Chang

Introduction: Reconstruction of defects of the lateral temporal and surrounding soft tissues remains a challenge due to the complex nature and size of each defect. When facial nerve sacrifice is required, an added layer of complexity must be considered in preoperative planning. Focuses of reconstruction should include filling in soft-tissue and bony defects, and providing adequate reanimation of facial function by static and/or dynamic procedures.

Method: We report the case of a 46-year-old White man with parotid acinic cell carcinoma involving the temporal bone and facial nerve, who presented with preoperative facial paralysis. He underwent lateral temporal bone resection, parotidectomy with facial nerve sacrifice, and selective neck dissection.

Results: His surgical defect was reconstructed with a gracilis free flap with obturator nerve–trigeminal nerve neurotomy and a rotational sternocleidomastoid flap. He has had no immediate postoperative complications, and his reconstruction is healing well to date.

Conclusion: The gracilis free flap has been used for reconstruction throughout the body; however, reports of its use for surgical defects of the lateral temporal bone are lacking to date. Not only does this reconstructive option offer capability for facial nerve reanimation but it is also dynamic and robust for patients whose advanced malignancies may require postoperative radiation therapy. Furthermore, this flap can be contoured and paired well with a variety of local rotational flaps for additional soft-tissue coverage where necessary.

Resolution of Vertigo Symptoms in Patients With Eustachian Tube Dysfunction

Macaulay Ojeaga (Presenter); Arianna V. Ramirez;
Jared Sperling; Victor Espinoza; Blake Hensler, PA-C;
Vincent Honrubia, MD

Introduction: The objective of this study is to demonstrate that eustachian tube dilation is a safe and effective treatment for patients with eustachian tube dysfunction suffering from vertigo.

Method: This case series analyzes the medical records of 5 patients who underwent eustachian tube dilation for chronic vertigo secondary to eustachian tube dysfunction. The charts of patient initial, perioperative, and postoperative clinical encounters were reviewed. Patients' age and demographic information were also reviewed.

Results: A total of 5 patient encounters were investigated. The cohort included 1 man and 4 women. The average age of patients evaluated was 41 years old, with a range of 30 to 49 years old. All patients evaluated had a documented history of chronic eustachian tube dysfunction with no resolution after medical management. At their initial clinical encounter, the cohort had an average Sino-Nasal Outcome Test–20 (SNOT-20) score of 72.2. After surgical intervention with eustachian tube dilation, the average SNOT-20 score decreased to 22.4. No surgical complications were documented.

Conclusion: In this retrospective case series, Eustachian tube dilation was shown to improve vertigo symptoms in patients with persistent eustachian tube dysfunction.

Revision Canal Wall Down Mastoidectomy: Keys for Long-term Success

Aaron M. Domack, MD (Presenter); Ralph Lamonge; John Leonetti

Introduction: Canal wall-down (CWD) mastoidectomy is primarily reserved for refractory chronic ear disease. Recurrent cholesteatoma, narrow external auditory meatus, high facial ridge, and residual diseased air cells are the most common findings in revision CWD mastoidectomy cases in the literature. This study aims to share a single surgeon's experience of revision CWD mastoidectomy to identify failures of primary CWD surgery and postulate keys for long-term success.

Method: A retrospective review was conducted for 53 adult patients who underwent revision CWD mastoidectomy by the senior author at a tertiary academic medical center from 2007 to 2019. We reviewed and collected data from the patient's preoperative, surgical, and postoperative course. Descriptive statistics were performed with additional statistical analysis in progress.

Results: Otorrhea (72.2%) and new hearing loss (27.8%) were the most common presenting symptoms, while recurrent cholesteatoma (51.9%) and granulation tissue (50%) were the most common findings on the patient's preoperative physical exam. Findings at surgery were recurrent cholesteatoma (83%), narrow meatus (49%), and high facial ridge (35.8%). Some 47 patients (87%) achieved a dry ear at an average of 9 months.

Conclusion: The surgical approach for chronic ear disease should emphasize a wide meatoplasty and complete lowering of the facial ridge to obtain an adequate canal wall down mastoid and avoid revision surgery.

Seasonal Variation of Hip Fractures in Patients With BPPV

Steven D. Curry, MD, MPH (Presenter); Pooja M. Varman, MS; Alessandro Carotenuto, MD; Justin C. Siebler, MD; Jonathan L. Hatch, MD

Introduction: Seasonal variation of benign paroxysmal positional vertigo (BPPV) presentation has been reported, with higher rates of presentation in months associated with times of lower serum vitamin D levels. The purpose of this study was

to examine the association between the timing of hip fracture in patients with BPPV and other vestibular diagnoses.

Method: A retrospective review of adult patients with hip fracture due to ground level fall based on ICD-10 code S72 from 2013 to 2019 at a tertiary care academic medical center who had previously been diagnosed with a vestibular disorder based on ICD-10 codes H81-83, A88.1, and R42. Included patients were matched on age and sex to control patients who had hip fracture but no vestibular diagnosis. Patient charts were reviewed, and demographic and clinical data were extracted related to hip fracture and prior vestibular diagnosis. Groups were subdivided based on whether patients had a hip fracture from January to June vs July to December. Fisher exact test was used to evaluate for a difference in seasonal variation between groups.

Results: There were 201 patients with vestibular disorders, including 27 patients with BPPV. The mean age was 79.5 years, and the sample was 66.9% female. Rates of hip fracture among patients with BPPV was higher in January to June (63.0%) vs July to December (37.0%) (odds ratio 1.59; 95% CI 0.66–4.00). The rate of hip fracture was not significantly different between these time periods for the control group (51.7% vs 48.3%) or the vestibular group (53.2% vs 46.8%). While nearly two-thirds of the BPPV patients had hip fracture during months associated with lower serum vitamin D levels, the difference compared with the control group did not reach statistical significance ($P = .32$).

Conclusion: These results offer preliminary evidence that in addition to an increased presentation for BPPV during months associated with decreased serum vitamin D, injuries due to BPPV may be increased as well. The present study is limited by the statistical power afforded by the small number of patients with BPPV and hip fracture that were identified.

Skiza (Listen up)! Is Listening Safe for Kenyan Youth?

Lillian Mokoh, MbCHB, MMED, ORLN (Presenter); Rose Njogu, MSC; Matthew L. Bush, MD, PhD, MBA

Introduction: According to the World Health Organization, 1.1 billion young people between 12 and 35 years of age are at risk of noise-induced hearing loss (NIHL), primarily due to use of electronic devices. Kenya, like many countries throughout the world, is undergoing rapid urbanization and industrialization with ample access to these devices; however, hearing health care and hearing aids are inaccessible and unaffordable to much of the general population. In line with the 2015 WHO Make Listening Safe Initiative, this study seeks to assess listening habits and awareness on safe listening practices among Kenyan youth.

Method: This is a cross-sectional web-based questionnaire study among Kenyan youth (<35 years). The questionnaire assessed demographics, listening patterns regarding electronic devices, and awareness of risks and symptoms of NIHL.

Results: There were 604 participants in the survey (50.3% females 49.7% males, median age 27 years). Most of the

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participants (92.1%) had attained tertiary-level education. The prevalence of listening device use was 79.8%, with 42.7% reporting daily use. Earphones were the primary means of listening (77.9%). There were significant inverse relationships between age and duration of daily use ($P = .006$) and age and listening volume levels ($P = .001$). More than 94% were aware that high-volume listening can cause hearing loss, and 87.8% receive device warnings of high volumes; however, 42% reported that they disregard the device warning. Many participants reported auditory symptoms after device use (tinnitus = 19.3%, fullness in ears = 44.6%, hearing difficulty = 11.6%).

Conclusion: There is evidence that Kenyan youth are exposed to potentially dangerously high levels of sound through personal electronic devices and may disregard device warnings of high-volume levels. Furthermore, this population experience auditory symptoms after device use. There is a need for vigorous public health campaigns on prevention of NIHL especially in educational settings along with the development of active and frequent screening programs to promote early detection and intervention for NIHL.

Skull Base Osteomyelitis as a Sign of an Undiscovered Carcinoma

Pauline Stoecker (Presenter); Stefan Lyutenski; Marc Bloching

Introduction: Skull base osteomyelitis (SBO) is a life-threatening disease. Since it is primarily related to uncontrolled diabetes, other immunocompromising factors are commonly underestimated during its assessment and treatment.

Method: All cases treated for SBO in a tertiary care hospital since 2018 were retrospectively analyzed.

Results: Of the 8 patients identified (all male, average age 82.6 years), 9 presented with lateral SBO manifested as a malignant otitis externa, 1 patient had central SBO involving the clivus, and 1 patient suffered from osteomyelitis of the temporal bone of uncertain etiology. Seven patients (87.5%) had diabetes as a preexisting condition. One patient had been diagnosed with a malignant disease (non-Hodgkin B-cell lymphoma) prior to diagnosis and treatment of SBO. A few weeks after the treatment, 2 patients suffered from acute gastrointestinal symptoms for their SBO, and both were diagnosed with a colon carcinoma following further examination. Based on this experience, a positron emission tomography–computed tomography (PET-CT) scan was initiated for the next patient presenting prolonged SBO to rule out an undetected carcinoma. The PET-CT showed signs of an early-stage bronchial carcinoma. Thus, in total, 4 of the 8 patients (50%) showed a malignant disease. This subgroup was characterized by severe manifestation of SBO with insufficient improvement in symptoms and findings, despite weeks of application of intravenous antibiotics, surgical therapy, local treatment and well-controlled blood sugar levels.

Conclusion: In atypically prolonged SBO with well-controlled diabetes and insufficient improvement through multimodal therapy, an undetected asymptomatic carcinoma as a cause of a compromised immune system should be ruled

out. Additional examination with a thoracic-abdominal CT or a PET-CT is recommended to detect a masked carcinoma and begin causal therapy.

Spontaneous Salivary Otorrhea:

A Case Report

Peter Steinwald, MD (Presenter); Kathryn Titcomb, PA; Jeremiah Tracy, MD; Kathryn Noonan, MD

Introduction: Spontaneous salivary otorrhea is a rare condition that occurs in the setting of a patent foramen tympanicum allowing a fistula to develop between the parotid gland and external auditory canal. Most cases of salivary otorrhea are the result of trauma or prior surgery, although only a few instances of spontaneous salivary otorrhea have ever been reported in the literature.

Method: Here we present the case of a 66-year-old woman who presented to otolaryngology clinic in January 2020 with copious salivary otorrhea with all oral intake. It started spontaneously after completing chemotherapy for breast cancer. The patient was treated with botulism toxin injections and eventually surgical resection of fistulous tract with a temporo-parietal fascia flap.

Results: Biochemical analysis of otorrhea showed high levels of amylase. Computed tomography showed patent foramen tympanicum. Conservative measures were unsuccessful. Surgical resection of fistulous tract led to complete resolution of symptoms immediately after surgery and no continued otorrhea at 1-month follow-up.

Conclusion: Given the lack of reported cases of spontaneous salivary otorrhea, management methods have not been well defined. Biochemical analysis of otorrhea for amylase can be a useful tool in guiding diagnosis. This case provides further support of surgical intervention as the definitive treatment option. This is also the first time chemotherapy has been reported as a possible risk factor for development of spontaneous salivary otorrhea in patients with patent foramen tympanicum.

Statistical Shape Models and Anatomical Variability of the Temporal Bone

Andy S. Ding (Presenter); Alexander Lu; Zhaoshuo Li; Jeffrey H. Siewerdsen; Russell H. Taylor, PhD; Francis X. Creighton, MD

Introduction: The temporal bone contains multiple intricate anatomical structures on a relatively small scale, and little is known about interpatient and interstructure variability of temporal bone anatomy. Statistical shape models (SSMs) provide a powerful basis in which to quantify the natural variation of anatomical structures as evident in medical images. This study presents SSMs of various temporal bone structures using automated image registration techniques.

Method: A total of 37 temporal bone cone-beam computed tomography scans were included in this analysis. Anatomical structures, including the middle ear ossicles, inner ear, facial nerve, and chorda tympani were segmented using 3D slicer and the Advanced Normalization Tools Python package.

Statistical shape models were built with these segmented images using MATLAB.

Results: Principal component analysis of the malleus, chorda tympani, facial nerve, and the bony labyrinth identified 11, 7, 9, and 9 components, respectively, that describe >90% of shape variability. Examination of the first three principal components for each structure showed that the greatest variability in the malleus related to the length of the manubrium (mean: 4.36 mm; ± 2 SD: 3.74 to 5.31 mm), as well as rotation about the long axis of the malleus (± 2 SD: -4.7° to 3.5° anterior). The facial nerve and chorda tympani exhibited greatest variability in rotation about the transverse plane. Finally, analysis of the bony labyrinth showed its greatest variability to involve the angle between the posterior and superior semicircular canals (mean: 95.0° ; ± 2 SD: 80.6° to 107.7°) and orientation of the basal turn of the cochlea (± 2 SD: -15.4° to 17.1° posteromedial).

Conclusion: Statistical shape models of structures in the temporal bone can inform surgeons on areas of greatest inter-patient variability for individual anatomical structures. These models add to our knowledge of temporal bone anatomy, and the automated method described in this model allows for further investigation of temporal bone anatomical variation based on age, body habitus, gender and geographical location.

Stem Cells Mobilization in Repairing Damaged Inner Ear in Rats

Ahmed M. Elbana (Presenter); Ahmed Omran

Introduction: The present work assessed the possibility of mobilizing endogenous bone marrow derived stem cells (SCs) in rats using granulocyte colony stimulating factor (G-CSF) to induce regeneration and repair to experimentally damaged inner ear hair cells by Amikacin injection.

Method: The study included 30 adult Sprague-Dawley male rats. Experimental induction of inner ear damage was done by repeated intratympanic injection of amikacin sulfate. Mobilization of bone marrow SCs was provoked by subcutaneous injection of G-CSF. Cochlear integrity, induction of hearing loss, and functional recovery of sensory hearing loss were assessed using distortion product otoacoustic emission (DPOAEs). The morphological alteration and recovery of the organ of Corti were assessed histologically using the light and scanning electron microscopes in Alexandria University Hospital Animal Laboratory between April 2011 and June 2011.

Results: After 6 months, there was improvement in 50% of the sensorineural DPOAE results. Functional recovery coincided with the repair of structural components of organ of Corti.

Conclusion: Stem cell mobilization by G-CSF is a promising alternative method for replacement therapy in sensorineural hearing loss.

Steroid Therapy on the Preservation of Residual Hearing After CI

Piotr H. Skarzynski, MD, PhD, MSc (Presenter);
Magdalena Beata Skarzynska; Aleksandra Kolodziejak;
Ewelina Bukata; Elzbieta Gos

Introduction: The procedure treatment of severe to profound hearing loss is cochlea implantation. Pharmacotherapy is an important factor that contributes to preserving better residual hearing after cochlear implantation. The objective of this study was to estimate how 2 different regimes of steroid administrations affect the preservation of residual hearing.

Method: In this prospective study, 2 groups of patients with cochlear implants from 2 different companies (Medel and Oticon) were examined. The groups were divided into 3 subgroups. In the first subgroup, patients underwent standard intravenous (IV) steroid therapy following implantation. In the second subgroup, patients underwent prolonged treatment with a combination of oral and IV corticosteroids. The third group was a control group who received no steroids before or after implantation. All groups were tested with pure-tone audiometry before and after implantation.

Results: Results of hearing thresholds in the Medel group were slightly worsened after implantation compared with preoperative hearing thresholds. In the Oticon group, the results were significantly worse after implantation as compared with preoperative hearing thresholds.

Conclusion: Depending on the cochlear implant used from Medel or Oticon, a slight or significant deterioration of the hearing thresholds was observed after cochlear implantation. Treatment with steroids was mostly contributed to preserving hearing in the Medel group, whereas steroid therapy was irrelevant for an Oticon cochlear implant.

Subclinical Hearing Loss in Systemic Lupus Erythematosus

Nuno O'neill Mendes (Presenter); Gustavo Pedrosa;
Liliana Carvalho; Ana Guimarães; Filipe Freire

Introduction: Inner ear involvement and sensorineural hearing loss (SNHL) have been widely reported in patients with SLE; however, literature involving high-frequency audiometry (HFA) and distortion product otoacoustic emissions (DPOAE) is sparse. This work aims to evaluate the audiological findings in a population with SLE and to ascertain if there is any association between audiological alterations and the degree of activity of the disease and/or elapsed time since SLE diagnosis.

Method: This case-control study was conducted from June to July 2020. Patients with SLE were recruited from our hospital. Patients 40 years old were excluded, as were patients with history of noise exposure, patients taking potentially ototoxic drugs, and patients with a personal or family history of otologic disease. A sample of 30 patients was obtained (mean age: 32.7 years; 87% women), group case "L." A control group "C" was created (equal number of individuals; no history of autoimmune disease, similar distribution to group "L," with same exclusion criteria). HFA, pure-tone audiometry (PTA), and DPOAE (750 Hz to 8 KHz) were performed in all 60 subjects. Chi-square and Mann-Whitney tests were used for statistical analysis.

Results: On HFA, at 12 KHz and 16 KHz, we found a statistically significant difference between the mean hearing

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threshold in the L group (12 KHz: 41 dB sound pressure level [SPL]; 16 KHz: 57-dB SPL) and C group (12 KHz: 35-dB SPL; 16 KHz: 54-dB SPL ($P = .02$) at a confidence level (CL) of 95%. In L group, DPOAE were absent in at least 1 frequency in 33% of cases, while in control individuals, DPOAE were present in all frequencies ($P = .04$; CL = 95%). On PTA, we found no cases of SNHL in controls and 6 cases of SNHL in the L group ($P = .22$; CL = 95%). In SLE patients, SNHL was strongly associated ($\eta = 0.85$) with more time since onset of the disease (mean: 16.3 years). Any of the aforementioned findings was related to the degree of activity of the disease.

Conclusion: Our results suggest that subtle early damage of the inner ear (absent DPOAE in 33% of patients and raised hearing thresholds at 12 and 16 KHz) may anticipate clinical SNHL in SLE patients with more prolonged illness.

Subtotal Petrossectomy: An Evidence Based Review

Jaspreet Amar (Presenter); Brian Yuhan, MD;
Brandon Golant; Matthew L. Kircher, MD

Introduction: We perform an evidence-based review describing the technique, indications, outcomes, and complications of subtotal petrossectomy (STP).

Method: A systematic review was conducted on literature describing Subtotal Petrossectomy. PubMed/MEDLINE, Cochrane Library, Ovid, and Scopus databases were evaluated. Studies were assessed for quality of evidence and risk of bias using the GRADE and MINORS criteria.

Results: A total of 38 studies, all case series, met inclusion criteria. In total, 1332 operated ears from 1185 patients who underwent STP were identified. GRADE criteria indicated studies of low to unclear quality with a mean MINORS score of 11.1. Two cohorts were identified. The most common inflammatory/infectious indication included chronic otitis media and cholesteatoma with 624 (44.2%) and 311 (22.0%) respectively, while the most common neoplastic indication was for glomus tumors and vestibular schwannomas with 50 (3.5%) and 31 (2.2%), respectively. In total, 333 STPs were performed with simultaneous cochlear implantation. The overall pooled complication rate was 11.9%. The pooled fistula rate was 3.7% ($n = 49$) and cholesteatoma recidivism rate was 2.6% ($n = 35$). Of the 36 cases requiring reoperation, 14 (38.9%) were related to cochlear implant reimplantation, explantation, or repositioning, and 6 (17.1%) were related to recurrent cholesteatoma.

Conclusion: Since its inception, the nomenclature for STP has been variably defined, and indications in the literature have been diverse and often confusing. This study defines STP, with obliteration of the mastoid and middle ear and closure of the external auditory canal, as an effective technique in mastoid and middle ear disease that are recurrent and chronic and that leave behind a large cavity or expose vital structures with no apparent chance of reconstruction of the conductive apparatus. It is a relatively safe procedure that provides middle ear exclusion and can be used effectively in preparing an ear with unfavorable conditions for cochlear implantation.

Sudden Sensorineural Hearing Loss in Sickle Cell Patients

Annie N. Farrell (Presenter); Geethanjeli N. Mahendran;
Ching Siong Tey; Nandini Govil, MD, MPH; Kristan Alfonso

Introduction: We conduct a systematic review of published literature on the occurrence of sudden sensorineural hearing loss (SSNHL) in the sickle cell disease (SCD) population.

Method: A systematic review was conducted to investigate sudden sensorineural hearing loss in patients with SCD. Four separate databases were searched (PubMed, Cochrane, Embase, and Web of Science). Articles were included from the earliest available to March 1, 2020. Search strategy and syntax were created and agreed upon with a library informationist. The study was registered in the Prospero International Register and article review was conducted using Covidence software. Abstracts and full articles were reviewed independently by 2 authors in a staged approach for inclusion in the systematic review. PRISMA guidelines were adhered to.

Results: Ten case reports, 2 case series, and 2 cohort studies were included with a total of 21 patients. Year of publication ranged from 1973 to 2019. Potential etiologies of SSNHL were found in 6 patients, including potential hemorrhage of the internal acoustic canal (IAC), cochlear vaso-occlusion, labyrinthitis, and extramedullary hematopoiesis. Ten patients experienced a sickle cell crisis concomitant with the sudden hearing loss event. The outcome and treatment regimens were not consistently reported across studies but included steroid treatment and exchange transfusion. Only 5 patients had improvement of the SSNHL, and 3 patients had subsequent cochlear implantation.

Conclusion: SSNHL in patients with SCD leads to significant morbidity. The current literature shows that SSNHL in this patient population can occur from multiple etiologies and is not always reversible. Moving forward, it is imperative that further investigation be done to establish concrete and clear guidelines regarding workup, treatment, and follow-up of these patients.

Surgical Treatment of Cholesteatomatous Labyrinthine Fistula by Hydrodissection

Sebastien Schmerber, MD, PhD (Presenter)

Introduction: Labyrinthine fistula is the most common complication of chronic cholesteatomatous otitis media, observed in 3% to 12% of cases. Hydrodissection is a simple technique in cholesteatoma surgery complicated by labyrinthine fistula, accessible to all otologists.

Method: Retrospective series of 207 cases of middle ear cholesteatoma operated between 2008 and 2018 comprised 16 lateral semicircular canal (LSC) fistulas, corresponding to an incidence of 8%. These patients (3 women, 13 men) had a mean age of 47 years (SD: 19 years). Fistulas involved the right LSC in 12 cases and the left LSC in 4 cases. Five of the 16 cases were treated by primary surgery. The fistula test was positive in only 35% of cases. Hydrodissection should preferably be performed with a fairly small calibre Luer otological

suction cannula, usually with an inner diameter of 0.7 to 1 mm. The Luer connector facilitates rapid changes of cannula during surgery. The diameter of the cannula should always be smaller than that of the suction cannula to avoid flooding the operative field. The irrigation solution used is physiological saline at body temperature or Ringer's lactate. Three criteria must be strictly observed to avoid any accidental suction of perilymphatic fluid: use of pedal-controlled suction, use of a suction cannula only to hold the fragment of cholesteatoma matrix and maintained in constant contact with this tissue, and continuous hydrodissection between the progressively detached matrix and the fistula itself.

Results: No recurrent or residual cholesteatoma was detected either clinically or on imaging, with a mean follow-up of 6 years (SD: 2 years) for the 16 cases. A sensorineural hearing loss of about 10 dB occurred in 1 case. The postoperative mean air-bone gap decreased in 7 cases (3 type II ossicular reconstructions, 4 type III), remained unchanged in 4 cases (3 type II, 1 type III), and increased in 3 cases (2 type II, 1 type III).

Conclusion: Hydrodissection is a simple technique, accessible to all otologists, that contributes to improving the anatomical and functional results in complicated cholesteatoma of the middle ear.

Systematic Review of Clinical Vestibular Symptom Triage, Tools, and Algorithms

Giovanni Lampasona (Presenter); Cynthia Ryan; Erin Piker; Matthew Crowson

Introduction: The evaluation of peripheral vestibular disorders in clinical practice is an especially difficult endeavor, particularly for the inexperienced clinician. The goal of this systematic review is thus to evaluate the design, approaches, and outcomes for clinical vestibular symptom triage and decision-support tools reported in contemporary published literature.

Method: A comprehensive search of existing literature in August 2020 was conducted using Ovid MEDLINE, CINAHL, and Embase using terms of desired diagnostic tools such as "algorithm," "protocol," and "survey" as well as an exhaustive set of terms to encompass vestibular disorders. Quality assessment was conducted using a modified version of the Quality of Diagnostic Accuracy Studies (QUADAS-2) assessment tool. Basic characteristics of included studies including the target population, intended health care provider audience, and targeted vestibular diagnoses were recorded as well as performance metrics of the respective tools including sensitivity, specificity, and accuracy.

Results: A total of 18 articles each reporting a novel tool for the evaluation of vestibular disorders were identified. Tools organized into three discrete categories including: self-administered questionnaires, health care professional-administered tools, and decision support systems. Most tools were capable of differentiating between specific vestibular pathologies with performance acceptable for their intended use.

Conclusion: Our systematic review identified several low-evidence reports of triage and decision-support tools for the evaluation of vestibular disorders. While all articles did report an outcome measure, they did not have sufficient uniformity to conduct a meta-analysis, and as such, no formal conclusions were drawn. Future work should look to address weaknesses in the identified tools, particularly with regard to patient comprehension of question prompts, as this was a significant source of error in the self-administered questionnaire group.

The Temporal Changes of Impedance Among CI Patients

Henrique F. Pauna, MD, PhD (Presenter);
Maria Stella Amaral; Rodrigo Pessini; Vagner Silva;
Miguel A. Hyppolito, MD, PhD

Introduction: The considerable interest regarding the bio-electrical and physiological engineering of the ear has clarified many unknown aspects of the functioning of the cochlea and the engineering beneath the electronic devices for hearing restoration.

Method: Patients were implanted between 2008 and 2017. The study protocol included repeated assessments, intraoperatively and postimplant, at 3 months; 6 months, and 1 year. In every case, the same type of perimodiolar array was implanted, with the same surgical technique. Electrode impedances were measured. Three-dimensional reconstruction of magnetic resonance imaging observed scan was carried out before every surgery to obtain a residual cochlear volume for each ear.

Results: In total, 34 patients (10 male and 24 female) were evaluated. The mean age was 13 ± 17.17 years. All patients had their etiology of deafness classified as idiopathic. The average of hearing thresholds of the right ear was 110.69 ± 7.95 dBHL and 112.95 ± 7.13 dBHL for the left ear (unaided ear; $P = .801$). The average of hearing thresholds of the right ear after 1 year of the cochlear implantation (CI) surgery was 34.55 ± 12.37 dBHL and 30.45 ± 5.98 dBHL for the left implanted ear ($P = .101$). The mean cochlear volume of the implanted ear was 68.16 ± 10.74 mm³ (for the right ear) and 56.54 ± 13.75 mm³ (for the left ear; $P < .01$). We observed an increase in basal electrodes impedance from t0 to t3, although it was not significant. Yet, for the apical electrodes' impedance, there was a decrease in averaged values from t0 to t3, although it was significant only in CG mode for the left ear ($P = .03$). The impedance of the apical portion decreased from t0 to every other moment of analysis, for both ears and for both modes (CG and MP1+2), and it was significantly reduced from t0 to t6 and t12.

Conclusion: The variation of global impedance significantly changed after CI surgery. Our data indicating a higher basal segment impedance are consistent with the literature with higher impedances at the basal turn up to 1 year after CI surgery. The larger volume in the basal turns may explain the higher impedances that are necessary to stimulate the residual spiral ganglion neurons.

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Tinnitus Outcomes of Translabyrinthine Resection and Simultaneous Cochlear Implantation

Robert M. Conway, DO (Presenter);
Pedrom C. Sioshansi, MD; Nathan C. Tu, MD;
Hugh P. Mallany; Christopher A. Schutt, MD;
Seilesh C. Babu, MD

Introduction: Tinnitus is a common complaint of patients with vestibular schwannoma. Both cochlear implantation (CI) and translabyrinthine resection of vestibular schwannomas have been shown to improve tinnitus outcomes independently. The purpose of this study was to evaluate if patients undergoing translabyrinthine resection of vestibular schwannoma had improved tinnitus outcomes when undergoing simultaneous CI.

Method: Patients with a diagnosis of vestibular schwannoma and available contact information were sent surveys to be completed, including the tinnitus handicap inventory (THI). Patients who responded to the surveys were then evaluated through retrospective chart review to determine factors such as treatment type, duration of treatment, and tumor size. A subgroup of patients who had undergone translabyrinthine resection with simultaneous cochlear implantation with pre- and postoperative THI scores were included. Postoperative THI scores were compared between the 2 groups as well as the change in score for the simultaneous CI group.

Results: Postoperative THI scores for the translabyrinthine resection with and without simultaneous cochlear implantation were 18.7 and 22.1, respectively ($P = .679$). There was a statistically significant improvement in the THI of the translabyrinthine with CI group, from 36.0 preoperatively to 18.7 postoperatively ($P = .002$).

Conclusion: There was no significant difference in postoperative THI scores between patients undergoing translabyrinthine resection of vestibular schwannoma with or without simultaneous CI. Given the significant improvement in the patients following simultaneous CI, this may suggest that the improvement in THI scores is due to the translabyrinthine resection rather than the CI aspect of the surgery.

Tuberculosis of the Middle Ear: A Systematic Review

Ariel Omiunu (Presenter); Vivienne Au; Dhiraj Peddu;
Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: Tuberculous otitis media (TOM) is a rare extrapulmonary manifestation of tuberculosis (TB) and remains a diagnostic challenge due to nonspecific symptoms. Late diagnosis can result in severe complications, such as irreversible facial paralysis and hearing loss. Our study aims to provide a review of the clinical characteristics, complications, and diagnostic modalities of TOM.

Method: A comprehensive search of the literature was conducted for articles published from 2000 to 2021. All case reports and case series of adult patients with TOM were included. Non-English studies, animal studies, and reviews were excluded.

Results: A total of 36 case reports and 6 case series were included ($n = 59$). The mean age was 39.6 years (range, 19–87 years), and most were female ($n = 42$, 71.2%). The mean duration of symptoms was 13.8 months (range, 0.25–120 months). The right ear was most frequently affected ($n = 23$, 39.0%), and bilateral involvement was found in 11 patients (18.6%). The most common symptoms were otorrhea ($n = 53$, 89.8%), hearing loss ($n = 53$, 89.8%), ipsilateral facial paralysis ($n = 21$, 35.6%), and otalgia ($n = 17$, 28.8%). Only 6 patients (10.2%) presented with constitutional symptoms. Some 40 patients (67.8%) had tympanic membrane perforation on otoscopic examination. Pulmonary TB was found in 16 patients (27.1%). Most TOM cases were diagnosed with biopsy ($n = 47$, 79.7%) and/or computed tomography (CT) scan ($n = 35$, 59.3%). Surgery was performed in 38 patients (64.4%). Long-term defects (eg, hearing loss, facial paralysis, and TM perforation) were noted in 25 patients at time of follow-up.

Conclusion: TOM should be suspected in most cases of chronic suppurative otitis media. Histopathological examination and CT imaging are reliable diagnostic methods. Early management is recommended for optimizing patient outcomes.

Tympanic Membrane Perforations: The Importance of Etiology, Size and Location

Luís Castelhana, MD (Presenter); Filipe Correia;
Tiago Colaço; Luís Reis; Pedro Escada

Introduction: The ability to predict the degree of the conductive hearing loss (CHL) caused by a given perforation is important, as it may indicate additional complementary means of diagnosis and prevent unexpected intraoperative findings in the middle ear. Our study aimed to correlate etiology, size, and location of tympanic membrane perforations (TMPs) to the resulting CHL.

Method: This transversal study took place at a Portuguese tertiary referral center between July 2019 and December 2020. A total of 58 patients with 65 TMPs underwent a comprehensive ear, nose, and throat history; a pure-tone audiometry, and an otoendoscopy. The air–bone gap (ABG) was measured at 500, 1000, 2000, and 4000 Hz. Image-processing software (ImageJ®) was used to measure the perforated and the tympanic membrane's areas. Qualitative variables included affected quadrants, presence of myringosclerosis, and involvement of umbo or malleus handle. Primary outcomes (mean ABG and pure-tone average [PTA]) were evaluated to find clinical factors associated with worse hearing.

Results: Data collected from 50 ears were included. Perforation size showed a positive statistically significant correlation with the ABG ($r = 0.508$; $P < .001$) and PTA ($r = 0.375$; $P < .001$). Greater ABGs were found in perforations involving the posterior quadrants and the malleus handle ($P < .001$ and $P = .031$, respectively). Regarding etiology, inflammatory causes showed higher bone and air conduction PTAs ($P = .031$ and $P = .084$, respectively) compared with traumatic or iatrogenic. An “inverted V” pattern of the ABG, with the

2-kHz frequency being the least affected, was a consistent finding.

Conclusion: The CHL resulting from a TMP is etiology, size and location-dependent, with higher losses occurring for inflammatory backgrounds, large perforations, and when the posterior quadrant or the malleus handle are involved. If the inverted V is absent, additional middle ear pathology should be investigated.

Universal Augmented Reality for Current Camera Systems in Otologic Surgery

Samuel R. Barber, MD (Presenter); Geoffrey E. Watson; Nicholas A. Dewyer, MD; Francis X. Creighton, MD; Elliott D. Kozin, MD

Introduction: Augmented reality (AR) applications are increasingly prevalent in surgery. AR in otologic surgery has used head-mounted displays and select microscopes. Current challenges include the adaptation of AR software to different diverse commercial cameras systems. Herein, we hypothesize that game engines can overlay anatomy with any camera on a single surgical display.

Method: An AR system with physical and virtual cameras was developed on a PC in Unreal Engine 4.0 (UE). Live AR overlays used digital compositing algorithms in Unreal via C++ and visual scripting. High-definition multimedia interface video capture used a live camera with a micro 4/3 sensor and a 14-mm lens at 4k and 30 Hz. A virtual camera in UE used identical parameters. Axial computed tomography of a temporal bone was used for (1) a 3-dimensional-printed phantom and (2) a virtual model in UE using volume rendering. Virtual and physical models were placed 15 cm from respective camera sensors in UE. Offset was measured virtually on screen for accuracy and distortion to calculate the “no-parallax point,” or central focal point of the lens. A lensgrid evaluated distortion.

Results: The game engine was able to overlay anatomy on a single surgical display at 4k resolution. The camera overlaid with an average latency of 11 ms. Confirmation of overlay included a comparison of points at mastoid air cells, tegmen, internal auditory canal, and operculum. The virtual model registered with the physical model at a virtual distance of 12 cm, calculating a no-parallax point to be 3 cm from the sensor. The lens grid for this system required no distortion correction.

Conclusion: We demonstrate a novel approach to AR overlays. Anatomy is feasible with 4k live video using a game engine and imaging data. With specifications for sensors and lenses, any surgical camera system may be recreated virtually for accurate AR projection. Future studies will test AR overlays with endoscope and exoscope systems, as well as integrate surgical navigation hardware into game engines.

Variations in Tympanoplasty Practices: A Survey Study

Michael J. Coulter, MD (Presenter); Tanner Miller, MD; Ryan A. Crane, MD; Caroline M. Schlocker, MD

Introduction: Although tympanoplasty remains one of the most common procedures in otolaryngology, there is little consensus on specific operative techniques or optimal perioperative care.

Method: This was a web-based survey sent to physicians who incorporate tympanoplasty in their practice. Responses were described then compared using chi-square analysis and Fisher–Freeman–Halton exact test based on background experience of practice setting, years in practice, and fellowship training.

Results: A total of 118 physicians completed the survey. Responses included typical use of preoperative antibiotics, preference for rimming the perforation, middle ear packing, aeration mastoidectomy, canalplasty, transcanal vs postauricular approach, microscopic vs endoscopic visualization, lateral vs medial grafting, choice of grafting materials, as well as postoperative routine. These answers were also assessed for different perforations including central, anterior marginal, subtotal, and draining ears. Among many other interesting findings, 47.5% of respondents always give preincisional antibiotics, and there was a significant trend of favoring the transcanal approach over the postauricular approach for central perforations (62.7% vs 21.2%; $P < .001$) but the opposite preference for marginal, anterior perforations (29.7% vs 70.3%; $P < .001$).

Conclusion: This survey study reveals tympanoplasty practice patterns that may be generalized to national trends. Although it does not investigate efficacy, it may inspire future comparative research of conflicting approaches, which may help standardize techniques and improve patient outcomes.

Vestibular Assessment in Chronic Otitis Media Surgery

Joaquin A. Reyes Miranda, MD (Presenter); Andrea M. Salazar Alba, MD

Introduction: This study examined preoperative and postoperative vestibular changes in patients undergoing surgery for chronic otitis media.

Method: This was a 3-year prospective study from January 2018 to December 2020 at AUDIOTEC otolaryngology clinic in Cochabamba, Bolivia. We studied 54 patients with chronic otitis media who needed middle ear surgery. The exclusion criteria were previously known vestibular disease. All patients had no preoperative vestibular symptoms. The neurotologic assessment included a 6-channel video head impulse test and video Frenzel 3 to 5 days prior to and 7 to 10 days after surgery. The patients who had vestibular symptoms were reevaluated 30 days after surgery. This study included tympanic membrane perforation, cholesteatoma, and granulomatous chronic otitis media.

Results: Patients were classified in 2 groups: (1) 11 patients with preoperative vestibular symptoms and (2) 43 patients with no vestibular symptoms. The 11 patients in group 1 had fibrous disease around the oval window niche, and the vestibular assessment reported a unilateral vestibular hypofunction. All symptomatic patients underwent vestibular rehabilitation with vestibular exercises and symptomatic pharmacological therapy.

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At 30 days postoperative, all patients had normal video head impulse gains and a normal neurotologic examination.

Conclusion: The more involved the area of the round window, the greater the risk of mobilization of the plate; therefore there is greater injury in the vestibule. In this study, the compromise of the oval window area was evaluated, and the hearing results were not compared because the type of lesion of the ossicular chain was not typified. In future studies, a comparison will be made according to type of tympanoplasty and ossicular chain status.

Video-Based Subjective Assessment of Otologic Surgical Skills

Mallory J. Raymond, MD (Presenter); Michaela Close, MD; Andrew Rowley; Royal Pipaliya; Ted Meyer, MD, PhD

Introduction: Assessment of otologic surgical proficiency relies heavily on the experience and subjective judgments of supervisors. The accuracy of subjective analysis of skills is unknown; therefore, our purpose was to assess experts' assessments of basic surgical skills.

Method: A 47-question online survey was distributed to members of the American Neurotology Society. Short videos of the early portion of mastoidectomies from three trainees, chosen from previous work objectifying suction irrigator and drill movement, were shown to respondents, who were asked to assess the quality and efficiency of the use of the drill and suction irrigator. Respondent agreement was assessed using Fleiss' kappa and Kendall's W for each category.

Results: Judgments were collected from 16 attendings and 1 fellow, who primarily practice within academic institutions. There was poor respondent agreement on the degree of drill pressure ($\kappa = -0.022$ [95% CI, -0.094 to 0.051]), degree of deliberate use of the drill ($\kappa = 0.012$ [95% CI, -0.076 to 0.052]), suction ($\kappa = -0.036$ [95% CI, -0.102 to 0.03]), irrigation ($\kappa = -0.025$ [95% CI, -0.105 to 0.055]), and clarity of surgical field ($\kappa = -0.008$ [95% CI, -0.105 to 0.089]). There was fair respondent agreement in the judgment of drill stroke length ($\kappa = 0.283$ [95% CI, 0.213 to 0.353]). While nearly all respondents felt that the use of the drill influenced their assessment of the surgeon's level of expertise at least somewhat, the correct level of the surgeons were predicted only at chance.

Conclusion: We found relatively poor agreement in experts' judgments of basic surgical skills and surgeon level using short video segments of early mastoidectomies. More attention should be given to the development of objective surgical skills analysis to better inform education and advancement decisions.

Virtual-Collaborative Cochlear Implant Care: From Candidacy to Surgery to Programming

Karl W. Doerfer, MD (Presenter); Marlene Bevan, PhD CCC-A; Sara Witek, AuD; Seilesh C. Babu, MD; Dennis Bojrab II, MD; Robert Hong, MD, PhD

Introduction: Cochlear implant (CI) patients require appointments with multiple providers prior to and following surgery. Visits include otologic and audiologic assessment, medical clearance, imaging, and postoperative programming. For patients living in rural areas, long travel times pose a barrier to efficient, safe care, especially considering the age and restricted mobility of many CI patients. The COVID-19 pandemic has accelerated expansion of telemedicine and has increased cooperation between local providers and distant specialists. This report describes a virtual-collaborative model of CI patient care (VCCI) in which surgeons at a major metropolitan CI center coordinate pre- and postoperative visits through telemedicine and remote collaboration with local audiologists, otolaryngologists, primary care physicians, and radiologists to improve the overall efficiency of managing CI patients.

Method: Medical records for patients undergoing VCCI were reviewed. Data collected included number of virtual and face-to-face visits, estimated total driving time, and time from initial consultation to implantation. These results were compared with a similarly sized sample of CI patients undergoing standard management.

Results: Patients undergoing VCCI showed >50% decrease in both face-to-face visits and average driving time when compared with standard pre-CI evaluation. Time to implantation was similar, although time required for evaluation was reduced substantially.

Conclusion: A virtual-collaborative model for CI patient care using virtual visits and collaborative efforts between local providers and remote specialists was effective in reducing the number of required face-to-face visits, as well as total distance traveled. This study adds to a growing body of literature describing strategies for increasing the efficiency of caring for cochlear implantation patients.

Patient Safety and Quality Improvement

Advance Care Planning and Palliative Care Communication Skills for Residents

Floyd Buen, MD (Presenter); Anne Walling; Emily Martin; Kirsten Buen; Amy Madnick; Neil Wenger

Introduction: We trained head and neck (H&N) surgery residents in communication skills related to early advance care planning (ACP) and palliative care (PC) for patients with H&N cancer at a large academic medical center.

Method: Two palliative care physicians, a primary care physician, 2 social workers, and a palliative care nurse led an interactive session (1-hour didactic, 3-hour small-group role-play) that focused on early ACP and the cognitive and emotional aspects of communication in a simulated H&N cancer patient case. Using a previously validated survey, participants rated their communication skills as well as their readiness, self-efficacy, and need for help to improve communication

regarding prognosis, ACP, end-of-life care, and symptom management before and after training. We computed means and compared matched pairs of pre- and postsurveys using paired *t* tests.

Results: Seventeen medical professionals (1 attending, 2 medical students, and 14 residents) completed at least 1 pre- or postsurvey. Eleven participants completed both a pre- and postsurvey and are included in this matched comparison. Self-reported communication ability using a 10-point scale improved following the training (4.6 vs 6.1, $P < .001$). Self-reported self-efficacy on a 4-point scale (1 = *a lot* and 4 = *not at all*) was also higher following the training (1.5 vs 1.1, $P = .02$). No significant change was noted with respect to readiness to improve communication in this domain (7.5 vs 7.6, $P = .7$) or need for help to improve communication skills (1.1 vs 1.2, $P = .6$). One participant commented, “WONDERFUL—should repeat annually for all residents, medical students and attendings.”

Conclusion: The Accreditation Council for Graduate Medical Education and the American Board of Otolaryngology’s residency milestones emphasize competency in communication skills in difficult situations such as end-of-life care. Conducting training to improve communication skills related to ACP and PC among H&N surgery residents is feasible and can be an initial step toward quality improvement in this area.

Are Difficult Airway Identifiers Predictive of Emergency Department Intubation Complications?

Kevin Calamari (Presenter); Stephen Politano; Chandler Rygalski; Zachary Brannan; Laura Matrka, MD

Introduction: The airway alert banner at our institution is designed to alert physicians to a patient with the potential for a difficult intubation based on medical history. Difficult airway programs and guidelines have been proven to reduce intubation-related complications in the operating room, but little research has been done on its impact in the emergency department (ED). We hypothesize that patients meeting criteria for the banner will have a more difficult intubation and increased complications.

Method: Patients >18 years old who presented to the ED for any complaint and required intubation in the ED were reviewed retrospectively from January 2015 to January 2020 and divided into cohorts of those meeting criteria for a difficult airway (criteria cohort) and those who did not (noncriteria cohort) based on established institutional difficult airway identifiers. Medical history, demographic data, and details of the intubation were collected for each patient.

Results: The mean number of attempts for successful intubation was 1.60 in the criteria cohort and 1.36 in the noncriteria cohort ($P > .05$). The mean grade of view during intubation on a scale of 1 to 4 was 1.73 for the criteria cohort and 1.39 for the noncriteria cohort ($P < .05$). The average size of the endotracheal tube ultimately placed was 7.50 and 7.74 in the criteria and noncriteria cohorts, respectively ($P < .05$). The use of adjunct intubation techniques was 28.6% in the criteria cohort and 12.5% in the noncriteria cohort ($P < .01$). The average

number of intubation attempts and rate of complications did not differ significantly between the 2 cohorts.

Conclusion: Intubations in patients meeting criteria for the airway alert banner in the emergency department are associated with a more difficult view, use of a smaller endotracheal tube, and increased use of adjuncts to facilitate intubation but not with a significantly higher rate of complications or intubation attempts. Physicians should prepare with additional endotracheal tube sizes, adjuncts, and a plan for secondary intubation strategies in these patients.

Assessing Otolaryngology Quality Improvement Curriculum Needs: A Multisite Cross-Sectional Study

Sarah Debs (Presenter); Garret Choby, MD; Kathryn Van Abel, MD; Rajanya Petersson, MD; Sarah N. Bowe, MD; Karthik Rajasekaran, MD

Introduction: There is a lack of uniform quality improvement (QI) education among otolaryngology departments. The purpose of this study is to identify the current state of QI education available to otolaryngology faculty and residents, identify deficiencies, and suggest areas of QI education needs.

Method: Otolaryngology faculty and residents at 7 academic departments were surveyed using a 19-item online tool. The results of the survey were summarized using frequencies and percentages both overall and between groups. Pearson chi-square tests were used to determine if there was a significant difference in responses between faculty and trainees.

Results: Of 316 survey recipients, 200 participated in the survey (63.3%), including 90 faculty members (45.0%) and 110 trainees (55.0%). Among all participants, 25 (12.5%) had no QI curriculum within their department, 54 (29.8%) had no training on error reporting and event analysis, 92 (51.4%) had no training on lean concepts and eliminating waste, and 69 (38.6%) had no formal training on health care disparities. When comparing faculty with trainees, trainees were more likely to have undergone training on patient care transitions (71.3% vs 50.6%; $P = .01$). Among all respondents, the most commonly identified areas of desired QI curriculum focus were interpretation of QI data (62.8%), health care disparities (62.2%), event analysis (58.1%), and lean concepts (53.5%). The most commonly identified barrier to QI program implementation was competing demands of busy clinical practice (84.5%).

Conclusion: Most otolaryngology departments have some form of QI training. However, there remains widespread lack of training on error reporting and event analysis, lean concepts, and health care disparities. These findings help set the stage for the development of a robust standardized QI curriculum development.

Barotrauma in Hyperbaric Medicine Therapy

Vishal Mago, MD (Presenter)

Introduction: The aim is to compare the pre- and postotological profile of patients, to recognize complications of each

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hyperbaric therapy, and to evaluate quality of life and patient safety in chamber. This abstract is considered late breaking as follow-up of patients is needed and closure of the facility on account of COVID surge in India.

Methods: This is a retrospective observational study of 40 patients who underwent hyperbaric oxygen therapy in multiplace chamber in Department of Burn and Plastic Surgery AIIMS Rishikesh for 3 years. Outcome measures were otoscopic examination of tympanic membrane. Pure-tone audiometry examination was done.

Results: Only 2 cases of minor alterations were observed out of the 40 cases placed in the chamber.

Conclusion: This study throws light on the safety and quality of life of patients placed in a multiplace chamber. The advantages of multiplace chamber are patient comfort and ease. A technician inside the chamber relieves the stress inside. There is less barotrauma due to the ambience inside.

The Benefit of Virtual Support for Laryngectomees and Family Caregivers

Brenda Capobres Villegas, EdD, MS, CCC-SLP (Presenter);
Laishyang M. Ouyang, MS, CCC-SLP;
Uttam K. Sinha, MD

Introduction: With the COVID-19 pandemic, patients and their family members postlaryngectomy are at risk for social isolation due to the need to stay home to avoid the risk of becoming infected. This study explores the benefits of virtual support for this special head and neck cancer population.

Method: A retrospective review of virtual support group meeting information including attendance and the use of a survey was used to study the benefits of virtual support. The information collected included the number of meetings in the last 6 months, number of participants in each meeting, and the number of patients and caregivers. The survey consisted of information regarding the participants (eg, number of meetings attended monthly), primary reason for attendance, and the impact of the meetings (very positive, positive, neutral, slightly negative, very negative).

Results: There were a total of 19 meetings held virtually using a Health Insurance Portability and Accountability Act-compliant Zoom platform. There was an average of 12 participants per meeting, with the majority of attendance being a patient (laryngectomee) with a spouse caregiver. Most patients and family caregivers attended 3 to 4 virtual meetings per month, and most of these same participants had attended support group meetings for 3 to 5 years. The primary 3 reasons for attendance at virtual meetings during the past 6 months included support, hope, and meeting other patients. All participants who completed the survey reported the impact of the virtual support meetings as “very positive.”

Conclusion: Psychosocial support for patients and family caregivers postlaryngectomy is important for quality of life. This study looked at a short time frame but demonstrated that, despite restrictions during COVID-19 for social gatherings, virtual support provides a feasible way to bring social support to this population of patients.

Better Safe Than Sorry—Making Surgical Tracheostomy Safe in COVID-19

Kranti Bhavana, MS, DNB (Presenter); Arun Srinivaasan;
Sheelia Ouseph

Introduction: This study outlines the unique modifications to open surgical tracheostomies in COVID-19 intensive care unit (ICU) patients. Our main aims and objectives were to outline and assess the efficacy of unique modifications to open surgical tracheostomy procedure among severe COVID-19 patients in terms of the operative setup, anesthetic considerations, and surgical procedure.

Method: An observational study was conducted between May 2020 and November 2020. The study group included patients who were in ICU due to severe COVID-19 symptoms and required tracheostomy. We conducted 85 surgical tracheostomies in severely sick ICU patients with certain novel modifications to achieve safe procedure for both the patient and the operating team. Modifications were done to reduce transmission in the form of shifting 1 portable operating table and a portable operating light by the bedside of patients in the ICU. These could be wheeled in to each ICU bedside, allowing a bedside tracheostomy to be performed without the need to shift the patient all the way to the operating theater. This had the following advantages: reduced viral exposure, better surgical environment, better comfort for operating surgeon, and better patient outcomes. There were certain modifications in surgical steps for COVID-19 tracheostomy, which were as follows: (1) procedure done under general anesthesia, (2) transient apneic tracheostomy, (3) carinal intubation, (4) avoiding utilization of cautery, (5) injection of intratracheal local anesthetic drug, (6) endotracheal tube clamping at end inspiration/inspiratory hold, (7) use of inner cannula and closed suction unit, and (8) postoperative stoma site mask application.

Results: Of the 85 open surgical tracheostomies, the number of transient intraoperative desaturation was 2. No intraoperative death was encountered, and no doctors acquired the COVID-19 infection despite doing up to 4 open surgical tracheostomies per day.

Conclusion: The modified bedside open surgical tracheostomy discussed is a safe, resource-efficient, and cost-effective method of performing open surgical tracheostomy in the COVID-19 era while protecting our health care personnel from the viral exposure.

Cost/Outcome Implications: Timing of Tracheostomies/Percutaneous Gastrostomy Tubes in Stroke Patients

Jarrett Jackson (Presenter)

Introduction: Tracheostomies and percutaneous endoscopic gastrostomies (PEGs) are commonly performed among patients with debilitating strokes. The aim of this study was to evaluate how the relative timing of these procedures was associated with hospital outcomes among stroke patients.

Method: Patients admitted for ischemic stroke were selected from the National Inpatient Sample, 2005–2014.

Those who underwent both tracheostomies and PEGs were identified. Patients who received a tracheostomy and PEG in the first 7 days of hospitalization were classified as the early treatment group; after 7 days, the late treatment group; and 1 procedure prior to the 7-day cutoff and the other following this time period, the early and late treatment group. Outcomes measured were hospital cost, length of stay (LOS), pneumonia rates, mortality, and postoperative complications. Descriptive analyses and multivariate analyses were used in identifying differences between the patient categories.

Results: There were 882,282 patients admitted with ischemic stroke, 5846 (0.7%) were administered tracheostomies, and 38,412 (4.4%) received PEGs during hospitalization. For those with both procedures, 626 (14.3%) received both early, 539 (12.3%) had 1 early and 1 late, and 3222 (73.4%) had both late. Compared with patients in the both early group, patients who had both procedures late were older (65 years vs 63 years, $P = .009$) and less likely male (56.6% vs 62.5%, $P = .005$). Multivariate analyses showed that, compared with the both early group, patients in the both late group had longer LOS, higher hospital cost, and higher pneumonia rates but similar mortality and postoperative complications. Patients who had 1 early and 1 late were similar to the both early group for all outcomes except LOS.

Conclusion: Early intervention with a tracheostomy and a PEG may improve clinical outcomes and reduce length of hospitalization and cost of treatment in patients admitted for ischemic stroke.

Do Surgical Smoke Evacuators Increase the Risk of Hearing Loss?

Taylor G. Lackey, MD (Presenter); Jacqueline Rowley, AuD; Norman M. Friedman, MD; Brian Herrmann, MD

Introduction: Surgical smoke evacuators are commonly used to reduce surgical smoke and more recently used to reduce the risk of COVID-19 exposure during aerosolizing procedures. The National Institute for Occupational Safety and Health (NIOSH) recommends that the exposure limit for occupational noise exposure is 85 decibels A-weighted (dBA), as an 8-hour time-weighted average (TWA). We hypothesize the noise levels generated by this device during adenotonsillectomy will exceed NIOSH recommended occupational noise exposure levels.

Method: The sound levels generated by the surgical smoke evacuator used in our practice on the max setting (COVIDIEN RapidVac Smoke Evacuator System) was measured using a sound level meter (TSI Quest SoundPro SE/DL) during adenotonsillectomy. Sound measurements were performed 16 inches from the smoke evacuator, equidistant to the surgeon's shoulder during the time of surgery. The test was repeated in 3 different operating rooms and 3 different surgeons. Background sound was additionally measured for 2 minutes after the surgery as control. Unpaired t tests were used to assess the differences between surgery and control sound level measurements.

Results: A total of 8 surgeries were recorded, with a mean time of 21 minutes. The mean sound level measured to be 75 dBA during the surgery, which was greater than the control of 67.7 dBA ($P < .01$). Maximum noise levels during surgery reached 86.9 dBA. Extrapolated TWA for a full operating room day of 12 adenotonsillectomy surgeries calculated to be an equivalent noise exposure level of 72.9 dBA.

Conclusion: Surgeons performing multiple adenotonsillectomy surgeries per day are exposed to significant noise levels that did not exceed the NIOSH-recommended exposure limit for risk of noise-induced hearing loss. The sound levels measured are comparable with other studies affecting operating room communication. Further interventions should be investigated to optimize communication and reduce noise exposure safely.

Efficacy of Disinfection of Rigid Endoscope by Prior Ethanol Cleaning

Henrique F. Pauna, MD, PhD (Presenter); Marco Cesar J. Santos; Kazuko Graziano; Richard Voegels

Introduction: Medical studies have described the low risk of cross-contamination through endoscopy and that the most widely known outbreaks are related to inadequate reprocessing of endoscopes. Alcohol exhibits rapid antimicrobial action against bacteria, viruses, and fungi.

Method: After nasal endoscopy was performed, the endoscope was swabbed with gauze; this served as the positive control sample. The standard operating procedure for intermediate-level disinfection with 70% ethanol following prior cleaning was applied. The endoscope was swabbed; this served as the experimental control sample. The biological load was extracted from the gauze pieces, filtered through a 0.22- μ m cellulose membrane, and cultivated on blood agar, chocolate agar, Sabouraud agar, Löwenstein-Jensen, and thioglycolate media.

Results: The results revealed a significant difference between the positive and experimental control groups for the presence of *Streptococcus coagulase* (-) ($P < .001$), *Bacillus* ($P < .001$), and *Staphylococcus aureus* ($P = .001$). These microorganisms were detected in the positive control but not in the experimental control.

Conclusion: Microorganisms were not recovered from the experimental control samples, demonstrating the efficacy of 70% ethanol with prior cleaning as a means of achieving intermediate-level disinfection.

ERAS Protocols for Thyroidectomy and Parathyroidectomy: Systematic Review and Meta-analysis

Kevin Chorath (Presenter); Neil N. Luu; Beatrice C. Go; Alvaro G. Moreira, MD; Karthik Rajasekaran, MD

Introduction: Enhanced recovery after surgery (ERAS) protocols are evidence-based, multidisciplinary programs implemented in the perioperative setting to improve postoperative recovery and attenuate the surgical stress response; however,

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evidence on its effectiveness in thyroid and parathyroid surgery remains sparse. The goal of this study was to investigate the clinical benefits and cost-effectiveness of ERAS protocols for the perioperative management of thyroidectomy and parathyroidectomy.

Method: A systematic review of MEDLINE, Scopus, Embase, and gray literature was performed to identify studies of ERAS protocols for thyroidectomy and parathyroidectomy. Two reviewers screened studies using predetermined inclusion criteria. Our primary outcomes included hospital length of stay and hospital costs. Readmission and postoperative complication rates comprised our secondary outcomes. Meta-analysis was performed to compare outcomes for patients enrolled in the ERAS protocol vs traditional standard of care.

Results: A total of 450 articles were identified; 6 (1.3%) met inclusion criteria with a total of 2986 patients. Perioperative components included in ERAS protocols varied across the studies. Nevertheless, patients enrolled in ERAS protocols had reduced hospital length of stay (mean difference [MD] = -1.18 days [-1.79, -0.57]) and hospital costs (MD = -464.27 US dollars [-470.89, -457.66]), without an increase in readmission (odds ratio [OR] = 0.75 [0.29, 1.94]) or complication rates (OR = 1.14 [0.82, 1.57]).

Conclusion: There is growing literature supporting the role of ERAS protocols for the perioperative management of thyroidectomy and parathyroidectomy. These protocols significantly reduce hospital length of stay and costs without increasing complications or readmission rates for these surgeries.

Establishing an HPV Vaccine Initiative in Otolaryngology Clinic: A Pilot Study

Sai Challapalli, MD (Presenter); Ibrahim Alava III, MD; Lucy Liu, MD; Julie Neil, MD; David Allen, MD

Introduction: We highlight a human papillomavirus (HPV) vaccine initiative at an otolaryngology-head and neck surgery clinic; assess the current knowledge of HPV, its connection to oropharyngeal cancer, and the HPV vaccine in the underserved population; and evaluate the effectiveness of the initiative at improving vaccination rates. To our knowledge, we are the first otolaryngology department to establish an HPV vaccine program, and our study highlights the effectiveness of such an initiative to improve vaccination rates. The project received institutional review board approval after the submission deadline, and therefore, it could not have been completed prior to the original deadline.

Methods: This is a prospective cohort study in 2021. Patients from 18 to 45 years of age with no history of HPV or head and neck cancer (HNC) were recruited from an otolaryngology-head and neck surgery clinic in a safety-net health system. Participants answered a 13-question survey on demographics as well as knowledge of HPV, HPV-associated cancers, and the vaccine. An educational presentation and handouts on HPV from the Center for Disease Control were provided.

Interested participants were given the first dose of the HPV vaccine or referred to their primary care provider for vaccination.

Results: Of the 100 survey respondents, 61% of the participants have heard of HPV. Some 44% associated HPV with cervical cancer, but only 22% associated HPV with oral cancer; 54% of participants had never heard of the HPV vaccine, and 85% reported never receiving recommendations for the vaccine. Some 18% of participants elected to receive the first dose of the vaccine in clinic without any side effects.

Conclusion: There is a clear disparity in knowledge of HPV, its connection to HNC, and the vaccine in the underserved population. The otolaryngologist-head and neck surgeon's recommendation for the vaccine shows promising results and can be implemented in otolaryngology-head and neck surgery practices across the country.

Factors Associated With Abnormal Airway Findings in Trauma Tracheostomy Patients

Edgar del Toro Diez, MD (Presenter);
Shyanne Lajud Guerrero, MD;
Camila Rios de Choudens, MD;
Adriana Baez, MD; Jeamarie Pascual, MD

Introduction: We implement a tracheostomy registry at Puerto Rico Medical Center (PRMC) for quality improvement; examine risk factors associated with airway lesions or abnormalities; and examine risk factors associated with an unsuccessful decannulation. This abstract is of utmost value, owing its purpose to achieve improvement in quality of care of patients with tracheostomies in Puerto Rico, and could serve as an example and idea to the generalizable population. This abstract informs the reader about retrospective data observed midst the creation of a Puerto Rico-based tracheostomy registry and database.

Methods: This was a retrospective descriptive prevalence study of 128 trauma patients who underwent tracheostomy at PRMC from February 2018 to 2020. Patient demographics, surgery date and approach, initial tracheostomy tube size (ITTS), intubation period, and flexible endoscopy findings, among others, were collected. Independent variables were surgical approach and ITTS. Outcome measures included decannulation percentage and abnormal airway findings (airway lesions and stenosis). Data were analyzed using χ^2 with Yates correction and Fisher exact test, with a P value (α at .05).

Results: Results showed that a total of 70.3% of patients were successfully decannulated. ITTS6 was used in 44.9% of patients and ITTS8 was used in 55.1%. Open tracheostomy (OT) was performed in 56% of patients and percutaneous tracheostomy (PT) in 43.8%. Flexible endoscopy showed abnormal airway findings in 58 (45.3%) patients. Of these, 11 (44.0%) had an OT and 17 (77.3%) had PT ($P = .04$). Based on the tube size, 10 (45.5%) patients with ITTS6 and 19 (70.4%) with ITTS8 had abnormal findings ($P = .14$). More specifically, airway granulomas were found in 12 patients (44.4%) with ITTS8 and in 2 patients (9.1%) with ITTS6 ($P = .01$).

Conclusion: Despite its frequency, tracheostomy is not standardized in choice of technique, which influences patient outcomes. PT and ITTS8 were associated with abnormal endoscopic findings and airway granulomas, respectively. Identifying potential vulnerabilities in these patients' care is critical to modifying or developing evidence-based protocols to improve tracheostomy patient care.

Factors Contributing to Clinic No-show at a Safety Net Hospital

Garrett K. Ni, MD (Presenter); Adam Kaplon, MD; Ashley Pankey; Oneida Arosarena, MD

Introduction: Clinic no-shows incur significant strains on the health care system and on health outcomes. Known factors associated with no-shows include government insurance, socioeconomic status, patient ethnicity, and clinic visit type. Temple University Hospital is a safety net hospital with 85% of patients having either Medicaid, Medicare, or no medical insurance. The aim of this study is to explore barriers to patient appointment keeping. By identifying both operational and patient factors, we can make changes to facilitate clinic attendance.

Method: Patients who missed outpatient otolaryngology appointments were identified prospectively in the Epic electronic medical record system. These patients were contacted via telephone within 48 hours of the missed appointment and interviewed using our study questionnaire until 50 patient interviews were completed. Patients were categorized based on their reason for missing the appointment, and demographic information was collected. The collected data were compiled and analyzed to provide descriptive statistics.

Results: Of the 50 patients interviewed, 60% were women, and the average age was 49.4 years. Of the patients, 58% identified as African American followed by 30% of patients identifying as Latinx. New patients made up 46% of the study population. Most no-show patients had their preferred appointment time and location (78%) and were able to reach the office by phone (92%). Patient concerns included cost of appointment (8%, $P < .05$), wait time at appointment (6%, $P < .05$), and transportation (12%, $P < .05$). The most common reason for no-show was forgetting the appointment (60%, $P < .05$), and 80% reported not receiving a reminder ($P < .05$).

Conclusion: Most patients at Temple University Hospital who missed their clinic appointments were able to reach the clinic by telephone and were not concerned with cost, wait time, and transportation for the clinic appointment. Most patients missed their appointment because they forgot about the appointment, possibly due to not receiving a reminder prior or dismissing a reminder call with an unknown caller identification.

Flexible Laryngeal Mask Versus Endotracheal Tube in Upper Airway Surgery

Diala Almardeeni (Presenter)

Introduction: This study aims at assessing the efficacy and safety of the flexible laryngeal mask (FLMA) in upper airway

surgery compared with the use of the standard endotracheal tube (ETT).

Method: A retrospective chart review was conducted of 229 patients who had undergone tonsillectomy alone or combined with nasal/sinus surgery and whose airway was maintained with either a FLMA or ETT at our institution between 2016 and 2019. Adult and pediatric patients were included. Patient demographics, conversion rate from FLMA to ETT, laryngeal mask (LMA) size modification rate, and LMA- vs ETT-related complications, induction time, and extubation time were recorded for both groups and compared.

Results: There were 229 patients (128 pediatrics and 101 adults) who had tonsillectomy alone or tonsillectomy combined with nasal/sinus surgery. A total of 179 patients received FLMA, while 50 had an ETT during their surgery. Conversion from LMA to ETT was carried out in only 2 adult cases (0.009%); 1 was due to inadequate oral pharyngeal space to perform tonsillectomy, and 1 was due to an air leak after tonsillectomy requiring a larger size FLMA. None of the patients in the FLMA group developed aspiration pneumonia, bronchitis, or any other pulmonary complication. Two patients in the FLMA group developed cough 1 month postoperatively due to documented laryngopharyngeal reflux. All patients were discharged home on the same day of surgery, except 1 adult patient with an ETT who was admitted overnight for monitoring due to postoperative desaturation and tachycardia. Both the mean induction time and extubation time were shorter when FLMA was used. The difference in the induction time was statistically significant (11.5 ± 0.9 minutes for ETT vs 7.8 ± 0.3 minutes for FLMA, $P = .0003$), as was the difference in extubation time (9.8 ± 1.1 minutes for ETT vs 7.1 ± 0.4 minutes for FLMA, $P < .05$).

Conclusion: The use of a flexible laryngeal mask airway is very safe and effective during upper airway surgery with minimal risk of pulmonary or cardiac complications and has the additional benefit of shorter induction and extubation time.

Implementing a Safe Tracheostomy Aftercare Taskforce (STAT) During COVID-19

Maeher R. Grewal (Presenter); Rahul K. Sharma; Brendon DiDonna, PA-C; Sallie M. Long, MD; Joshua Sturm, MD, PhD; Susannah E. Hills, MD

Introduction: At the height of the COVID-19 pandemic, our institution instituted a safe tracheostomy aftercare taskforce (STAT) team to care for the influx of patients undergoing tracheostomies. This review was undertaken to quantify and understand this team's benefits on the outcomes of tracheostomy care.

Method: Retrospective data were collected from patients undergoing tracheostomies at our institution from February to June 2019, prior to creation of the STAT team, and was compared with prospectively collected data from tracheostomies performed from February to June 2020 while the STAT team was in place. The primary endpoint was decannulation before discharge. Secondary endpoints included downsizing and outpatient follow-up.

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Results: Prior to the STAT team, 92 patients underwent tracheostomy from February to June 2019, including 59 males (64%) and 33 females (36%). Following implementation of the STAT team, 170 patients underwent tracheostomy from February to June 2020, including 106 males (62%) and 64 females (38%). Mean time from tracheostomy to discharge was 43.7 days (range, 1–174; standard deviation [SD] 45.5) in 2019 and 39.7 days (range, 2–205; SD 30.3) in 2020. Twenty (22%) and 26 patients (15%) expired in the 2019 and 2020 cohorts, respectively. Of the surviving patients, 22% of patients in 2019 compared with 60% of patients in 2020 were decannulated before discharge ($P < .00001$). With the STAT team, decannulation rates before discharge increased absolutely by 40% and relatively by 178%. In the 2020 cohort, 59% of patients had documented downsizes during admission compared with just 20% of patients in 2019 ($P < .0001$). In 2020 the STAT team remained in contact to advise further tracheostomy care for 86% of discharged patients.

Conclusion: The STAT team significantly increased decannulation rates, documentation of downsizing, and improved follow-up for tracheostomy care. It is possible that the STAT team's positive impact was related to improved documentation of significant tracheostomy care events. Nevertheless, this type of care team provides significant benefit to hospitals and improves the overall care of patients with tracheostomies.

Improving Quality and Safety of Tonsillectomy: Report of 1248 Tonsillectomies

Emily Kamen (Presenter); Qianhui Shao; Scott Rickert; Babak Givi, MD

Introduction: Tonsillectomy is one of the most common procedures in otolaryngology, particularly in pediatrics. The safety of nonnarcotic pain medications is still debated, and the incidence of postprocedural hemorrhage has been reported as high as 5%. We initiated a quality improvement program to monitor and improve the quality and safety of tonsillectomy, emphasizing reducing opioids use and adverse events.

Method: All surgeons who perform tonsillectomies at our institution participated in the process. A prospective data collection program was established. Reduction in the use of narcotics was emphasized and implemented. When they occurred, all adverse events were reviewed with the responsible surgeons, and adjustments were made accordingly. The data were collected prospectively from January 2019 to December 2020. Demographics, indication, technique, pain medication, need for additional prescriptions, and adverse events were analyzed.

Results: During the study period, 1248 tonsillectomies (970, 77.7% in pediatrics; 278, 22.3% in adults) were performed by 32 surgeons. In total, 45 (12%) pediatric patients and 77 (58%) adult patients were prescribed narcotics in the second half of the study period. Throughout the study, there was a decrease in the rate of postsurgical adverse events from 4% (15 of 393) in the first 6 months to 2% (8 in 507) in the last 12 months ($P = .03$). In the final 12 months, only 6 (1.2%) postoperative

hemorrhage events requiring return to the operating room were observed.

Conclusion: By establishing a quality improvement and monitoring program, we were able to reduce the use of narcotics while improving the safety of tonsillectomies in pediatrics and adult patients. Most patients can be adequately managed without narcotic use. These data could be used in setting benchmarks of safety and quality to guide public and health care providers' expectations.

The “Michael Douglas Effect” in HPV-Related Head and Neck Cancer

Trevor Torgerson (Presenter); Austin L. Johnson; Craig Cooper; Tom Hamilton; Matt Vassar

Introduction: In June 2013, actor Michael Douglas announced that he had received a diagnosis of throat cancer, which he attributed to the human papillomavirus (HPV). HPV is the most common sexually transmitted disease; however, the HPV vaccination rates are lower than other vaccines. Given the health disclosure of Michael Douglas's cancer, we queried whether this event had an effect on public awareness for HPV-related head and neck cancers (HNCs) or its prevention.

Method: Using Google Trends and Twitter, we retrospectively analyzed search trends and Tweets for the keywords “throat cancer,” “oral cancer,” “hvp vaccine,” and “human papillomavirus infection.” We extracted data and compared it with an expected forecast found using an autoregressive integrated moving algorithm (ARIMA).

Results: During the week of disclosure, Google Trends data demonstrated an increase of 62.5% in “hvp infection” inquiries, 47.0% in “hvp vaccine” inquiries, 47.0% in “oral cancer” inquiries, and 81.5% in “throat cancer” inquiries above the expected. Tweets referencing “hvp” increased 127.2%; tweets referencing “hvp (vaccine OR vaccination)” increased 98.8%; tweets referencing “hvp awareness” increased 778.4%; tweets referencing “oral cancer” increased 1038.7%; and tweets referencing “throat cancer” increased 811.7% compared with the rest of 2013.

Conclusion: Data from Google Trends and Twitter indicated that Michael Douglas's disclosure of HPV-related HNC resulted in a substantial increase in public awareness and prevention methods for HPV-related HNC. Celebrity health disclosures may thus prove to be a cost-effective strategy to advocate for public health literacy and positively influence public interest in specific health issues.

Objective Assessment of Aerosolization During Transnasal Endoscopy: A Systematic Review

Sophia Matos (Presenter); Dana Crosby, MD, MPH; Arun Sharma, MD, MS

Introduction: The risk of aerosolization during clinic transnasal endoscopic procedures is of concern during the coronavirus disease 2019 (COVID-19) pandemic. SARS-CoV-2 is known to be spread through respiratory droplets,

including aerosols. The goal of this systematic review is to assimilate the literature on objective assessment of particulate aerosolization during transnasal endoscopic procedures.

Method: The PubMed electronic database was searched using Medical Subject Headings (MeSH) and free-text search terms relating to aerosolization and transnasal endoscopic procedures from inception to November 16, 2020. References were hand searched to identify additional publications, and these were included for consideration. Inclusion in the systematic review required quantification of aerosol generation during clinic transnasal endoscopic procedures. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and flowchart were followed during the systematic review.

Results: Eight out of 899 studies met criteria for inclusion in the systematic review. Five studies tested nasal endoscopy with mixed findings on the risk of aerosol generation during this procedure. Two studies assessed flexible fiber-optic laryngoscopy and also reported mixed findings. Breathing, sneezing, speech, and spray anesthetic/decongestants were found to consistently increase aerosol generation above baseline. A number of studies tested new and general mitigation strategies and were found to be effective in decreasing aerosol generation.

Conclusion: The COVID-19 pandemic has informed many considerations regarding patient and provider safety. It is valuable to understand the risk during outpatient otolaryngology procedures through the quantification of aerosolization. There are several effective methods to control aerosolization during these procedures. The findings of this systematic review will inform appropriate precautions to protect against infectious agents spread by aerosolization.

Opioid-Sparing Protocol for Outpatient Otolaryngology Procedures

Daniel B. Hall, MD (Presenter); Yuanyuan Wang, PhD; Irina Castellanos, PhD; Shruthi Sethuraman; Laura Matrka, MD; Minka Schofield, MD, MPH

Introduction: The objective of this study is to demonstrate the impact of an opioid-sparing postoperative pain management protocol in reducing the amount of opioids prescribed and consumed among outpatient otolaryngology-head and neck surgery (OHNS) patients.

Method: The study design is a prospective cohort. An opioid-sparing postoperative pain management protocol was developed and implemented for all adult patients undergoing outpatient OHNS at The Ohio State University. Opioid prescribing historical data collected from January 1, 2019, to December 30, 2020, will be compared with data collected from January 1, 2021, through August 1, 2021, in the postprotocol cohort. Pre- and postoperative patient questionnaires will be administered and analyzed in the postprotocol cohort to elucidate prescribing patterns, opioid consumption, and patient perspectives.

Results: The study is currently ongoing with an anticipated 400 participants within the postprotocol group. Anticipated completion is by August 1, 2021. Early analysis suggests a significant decrease in the mean amount of opioids prescribed and the mean amount of opioids consumed by study participants without a significant change in perceived pain scores or refill requests.

Conclusion: The implementation of an opioid-sparing postoperative pain management protocol has the potential of reducing the amount of opioids prescribed, reducing the amount of opioids consumed, and refining opioid-prescribing practices and culture among providers following outpatient OHNS.

Otolaryngology Subspecialty Surgical Case Rescheduling Rate During the COVID-19 Pandemic

Emily Sagalow (Presenter); Alexander Duffy, MD; Priyanga Selvakumar; David M. Cognetti, MD

Introduction: In the beginning of the COVID-19 pandemic in spring 2020, much was unknown regarding nosocomial transmission of the disease. During that time, both elective and oncologic surgical cases were canceled. At our institution, a tiering system was used to determine which cases were pursued vs rescheduled. After adequate safety protocols were established, each subspecialty within otolaryngology faced unique challenges in reengaging patients for surgical scheduling.

Method: Patients whose surgeries were canceled between March and May 2020 due to COVID-19 hospital precautions were identified at an academic institution. Rescheduling rates were analyzed by subspecialty.

Results: Of the 833 otolaryngology cases scheduled between March 16, 2020, and May 29, 2020, 555 (66.63%) were canceled due to COVID-19 precautions. For the entire department, 395 (71.17%) of the canceled surgeries were rescheduled within 6 months of the originally scheduled surgery date. Total number of scheduled, canceled, and rescheduled canceled cases for each subspecialty were as follows: head and neck: 208, 89 (42.79%), and 79 (88.76%); sleep surgery: 199, 167 (83.92%), and 107 (64.07%); rhinology: 172, 125 (72.67%), and 81 (64.80%); facial plastics: 150, 120 (80.00%), and 89 (74.17%); otology/neurotology: 38, 27 (71.05%), and 18 (66.67%); and laryngology: 35, 24 (68.57%), and 19 (79.17%). The overall case completion rate for the subspecialties was as follows: head and neck, 95.19%; sleep surgery, 69.85%; rhinology, 74.42%; facial plastics, 79.33%; otology/neurotology, 76.32%; and laryngology, 85.71%.

Conclusion: Head and neck had the highest number of cases originally scheduled, lowest number of cases canceled, and highest number of cases rescheduled. In contrast, sleep surgery had the most cases canceled and fewest cases rescheduled. Differences between subspecialties are presumably multifactorial and likely include both surgeon and patient perceptions of time sensitivity of interventions. Our experience demonstrates that subspecialties that function on a more

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elective nature faced increased scheduling difficulty during the COVID-19 pandemic.

Prednisone Decreases Opioid Use in Patients Receiving Benign Oropharyngeal Surgery

Emily Sagalow (Presenter); Joann Butkus; Samuel Alfonsi; David Rosen, MD; Maurits Boon, MD; Colin T. Huntley, MD

Introduction: Prescription narcotics account for a large percentage of abused opioids. Physicians are challenged with balancing pain relief with minimizing excess prescription opioids in the community. Multimodal analgesia and alternative pain management strategies, such as the addition of prednisone to pain regimens, can potentially reduce the reliance on opioids for postoperative pain management and minimize the influx of prescription opioids into society for potential abuse.

Method: Patients undergoing tonsillectomy, tonsillectomy and adenoidectomy (T&A), or expansion sphincter pharyngoplasty (ESP) from December 2020 to present under the care of 5 faculty in our department of otolaryngology were included. The postoperative pain management cocktail differed between faculty with 3 utilizing steroids and 2 not utilizing them in a standard-of-care fashion. All patients received a postoperative regimen of an opioid, acetaminophen, gabapentin, and magic mouthwash. Those patients receiving postoperative steroids were prescribed a prednisone taper. Outcome measures were postoperative amount of narcotic used and pain scores at postoperative days (PODs) 0, 1, 3, and 7, comparing between the cohort receiving steroids to those not.

Results: Seven patients have been recruited thus far. Of the 7 patients, 5 (71.43%) received prednisone included in the postoperative regimen. All patients received liquid oxycodone. Four (57.14%) patients were female, and the average age was 39.14 years. A total of 4 (57.14%) patients underwent T&A, 2 (28.57%) tonsillectomy, and 1 (14.29%) ESP. All patients took Tylenol as prescribed, and 5 (71.43%) patients took gabapentin as prescribed. The postoperative pain scores on each POD and change in pain scores from POD 0 to 7 were not significant between the 2 cohorts ($P > .05$). The cohort receiving prednisone used significantly less narcotic than the cohort that did not (270 mL, $P = .0043$).

Conclusion: Patients receiving a prednisone taper as part of their pain management cocktail used less narcotic than those not using steroids. We will continue to recruit patients as more data are needed to confirm these findings.

Preoperative Functional Status Assessment Before Major Head and Neck Surgery

Ashley L. Miller, MD (Presenter); Andrew Holcomb, MD; Anuraag Parikh, MD; Julianne Richards, PA-C; Eleni Rettig, MD; Mark Varvares, MD

Introduction: Patients undergoing head and neck cancer surgery are at high risk for adverse postoperative outcomes related to both their underlying diagnosis and requisite treatment. The objective of this study was to demonstrate

feasibility of a novel screening tool, the Vulnerable Elders Surgical Pathways and outcomes Analysis (VESPA), in the preoperative setting to characterize the baseline functional status of patients undergoing major head and neck oncologic surgery and to examine the relationship between preoperative functional status and postoperative outcome measures.

Method: We conducted a prospective cohort study with retrospective data analysis at 2 tertiary care academic hospitals. The VESPA was administered prospectively in the preoperative setting. Data on patient demographics, ablative and reconstructive procedures, and outcome measures including total length of stay (LOS), discharge disposition, delay in discharge, or complex discharge planning (delay or change in disposition) were collected via retrospective chart review. VESPA risk categories were then used to estimate risk of postoperative outcomes using multivariate logistic regression for categorical outcomes and linear regression for continuous variables.

Results: Some 58 patients were assessed using the VESPA prior to surgery. The mean (standard deviation) age was 66.4 (standard deviation 11.9) years, and 58.4% of patients were male. Nearly one-quarter of patients described preoperative difficulty in either a basic or instrumental activity of daily living prior to surgery, and 17% were classified as low functional status (ie, high risk) according to the VESPA scale. Low functional status did not independently predict LOS but was associated with delayed discharge (odds ratio [OR] 5.0, 95% CI, 1.2–21.3; $P = .030$) and complex discharge planning (OR 5.7, 95% CI, 1.34–24.2; $P = .018$).

Conclusion: The VESPA scale can identify head and neck surgical patients with low preoperative functional status who may be at risk for delayed or complex discharge planning. These patients may benefit from enhanced preoperative counseling and more intensive discharge preparation.

A Quiet Place: The Impact of “Quiet” on Clinical Workload

Beatrice C. Go (Presenter); Kevin Chorath, MD; Karthik Rajasekaran, MD

Introduction: The objective of this study was to determine the impact of uttering the word “quiet” on clinical workload and self-perceived busyness during the overnight otolaryngology call shift.

Method: A multicenter, single-blind, randomized controlled trial was conducted at the University of Pennsylvania Health System. A total of 80 overnight otolaryngology call shifts covered by a pool of 10 residents were randomized to a quiet group or to a control group. At the beginning of the shift, residents were asked to state aloud: “Today will be a quiet night” (quiet group) or “Today will be a good night” (control group). Clinical workload, as measured by the total number of nonurgent and urgent consults, was the primary outcome. Secondary measures included number of tasks at sign out, unplanned inpatient visits and operating room trips, total number of phone calls and hours of sleep, and self-perceived busyness.

Results: There was no difference in the number of total ($P = .23$), nonurgent ($P = .18$), and urgent ($P = .18$) consults. Tasks at sign-out, total phone calls, unplanned inpatient visits, and unplanned operating room visits did not differ between the control and quiet groups. While there were more unplanned operating room visits in the quiet group (29, 80.6%) compared with the control group (34, 94.4%), this was not found to be significant ($P = .07$). Most residents reported feeling “not busy” during control nights (18, 50.0%) compared with feeling “somewhat busy” during quiet nights (17, 47.2%; $P = .42$).

Conclusion: Contrary to popular belief, there is no clear evidence that uttering the word “quiet” significantly increases clinical workload.

Reduction in Adult Posttonsillectomy Opioid Prescriptions: A Quality Improvement Project

Michael J. Coulter, MD (Presenter); Jade Lewis, MD; Michael Baxter, MD; Christopher M. Johnson, MD

Introduction: In light of the recent opioid abuse epidemic, surgeons have been encouraged to reduce the amount of post-operative opioids they prescribe, usually by means of multimodality approaches.

Method: A quality improvement project implementing the plan, do, study, act (PDSA) model was conducted in an attempt to reduce opioid prescriptions after adult tonsillectomy. The percentage of opioid refills, hemorrhage interventions, and average morphine milligram equivalents (MME) were collected, and the department collectively decided the best next medication regimen for the following period. A retrospective analysis of this project was then completed, including the 3 months prior as a control.

Results: Medication regimens after 167 adult tonsillectomies involved oxycodone combined with or separate from acetaminophen, gabapentin, or ibuprofen. Reducing initial opioid prescriptions significantly reduced average perioperative MME (349.18 vs 466.88, $P < .001$) but increased opioid refills (29.51% vs 12.20%, $P = .027$). Although effects were statistically insignificant, the addition of ibuprofen showed a trend toward fewer narcotic refills (21.62% vs 41.03%, $P = .069$) but a higher rate of postoperative hemorrhage (13.51% vs 9.52%, $P = .487$).

Conclusion: Reducing perioperative opioid prescriptions is important for our patients and is feasible after adult tonsillectomy via a departmental quality improvement project implementing the PDSA model. Specific effects of pharmaceuticals used in multimodality pain control deserve further investigation.

Socioeconomic Disparities Impact Oropharyngeal Cancer Outcomes in Upstate New York

Nicolas Casellas, MD (Presenter); Saiganesh Ravikumar, MPH; Shalini Shah; Katherine Rieth, MD, MA

Introduction: Literature shows that socioeconomic status and race impact outcomes for patients with oropharyngeal

squamous cell carcinoma (OPSCC). Prior studies have not examined this effect on patients in Upstate New York (USNY).

Method: Retrospective data were collected from patients evaluated at a single tertiary care center in USNY diagnosed with OPSCC between March 11, 2011, and October 31, 2019. Data relating to median household income and educational status by zip code was obtained from American Community Survey 2018. Multiple Cox regression analysis was adjusted for age at diagnosis, stage at presentation, human papillomavirus (HPV) status, and sex as well as hypertension, type 2 diabetes, and smoking status comorbidities to evaluate 5-year overall survival by socioeconomic status of zip code and by race. Chi-squared, Fisher exact, and Wilcoxon rank-sum tests were performed to reveal differences in patient characteristics by HPV status.

Results: There were 123 cases of OPSCC, of which 93 were HPV positive and 30 were HPV negative. A total of 111 patients identified as White race, 6 identified as Black race, and 6 identified as “other.” There was a significant difference in the distribution of gender by HPV status with greater proportion of patients with HPV positive cancers being male ($n = 78$, 84%) compared with HPV-negative ($n = 18$, 60%) cancers ($P < .01$). After adjusting for covariates, Black patients (hazard ratio [HR] = 19.9, $P = .012$) with OPSCC ($n = 123$) had lower 5-year overall survival compared with White patients (HR = 1, reference). In addition, residing in a zip code with a greater proportion of population who had high school-level education or higher was associated with decreased mortality (HR = 0.79, $P = .047$). Median household income of zip code was not significantly associated with predicting 5-year survival ($P = .56$).

Conclusion: Black race and lower socioeconomic status of one’s neighborhood, as measured by the percentage of population with a high school education or greater, is associated with significantly worse 5-year survival for HPV-positive and HPV-negative OPSCC. Efforts should be made to delineate the origins of these disparities and mitigate their role in oropharyngeal cancer outcomes.

Tranexamic Acid for Posttonsillectomy Bleeding: A Quality Improvement Project

Matthew Kabalan (Presenter); Jason C. DeGiovanni, MD; Francesca Viola; Kiana Saade; Jyothi Sharma; Michele M. Carr, MD, DDS, MEd, PhD

Introduction: Tranexamic acid (TXA) is an antifibrinolytic agent used perioperatively. It is a lysine derivative that reversibly binds to plasminogen, blocking its conversion to plasmin, thus stabilizing fibrin clots. Our goal with this project was to institute the use of TXA for children with posttonsillectomy bleeding and evaluate its role in reducing return to the operating room (OR).

Method: A quality improvement project was started in April 2020 in which children presenting with a posttonsillectomy bleed were treated with TXA. Children with persistent

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bleeding were taken to the OR for treatment of bleeding, and the rest were observed for 24 hours. A run chart was constructed showing percentage of patients going to the OR for control of bleeding and percentage of patients receiving TXA from January 2019 to December 2020.

Results: There were 207 patients included. The mean age was 8.9 years (95% CI, 8.2–9.5). Prior to instituting the change, 8.4% of patients were treated with TXA; 91.7% of these went to the OR. Of all posttonsillectomy bleeds, 27.3% went to the OR. Records suggest that only children with ongoing bleeding were given TXA. After the change, significantly more received TXA (20.3%, $P = .015$), 46.2% of whom went to the OR for control of bleeding. 22.9% of all posttonsillectomy bleeds went to the OR ($P = .357$). Barriers to instituting the use of TXA for posttonsillectomy bleeding were concern about side effects and reluctance to employ any intervention if a clot was already present. The project is ongoing.

Conclusion: More data are needed to come to conclusions about the value of giving TXA routinely for posttonsillectomy bleeding. The inability to predict whether bleeding will restart hampers the routine use of prophylactic medications in this situation.

Utility of Electronic Medical Record Dashboard on COVID-19 Surgical Volume

Shannon S. Wu (Presenter); Samantha Anne, MD;
Rachel Georgopoulos; Swathi Appachi;
Brandon Hopkins, MD

Introduction: An understanding of disruptions to health care delivery in real time is critical for monitoring volumes and outcomes. Currently outcomes are evaluated via time-consuming reviews of patient records. This study aims to demonstrate the utility of a novel electronic medical record (EMR) dashboard via the impact of COVID-19 on pediatric otolaryngology procedures.

Method: An EMR dashboard utilizing surgical encounters driven by Current Procedural Terminology groupings was used to enable real-time viewing of summaries and trends in a multicenter academic health system. The number of pediatric adenoidectomies, tonsillectomies, and tympanostomy tube placements (PETs) for an 11-month period was compared between 2019 and 2020 to assess COVID-19 impact. Return to emergency department (ED) within 30 days, 30-day readmission/observation rates, return to operating room (OR), and postoperative bleeding were assessed with chi-square analysis.

Results: The EMR dashboard was reviewed for all patients <19 years for all providers and hospitals within the health system for defined procedure groupings. In 2019 264 adenoidectomies, 937 tonsillectomies, and 1134 PETs were performed vs a 2020 volume of 158, 563, and 664, respectively, at a 40% volume decline. For 2019 vs 2020, postoperative tonsillectomy bleed rates were 3.3% vs 5.2%; return to the ED rates were 11.1% vs 12.1%; 30-day return to OR rates were 2.6% vs 4.6%; and observation/readmission rates were

2.2% vs 2.1% ($P = .539$). For all 3 procedures, no statistical difference was identified between years for any complication. There were no mortalities.

Conclusion: In contrast to time-intensive chart review, the novel EMR dashboard confers rapid analysis and identification of surgical volumes for pediatric otolaryngology cases. Despite selection bias for more complicated cases due to cancellation of elective procedures, the EMR dashboard provides real-time reassurance that complication rates remained stable during the COVID-19 pandemic. We expect this EMR dashboard will improve our ability to monitor changes in surgical delivery.

Voice Therapy for Vocal Fold Weakness

Celeste Kim (Presenter);
Laishyang M. Ouyang, MS, CCC-SLP;
Brenda Capobres Villegas, EdD, MS, CCC-SLP;
Uttam K. Sinha, MD

Introduction: Treatment of vocal fold paresis can include both surgical and nonsurgical methods, and although the utility of voice therapy is noted throughout existing literature, there are discrepancies about the proper timing of initiation after diagnosis. Our goal is to analyze the role of early voice therapy, implemented within 3 months of diagnosis, in improving voice outcomes in patients with vocal fold weakness.

Method: This is a retrospective cohort study in which cohort A consisted of 30 patients with vocal fold paresis who received voice therapy within 3 months after diagnosis. Pre- and post-therapy objective data measurements for cohort A included relative average perturbation (RAP), maximum phonation time (MPT), pitch range (PR), and voice handicap index (VHI). Within cohort A, t tests were performed to compare pre- and posttherapy values. Cohort B (control) will consist of 20 to 30 patients with vocal fold paresis who did not receive voice therapy. VHI scores will be obtained for cohort B at least 6 months after the onset of voice symptoms to analyze if healing time without voice therapy also allows for similar outcomes. We will use t tests to compare VHI values between cohorts.

Results: Our preliminary results show that all patients who received early voice therapy within 3 months (cohort A) showed improvements in all 4 voice measurements. When comparing scores at initial evaluation and at discharge, there was an average improvement of 1.01% in RAP ($P < .001$), 4.90 seconds in MPT ($P < .001$), 70.90 Hz in PR ($P = .002$), and 27.57% in VHI ($P < .0001$). We predict that cohort B will have lesser improvements in VHI when compared with cohort A.

Conclusion: Our results show that the implementation of voice therapy within 3 months of diagnosis of vocal fold paresis can lead to significant improvements, as indicated by the changes in RAP, MPT, PR, and VHI. These results emphasize the importance of early functional rehabilitation in patients who display vocal fold weakness.

Pediatric Otolaryngology

3D-Printed Pediatric Middle Ear Model for Endoscopic Surgery

Joshua A. Stramiello, MD (Presenter); Stephanie Wong; Omid Moshtaghi; Alice Tor; Justin Ryan; Daniela Carvalh

Introduction: The use of 3D-printed surgical models for simulation training in otolaryngology has been shown to improve self-reported confidence and expertise in the associated practice. The purpose of this study is to assess the appropriateness of a multimaterial, 3D-printed pediatric middle ear model with a replaceable middle ear unit as an effective endoscopic ear surgery (EES) simulator.

Method: This was a single-blinded, prospective, proof-of-concept study conducted in a simulation operative suite on January 8, 2021. The participants were otorhinolaryngology–head and neck surgery residents, fellows, and attendings from the San Diego area in California. Subjects were presented with the right ear surgical model with normal anatomy (intact ossicular chain) and asked to point to 7 anatomical sites before and after a short anatomy presentation of a left, human middle ear endoscopic photograph. The participants used a 30° 3-mm scope (10 cm) and a Rosen needle to point to the structures in the model. They also filled out a survey about the feasibility of the model. Outcome variables included survey scores and pre-anatomy (PA) and postanatomy presentation quiz scores. Independent variables included level of training, resident postgraduate year, subspecialty, and prior endoscopic ear surgery experience.

Results: There was a total of 24 participants (19 residents, 1 fellow, and 4 attendings), none with self-reported proficiency in EES. Total survey score means were 22.8 (out of 30). The PA mean score was 4.42, and the postanatomy quiz mean score was 5.3 (average improvement of 43% [CI, 17%–70%]; $P = .003$). The higher the level of training, the higher the PA scores (0.55 points per year of training; $P = .004$). The subspecialty (otology, other, in training) was also associated with the PA scores ($P = .004$).

Conclusion: The results of this study suggest that our 3D-printed model has adequate high fidelity to mimic a real, pediatric temporal bone for EES. As 3D printing technologies continue to advance, the quality of ear models has the potential to provide improved surgical training for pediatric EES.

Adverse Outcomes Following Surgical Management of Pediatric Peritonsillar Abscess

Mattie R. Rosi-Schumacher, MD (Presenter); Cathleen C. Kuo; Celina Virgen; Michele M. Carr, MD, DDS, ME, PhD

Introduction: This study describes adverse outcomes of pediatric patients after surgical management of a peritonsillar abscess (PTA) to highlight risk factors and guide clinical management.

Method: A multicenter retrospective cohort study of patients from the American College of Surgeons National Surgical Quality Improvement Program database was conducted. The study population included pediatric patients who underwent an incision and drainage of a PTA identified by Current Procedural Terminology code 42700 from 2012 to 2017. Data regarding patient demographics, comorbidities, and 30-day postoperative events (unplanned reoperation, readmission, and complications) were extracted. Univariate and multivariate logistic regression were used to analyze variable effects on adverse events.

Results: There were 777 patients identified with a mean age of 10.7 years and a female-to-male ratio of 1.2:1. In total, 656 (84%) were admitted through the emergency department, and 587 (76%) were treated as inpatients. The average length of stay (LOS) was 1.68 days (95% CI, 1.48–1.88). Some 395 (51%) met criteria for systematic inflammatory response syndrome or sepsis, and 71 (0.1%) patients received steroids prior to the operative procedure; however, neither of these factors significantly affected LOS, readmission, or reoperation. A total of 24 (3%) patients required readmission, and 23 (3%) patients underwent reoperation. Patients aged 13 to 18 years made up 71% (17) of readmissions and 48% (11) of reoperations, which was statistically significant when compared with other age groups ($P = .028$ and $P = .035$, respectively). Patients younger than 5 years ($P = .004$), American Society of Anesthesiologists class ($P = .002$), and operative time ($P = .006$) were all significantly associated with longer LOS.

Conclusion: Pediatric PTA is a condition that commonly presents as an emergency and carries a risk of sepsis. Older patients are at increased risk for readmission and reoperation, while younger patients, those with comorbidities, and cases requiring longer operative time are more likely to have a longer hospital stay.

Anomalies of First Branchial Origin: Varied Presentations and Management

Julianna Decuzzi, MD (Presenter); Kimberly Oslin; Amal Isaiyah, MD, PhD; Kevin Pereira, MD, MS

Introduction: First cleft anomalies are unusual and frequently misdiagnosed. We describe the various clinical presentations of these lesions and highlight the complexities in management.

Method: This study design was a case series that described the presentation of 4 pediatric patients with first branchial anomalies.

Results: Four different types of clinical presentations were encountered. The first presented with complete duplication of the external auditory canal that required primary excision and closure. The second presented with recurrent neck abscesses for which an ultrasound and magnetic resonance imaging confirmed the anomaly and that had to be followed into the middle ear and mastoid, and the third had recurrent tail of parotid abscesses that were treated with multiple drainage procedures before finally undergoing imaging and excision of the cleft

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cyst, along with a superficial parotidectomy. The fourth presentation was with an infratragal sinus with recurrent parotid abscesses that had a needle aspiration followed by excision of the sinus tract up to the external auditory canal, along with a superficial parotidectomy.

Conclusion: First branchial anomalies are rare and can mislead clinicians by resembling primary parotid disease. A delayed diagnosis is common, and high index of suspicion is required to identify these lesions in young children. The surgical management is complex due to the young age of the patient, previous infections, depth and course of the tract, and proximity to the facial nerve.

Atypical Head and Neck Infections as a Precursor to MIS-C

Annie N. Farrell (Presenter); Nikhila Raol; Steven Goudy; Sean S. Evans, MD

Introduction: Multisystem inflammatory syndrome in children (MIS-C) is a rare, life-threatening sequela of COVID-19 infection in pediatric patients. We review the literature and describe a novel presentation of severe head and neck manifestations in 2 MIS-C patients.

Method: A case report and PubMed literature search were conducted.

Results: Two adolescent patients were evaluated at a tertiary care children's hospital for headache, fever, and neck pain. Examination demonstrated massive cervical lymphadenopathy (LAD), neck cellulitis, and tonsillopharyngitis. Laboratory findings demonstrated C-reactive protein elevation and negative COVID-19 polymerase chain reaction (PCR) testing. Computed tomography (CT) imaging demonstrated extensive multicompartiment head and neck phlegmonous fluid collections. Steroids and broad-spectrum antibiotics were initiated. Rapid resolution of neck pain and fever occurred but was succeeded by the development of cardiogenic shock requiring critical care transfer and initiation of vasopressors. Positive COVID-19 immunoglobulin G testing was followed by the initiation of intravenous immunoglobulin and normalization of cardiac function in both patients with subsequent discharge home in stable condition. PubMed reviews for articles highlighting MIS-C presentations and head and neck manifestations were included. The defining presenting characteristics are typically prolonged fever, abdominal pain, and cardiac involvement without any signs of pneumonia on chest CT. Cervical LAD and sore throat are rare presenting symptoms of MIS-C but common in the general pediatric population. Otolaryngologists are frequently engaged to help manage patients with complications such as severe tonsillitis or deep neck fluid collections. A negative COVID-19 polymerase chain reaction may falsely lower the threshold of suspicion of a SARS-CoV-2-related illness; however, awareness of unusual head and neck manifestations as a presentation of MIS-C may help the early recognition and treatment of this potentially fatal syndrome.

Conclusion: COVID-19 should be considered in the differential for atypical head and neck infection in the pediatric patient, as this may serve as a precursor to MIS-C.

Audiological and Psychological Profiles of Children With Tinnitus

Justyna Kutyba, MSc (Presenter); Danuta Raj-Koziak; Wiesław Jędrzejczak; Piotr Henryk Skarzynski; Henryk Skarzynski

Introduction: There is limited knowledge of the incidence or severity of tinnitus in children. Results generally indicate that the prevalence of tinnitus is higher in children with hearing loss than in children with normal hearing, but it is not known whether children with hearing loss suffer more severe tinnitus than those with normal hearing. The objective of the study was to gauge the audiological and psychological profiles of children with tinnitus.

Method: We recruited 25 pediatric patients (aged less than 18 years) reporting tinnitus who voluntarily came to our clinic in 2017. The children and their parents underwent a structured interview as part of a consultation in the tinnitus department. Otolaryngological examination and tonal and impedance audiometry were performed. Children filled in a visual analog scale (VAS) on loudness, annoyance, and how well they were coping with their tinnitus. In addition, we used the Revised Children's Anxiety and Depression Scale and the Revised Children Anxiety and Depression Scale (Parent Version) to look for possible depressive and anxiety disorders, and the Emotionality Activity Sociability Temperament Survey to assess the temperament of the children.

Results: The group consisted of 25 children (16 girls and 9 boys) aged from 6 to 16 years. Most of the children had normal hearing. Tinnitus had a significant daily impact on sleeping, studying, and leisure. The VAS scale results revealed that younger children, 6 to 10 years old, found tinnitus more troublesome than older children did (11 to 16 years). No child with tinnitus showed any severe symptoms of depression or anxiety. All showed average levels of temperamental traits close to normative values.

Conclusion: When diagnosing tinnitus in children, it is important to recognize that tinnitus affects children differently to adults. Whether children with tinnitus require specific intervention remains a difficult question to answer. Hence, there is an urgent need to devise a questionnaire that can assess the impact of tinnitus on children's quality of life.

Balloon Dilations in Subglottic Stenosis

Kaci Dejarnette (Presenter); Elijah DeBroux; Walter Humann; Madhu Mamidala, PhD; Jerome Thompson

Introduction: Subglottic stenosis (SGS) is most commonly an acquired pathology secondary to prolonged intubation. This study's objective is to determine if balloon dilation effectively reduces tracheostomy placement in pediatric SGS patients.

Method: A retrospective chart review from June 2014 to June 2018 was performed of 123 charts with patients 0 to 18 years old diagnosed with SGS and treated with tracheostomy and/or balloon dilation. A total of 92 patients met these inclusion criteria. A chi-square analysis was used to evaluate the association between balloon dilation and tracheostomy placement. Pearson's correlation coefficient assessed whether the number of dilations was related to tracheostomy placement. Finally, a descriptive analysis was performed comparing the outcomes of patients born prematurely to those born at full term. A similar comparison was performed on the outcomes of infants diagnosed with chronic lung disease to those who were not.

Results: Chi-square analysis revealed a chi-square value of 9.75, Cohen's effect size of 0.469 (95% CI, 0.23–0.97; $P < .001$). Pearson correlation coefficient resulted in a coefficient of -0.787 ($P = .011$). The descriptive analysis comparing outcomes of premature infants with full-term infants found that prematurity was associated with an increased rate of tracheostomy placement despite intervention with balloon dilation. A similar comparison that examined the presence of lung disease found an increased rate of tracheostomy after balloon dilation in patients with lung disease.

Conclusion: Statistical analyses demonstrated that balloon dilation and repeat dilations might have a modest impact on reducing the tracheostomy requirement. This study demonstrates that balloon dilation (including repeat dilation) is associated with a statistically significant reduction in tracheostomy placement.

Characterization and Outcomes of Pediatric Vocal Cord Paresis and Paralysis

Alexandria Harris (Presenter); Jennifer L. McCoy, MA; Allison Tobey, MD

Introduction: Pediatric vocal cord paralysis is an increasingly recognized problem in pediatric patients and is the second most common cause of stridor in neonates with increased recognition, diagnosis, and survivorship from complex conditions including cardiac and neurologic problems. Our study aims to characterize the outcomes and prognostic factors for pediatric vocal cord paresis and paralysis (VCP).

Method: A retrospective chart review was performed on all VCP pediatric patients from 2007 to 2018 at a tertiary children's hospital. Variables included demographics, weight, vocal cord (VC) characteristics, cause of paralysis including cardiac surgery, interventions, and speech language pathology (SLP), respiratory, and feeding outcomes. Improvement was considered before and after VCP interventions.

Results: A total of 61 predominately female (52.5%) and White (88.5%) patients were included with a median age at VCP diagnosis (dx) of 5 months. There were 47 patients that had unilateral VCP (77.0%) with partial paralysis noted in 22 (40.0%). Prior cardiac surgery and neurologic conditions were present in 34.4% and 39.3% of patients, respectively. After dx,

40% required supplemental oxygen, and 44.1% had feeding modifications. Six patients had tracheostomy placement after VCP dx, and 1 had placement on the day of dx. Trach placement likelihood did not change with age at dx, weight centile, VCP side, prior cardiac surgery, or neurologic condition ($P > .05$). No differences in speech, respiratory, or feeding outcomes were seen between uni- or bilateral VCP or paralysis vs paresis ($P > .05$). A total of 23 patients (37.7%) had documented resolution with a median of 3 months from dx (range, 7 days to 49 months). Of these, only 2 (8.7%) had injections and none had laryngoplasties.

Conclusion: Our results show that vocal cord paralysis outcomes are not affected by laterality, age at diagnosis, or iatrogenic vs idiopathic origin. Most patients with diagnosed resolution did not have surgical intervention, supporting pre-existing literature that most resolution is spontaneous and the practice of conservative treatment.

Common Characteristics and Comorbidities Associated With Juvenile Recurrent Parotitis

Timothy Fan (Presenter); Ezer Benaim; Anwesh Dash; Madhu Mamidala, PhD; Jennifer McLevy-Bazzanella, MD

Introduction: Juvenile recurrent parotitis (JRP) is an inflammatory condition of unknown etiology characterized by recurrent episodes of parotid swelling commonly affecting young children, especially boys. Clear understanding of common characteristics, comorbidities, and management may shed new light into the etiology of JRP, and facilitate establishment of standard treatment protocol.

Method: This was a retrospective chart review study of pediatric patients diagnosed with sialadenitis at a single tertiary care center from 2011 to 2016. Demographics, laboratory and imaging studies, concurrent disease states, and treatment methods were gathered for patients with recurrent parotitis.

Results: Among 709 charts reviewed, 39 met the inclusion criteria for the study. Most patients were Black (48.7%), male (51.3%), and had onset between ages 6 and 8 years (23.1%). Laboratory studies (64.1%) and computed tomography (56.4%) were regular components of the initial workup. The most common laboratory findings were high amylase and erythrocyte sedimentation rate. Seventeen patients (43.6%) received ≥ 3 antibiotics, 14 patients (35.9%) underwent surgery, and 7 patients (17.9%) received both for their salivary complaints. Sialoendoscopy was the most widely performed procedure (78.6%). The top 3 most common comorbidities were of atopic (66.7%), obesity (48.7%), and gastrointestinal (GI; 30.8%) etiologies. However, GI comorbidities were overtaken by otolaryngologic diseases (42.9%) for the surgery subgroup.

Conclusion: No standard antibiotic selection protocol exists for JRP treatment, and as many as 13 types were used in various combinations, orders, and cycles for patients reviewed. In JRP patients with atopic and obesity comorbidities, earlier and

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more aggressive interventions may be warranted. The high proportion of patients who have received ≥ 3 antibiotics and/or undergone surgery indicates the significant morbidity of the JRP symptoms and underscores the necessity to develop better diagnosis and treatment algorithms.

A Comprehensive Review of Lemierre's Syndrome in Pediatric Patients

Daniel Swanson (Presenter); Stephanie Johng; Earl Harley, MD

Introduction: The objective of this report is to summarize the symptoms, diagnostic workup, necessary imaging, and management of Lemierre's syndrome (LS) in pediatric patients.

Method: A comprehensive literature review was completed on peer-reviewed publications using PubMed, Google Scholar, Cochrane Systematic Review Database, and Ovid MEDLINE database. We reviewed 45 cases of LS in pediatric patients. Articles pertaining to the management, diagnosis, and treatment of Lemierre's syndrome in pediatric patients were reviewed and included in this study.

Results: LS in pediatric patients can present with a clinically variable picture, but it is characterized by septic emboli and thrombosis of head and neck veins. Children frequently have a history of oropharyngeal infections, *Fusobacterium necrophorum*, and other anaerobes that can cause this disease. Computed tomography scans of the head and neck with intravenous (IV) contrast or ultrasound are important imaging tests to show neck vein thrombosis, but it is the whole clinical picture that alerts a physician to LS. Antibiotics continue to be the standard of care when addressing this disease, and it is critical to start these antibiotics before signs of septic shock manifest themselves.

Conclusion: The symptoms of pediatric LS appear to be similar to that of the classic presentation of LS; however, headache and otitis can be seen more in pediatric patients. Pediatric history of oropharyngeal infection is a critical risk factor in these patients. Mortality in pediatric LS appears to be less than 5%, but early identification of this disease with aggressive IV antibiotics is critical to prevent significant morbidity.

Decisional Conflict and Family Support in Parents of Otolaryngology Patients

Michele M. Carr, MD, DDS, MEd, PhD (Presenter);
Nicole Favre; Jason C. DeGiovanni, MD;
Mattie R. Rosi-Schumacher, MD; Philomena Behar

Introduction: The objective is to evaluate the correlation between decisional conflict (DC) scores and family support (FS) scores in parents of children who are offered otolaryngological surgery.

Method: Consecutive parents who were offered surgery for their child in 1 of 2 pediatric otolaryngology clinics were recruited. Each completed validated DC and FS scales and a brief demographic scale. Nonparametric comparisons were made based on demographic groups, and correlations were computed.

Results: Of 69 parents who participated, 62 (89.9%) were women, 6 (8.7%) were men, and 1 (1.4%) declined to answer. A total of 51 (73.9%) were between 30 and 45 years, 14 (20.3%) were younger than 30 years, and the remainder were older than 45 years. There were 34 (49.3%) that were college graduates, 19 (27.5%) had some college education, and the remainder had less education. Some 52 (75.4%) were White, 12 (17.4%) were African American, and 4 (5.7%) identified as other races. Mean patient age was 6.0 years (95% CI, 4.9–7.0). Respondents had a mean of 2.3 (95% CI, 2.0–2.5) children at home. The mean DC score was 7.9 (95% CI, 5.5–10.3), and the mean FS score was 18.3 (95% CI, 16.5–20.1). There were no significant differences in DC or FS scores based on the demographic groups except for FS compared by education level. Parents whose highest education level was high school graduate had the lowest FS scores (14.8; 95% CI, 10.0–19.5). Spearman rho was -0.173 between DC and FS scores, which was not statistically significant.

Conclusion: Early results show that DC and FS vary inversely and that FS scores were related to education level. Data collection is ongoing to improve the statistical power.

Detecting Coagulopathy in Pediatric Patients With Posttonsillectomy Hemorrhage

Anisha Konanur (Presenter); Jennifer L. McCoy, MA;
Amber D. Shaffer; Dennis Kitsko; Raymond Maguire;
Reema Padia, MD

Introduction: Postoperative hemorrhage (POH) is a serious complication after a tonsillectomy. The utility of lab work at presentation is unclear. This study aims to determine the frequency and type of labs drawn at emergency department (ED) presentation and assess the incidence of uncovering a previously unidentified coagulopathy.

Method: A retrospective chart review was performed at a tertiary care children's hospital from 2017 to 2019. Exclusion criteria included the following: no tonsillar bleed, history of coagulopathy, and treated by outside provider. Lab work included complete blood count (CBC), prothrombin time (PT), partial thromboplastin time (PTT), and von Willebrand factor (vWF).

Results: Of 723 patients, 364 (50.3%) patients met inclusion criteria. Of 364 patients, 179 (49.2%) were male and 309 (84.9%) were White. The average age at surgery was 8.12 years (SD = 4.0), and the average number of postoperative days was 6 (SD = 2.1). Operative control of bleeding occurred in 68 of 364 (18.7%) patients. Of 364 patients, 64 (17.6%) were anemic (hemoglobin $< 450,000$), 11 (3.0%) had elevated PTT, and 7 (1.9%) had elevated PT. Hematology was consulted in 14 (3.8%), of which 6 were diagnosed with von Willebrand disease and 1 with factor VII deficiency. Aminocaproic acid was used in 8 of 364 (2.2%) due to elevated PTT in 3 of 8 and multiple episodes of bleeding in 5 of 8. Four of 364 (1.1%) needed a blood transfusion due to hemodynamic instability. There was no significant difference in incidence of abnormal lab work in relation to those who did

and did not need operative control of bleed ($P = .125$). Overall, 7 patients (2.1%) had an uncovered coagulopathy.

Conclusion: Uncovering incidental coagulopathies is rare in patients who present with POH. Anemia was the most common abnormality noted; however, a small percentage required transfusion, and all had abnormal vital signs. Thrombocytosis was the next common abnormality, and this can commonly be seen in an inflammatory state. Developing algorithms is necessary to better guide appropriate lab work in patients who present with POH and to provide optimal value of care to patients.

Does Insurance Type Impact Disposition Outcomes in Children With Tracheostomies?

Mehdi Lemdani (Presenter); Vraj P. Shah; Chris B. Choi; Christina H. Fang, MD; Jean Anderson Eloy, MD; Christen Caloway, MD

Introduction: The aim of this study is to investigate the association between insurance type and the outcomes of pediatric patients receiving tracheostomies, including incidences of postoperative complications, length of stay, and total charges.

Method: The 2016 Kids' Inpatient Database (KID) was reviewed using the *International Statistical Classification of Diseases, Tenth Revision* (ICD-10) procedure codes for tracheostomies and ICD-10 diagnosis codes for postoperative complications related to tracheostomies. Chi-square tests were used for univariate analysis. Multivariate logistic regression was used to assess the independent effect of any covariates on patient outcome.

Results: A total of 3105 patients had a primary expected payer recorded. These payers included Medicare, Medicaid, private insurance, self-payers, and miscellaneous payers titled "other." Patients were divided into 3 categories: Medicaid, private insurance, and remaining payers. The Medicaid cohort was charged less than the remaining payers ($P < .001$) but not charged less than private insurance ($P = .395$). The Medicaid cohort had a higher proportion of Black (29.5%) and Hispanic patients (23.8%) compared with the private insurance cohort ($P < .001$). For tracheostomy-related complications, Medicaid patients had a higher incidence (12.0%) compared with private insurance payers (9.3%; $P = .023$). On multivariate analysis, Medicaid insurance status was associated with lower total charges when compared with private insurance ($P = .031$) and the remaining patients ($P = .008$) but was not associated with postoperative complications.

Conclusion: This study suggests that insurance type is associated with race and higher total charges. The Medicaid cohort had the lowest cost. Insurance type and postoperative complications appear unrelated.

Does Insurance Type Impact Tracheitis Outcomes in Children With Tracheostomies?

Vraj P. Shah (Presenter); Mehdi Lemdani; Chris B. Choi; Christina H. Fang, MD; Jean Anderson Eloy, MD; Christen Caloway, MD

Introduction: The aim of this study is to investigate the association between insurance type and costs/outcomes in pediatric tracheitis patients with tracheostomies.

Method: The 2016 Kid's Inpatient Database was used to identify pediatric tracheitis patients with tracheostomies and their subsequent procedures and complications via the *International Statistical Classification of Diseases, 10th Revision*, codes. Chi-square analysis and linear/logistic regression were used to determine association in patient data among insurance type.

Results: The primary payer statuses of the 4007 patients were private insurance ($n = 862$), Medicaid ($n = 2820$), and remaining payers (Medicare, "other," self-pay; $n = 325$). The mean age was 5.81 years (SE: 0.09). Multivariate analysis indicated that Medicaid patients and those with private insurance had similar total charges (mean cost of \$182,039.80 vs \$197,438.79, $P = .212$) and length of stay (LOS; mean LOS 13.17 days vs 13.11 days, $P = .931$). Patients with private insurance underwent a greater number of procedures than Medicaid patients (mean procedures of 2.60 vs 2.24, $P = .009$) and remaining payers (mean procedures of 2.60 vs 2.11, $P = .023$). Furthermore, Medicaid patients had similar mortality (odds ratio [OR] 1.780; 95% CI, 0.684–14.632; $P = .237$) and tracheostomy complications (OR 0.867; 95% CI, 0.687–1.094; $P = .229$) as compared with patients with private insurance. Likewise, remaining payers had no significant differences in outcomes or costs other than number of procedures when compared with private insurance.

Conclusion: Medicaid patients and remaining payers undergo fewer procedures than those with private insurance but otherwise have similar outcomes and costs. This suggests that varying insurance type is not strongly associated with differences in the management of pediatric tracheitis patients with tracheostomies.

Early Respiratory Outcomes in Obese Pediatric Tonsillectomy Patients

Kathryn Bradburn (Presenter); Sarah Hancock; John Faria

Introduction: Obesity has not been studied as an independent risk factor for early respiratory complications following tonsillectomy in pediatric patients, and admission practices vary among otolaryngologists. In this case series, we evaluated respiratory outcomes in obese pediatric patients posttonsillectomy and described the characteristics of patients who suffered early adverse respiratory events (ARE).

Method: This was a case series of patients 3 to 12 years of age who underwent tonsillectomy with or without adenoidectomy from March 1, 2011, to July 15, 2020, at a single tertiary care center. Patients with a body mass index (BMI) >95th percentile were admitted per institution protocol and included in this study. Exclusion criteria consisted of medical conditions that warrant admission regardless of BMI, including Trisomy 21, gross developmental delay, neuromuscular disorders, and congenital heart disease. Chart review was conducted to identify ARE, defined as postoperative desaturation (blood oxygen saturation [SpO_2] 2h).

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Results: There were 208 patients who met inclusion criteria for this study, and 17 patients (8.17%) had at least 1 ARE. Of these 17 patients, 7 resolved without intervention, 8 required noninvasive supplemental oxygen >2 hours, and 2 had significant events, specifically pulmonary edema and inpatient initiation of continuous positive airway pressure. Preoperative polysomnographies (PSGs) were available for 11 of 17 subjects with ARE and 113 of 191 subjects without ARE. The preoperative obstructive apnea-hypopnea index (oAHI) and SpO₂ nadir were significantly different between patients who had an ARE and those who did not (mean oAHI 54.3 vs 17.4, $P = .02$; mean SpO₂ nadir 71.2% vs 84.38%, $P = .05$). There was no significant difference in the BMI between the groups (30.33 vs 27.29, $P = .14$).

Conclusion: While early respiratory complications requiring inpatient management are relatively uncommon in obese children, there are specific characteristics that may indicate a higher risk for ARE and a need for postoperative admission. In our study, patients with a postoperative ARE had a significantly higher oAHI and lower SpO₂ nadir on preoperative PSG, although there was no difference in BMI.

Effect of Ibuprofen on Posttonsillectomy Hemorrhage Severity in Pediatric Patients

Emma De Ravin (Presenter); Grace L. Banik, MD; Adva Buzi, MD

Introduction: The association between ibuprofen use and severity of posttonsillectomy hemorrhage (PTH) remains unclear. The objective of this study was to compare the severity of surgically managed PTH in patients who did or did not receive postoperative ibuprofen.

Method: This was a retrospective cohort study of pediatric patients requiring operative control of PTH at a tertiary children's hospital between 2015 and 2019. Severity of PTH was assessed using pretonsillectomy and post-PTH hemoglobin and hematocrit values, estimated intraoperative blood loss, estimated blood flow rate, and receipt of transfusion. Statistically significant differences in severity markers for patients who did and did not receive ibuprofen postoperatively were calculated using t test and Fisher exact test.

Results: A total of 193 patients were included in this study. The mean age was 8.7 years, and 55% of patients were male. Approximately 40% of the study population received ibuprofen postoperatively. There were no statistically significant differences in the mean change in hemoglobin (0.9 vs 1.1, $P = .29$) or hematocrit (2.7 vs 3.0, $P = .36$) in patients who received ibuprofen compared with those who did not. Similarly, there were no significant differences in need for transfusion (4% vs 3%, $P = 1.00$), presence of high-flow bleeding (34% vs 40%, $P = .55$), or occurrence of severe (>100 mL) blood loss (8% vs 9%, $P = 1.00$) between the 2 groups.

Conclusion: Postoperative ibuprofen use does not appear to significantly increase the severity of surgically managed PTH, as measured by change in hemoglobin and hematocrit values, need for transfusion, presence of high-flow bleeding, or occurrence of severe blood loss. This study introduces previously

unexplored markers to assess PTH severity and supports further prospective studies to determine the effect of ibuprofen use on PTH severity.

The Effect of Income Disparities on Pediatric Facial Fractures

Sudeepti Vedula (Presenter); Yash S. Shah; Yash M. Shah; Chris B. Choi; Christen Caloway, MD

Introduction: Socioeconomic factors play an important role in the determinants of patients with trauma-related diagnoses. This study investigates the demographics and outcomes associated with income disparities of pediatric patients who had facial fractures.

Method: The Kids' Inpatient Database (KID) from 2016 was queried for patients younger than 21 diagnosed with facial fractures. Patients were stratified into lower and higher income groups based on the median household income of their zip code using a threshold of \$54,000. Univariate and multivariate analyses were conducted, comparing demographics and outcomes between the 2 groups.

Results: A total of 22,883 pediatric facial fractures were identified. Of these, 13,626 (59.5%) had a lower median household income, while the remaining 9258 (40.5%) had higher such income. Univariate analysis revealed distributions of age cohorts, race, season of fracture, and region as significantly different between the 2 groups ($P < .001$). Patients in the lower income group had a longer length of stay than those in the higher group (5.73 vs 5.29, $P = .001$). In a multivariate analysis, the difference in length of stay between the 2 income groups remained statistically significant ($P = .023$). However, total charges between the 2 groups were not significantly different in a univariate or multivariate analysis.

Conclusion: Pediatric facial fracture patients with a lower income status had significantly different demographics and length of stay when compared with those with a higher income status. Total charges were not significantly different, however. These findings illustrate the importance of socioeconomic status on the epidemiology and outcomes in pediatric facial fractures.

Effect of Insurance Type on Postoperative Tympanostomy Tube Follow-up

Terral Patel, MD (Presenter); Jennifer L. McCoy, MA; Michael Belskey; Noel Jabbour; Reema Padia

Introduction: Bilateral myringotomy with tube insertion (BMT) is commonly used to treat recurrent acute otitis media (RAOM) in children. Appropriate follow-up is necessary to ensure identification and treatment of postoperative sequelae. This study investigates the relationship between insurance type, completion of postoperative follow-up, and subsequent need for further care after BMT.

Method: A retrospective review was performed on patients up to 3 years of age undergoing BMT at a single tertiary care children's hospital from June 2017 to February 2020. Patients were excluded if they had received a prior BMT; underwent a

concurrent ear, nose, and throat procedure; or had a syndromic diagnosis, craniofacial abnormality, or any significant cardiac or respiratory comorbidity. Socioeconomic status (SES) and postoperative outcomes were analyzed.

Results: A total of 734 patients were included. The median age at time of BMT was 15 months (range, 4–35 months). Most patients had private insurance (520/734; 70.8%). Patients with public insurance attended fewer postoperative appointments (1.5 vs 1.8; $P < .001$), had a higher rate of no shows (13.2% vs 2.7%; $P < .001$), and had a higher incidence of BMT-related emergency department (ED) visits (10.3% vs 3.8%; $P = .001$). Institution-sponsored insurance as compared with non-institution-sponsored insurance did not have an effect on postoperative visit attendance (1.7 vs 1.8 number of appointments; $P = .231$) or ED visits (0.1 vs 0.1; $P = .564$). When controlling for age, race, distance from hospital, and SES, patients with private insurance were more likely to attend postoperative appointments (odds ratio [OR], 3.52; 95% CI, 2.12–5.82; $P < .001$) and less likely to have a BMT-related ED visit (OR, 0.42; 95% CI, 0.20–0.89; $P = .024$).

Conclusion: Insurance type plays a role in outcomes after the treatment of RAOM with BMT. Future studies that survey individuals in both groups will help identify barriers that contribute to their absence at follow-ups and need for subsequent ED visits. Earlier interventions, counseling, and the use of telemedicine may benefit patients within the public insurance group to help combat some of the obstacles they face.

The Efficacy of CT and MRI in Pediatric Cholesteatoma Evaluation

Hannah Moriarty (Presenter); Courtney Voyles; Ching Siong Tey; Nandini Govil, MD, MPH

Introduction: There is variability among surgeons in the preferred imaging modality for diagnosis of cholesteatoma. In pediatrics, this choice is further complicated by the risk of radiation with computed tomography (CT) and potential need for sedation with magnetic resonance imaging (MRI). The objective of this study is to determine if CT, MRI, or combined CT/MRI is more effective in predicting the surgical presence of pediatric cholesteatoma.

Method: This study retrospectively reviewed surgical cases completed at a tertiary pediatric hospital from November 2010 to January 2021 for patients with suspected cholesteatoma and imaging within 6 months of surgery. The intervention assessed was the imaging modality, and the outcome was surgical presence of cholesteatoma. Preoperative imaging findings were defined as positive or negative based on the radiologist report. Due to heterogeneity of reports, 2 separate analyses were completed. In analysis 1, radiology reports were considered positive for cholesteatoma if there was description of “soft tissue debris, opacification, or suspected cholesteatoma.” In analysis 2, radiology reports were only considered positive if the report explicitly said “suspected cholesteatoma.” Statistical

analyses were completed with Fisher exact test and analysis of variance using SAS 9.4 and Statistical Product and Service Solutions software.

Results: A total of 122 patients were included: 111 CT imaging only, 4 MRI only, and 7 CT and MRI. No significant demographic differences existed across imaging groups. In addition, no imaging modality was significantly more efficacious at predicting surgical presence of cholesteatoma (analysis 1, $P = .941$; analysis 2, $P = .645$).

Conclusion: No difference was found between preoperative CT, MRI, or combined CT/MRI in predicting the surgical presence of cholesteatoma. Further research is needed to assess the cost and long-term consequences of imaging modality in the diagnosis of pediatric cholesteatoma.

Epiglottic Stiffening Surgery for Children With Obstructive Sleep Apnea

Ahmed Nassar (Presenter)

Introduction: Adenotonsillectomy (AT) is the first-line treatment for pediatric obstructive sleep apnea (OSA), with a success rate of 71% to 87% in a normally developing pediatric population. However, the success rate of AT in children with Down syndrome (DS) is poor and less favorable compared with that in normally developing children. This has been attributed to multilevel upper airway obstruction in children with DS.

Method: Nine children with DS based on karyotypic information were referred to us from the genetics unit at the pediatric hospital of our institute. All patients had persistent OSA after adenotonsillectomy. There were 5 boys and 4 girls, and their ages ranged between 5 and 12 years. The study was carried out in the period between December 2015 and June 2019. Patients were subjected to overnight polysomnographic examination (PSG) for at least 6 hours in a quiet, dark room. We measured the apnea-hypopnea index (AHI); children with an AHI >1 were considered to have OSA, and we included them in the study. Other polysomnographic parameters such as sleep efficiency, total sleep time (TST), arousal index, minimum oxygen saturation, desaturation index, and peak end-tidal carbon dioxide were measured. Drug-induced sleep endoscopy was used to detect epiglottic collapse. Patients with epiglottic collapse were treated with epiglottic stiffening using coblation (Evac 70; ArthroCare) to create a raw area down to the perichondrium on the lingual surface of epiglottis. Three months postoperatively, all patients were subjected to overnight polysomnographic examination with measurement of the same parameters, which were recorded preoperatively.

Results: The PSG study showed no significant changes in pre- and postoperative values of either TST and sleep efficiency. Other parameters showed significant postoperative changes. Postoperatively, normalization of AHI was detected in 3 patients who demonstrated AHI <1 , while 6 patients demonstrated OSA with improvement of their AHI.

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Conclusion: Epiglottic stiffening surgery using coblation is a minimally invasive procedure able to improve AHI in children with DS and OSA.

Exploring the Role of Video Endoscopes in Resident Tonsillectomy Training

Gene C. Liu, MD (Presenter); David M. Bruss, MS; Victor Hsue, MD; Kyohei Itamura, MD; Matthew K. Lee, MD

Introduction: Training otolaryngology residents to perform tonsillectomy surgery is uniquely challenging because of the small anatomical boundaries of the oral cavity. Video endoscopes positioned exterior to the oral cavity may offer a simple solution to improve visualization of the surgical field during tonsillectomy surgery.

Method: Rigid sinus and laryngeal 70° video endoscopes and the VITOM 3D (Karl Storz SE & Co KG, Tuttlingen, Germany) were positioned exterior to the oral cavity. Video endoscopes were supported manually by hand or with the assistance of the Point Setter (Mitaka Kohki Co, Ltd, Tokyo, Japan) holding system. The video feed from the video endoscopes projected the surgical field to wall-mounted and boom-mounted monitors. Surgical trainees first observed the surgical attending perform a unilateral tonsillectomy and then performed the contralateral tonsillectomy under the direct supervision of an attending surgeon.

Results: All 3 video endoscopes dramatically improved visualization of the surgical field for both the surgical trainee and the attending surgeon. Placement of a video endoscope exterior to the oral cavity allowed for step-by-step observation of the surgical procedure free from any obstruction of view. The resident trainees described improved discrimination of tissue planes while observing their attending surgeon operate.

Conclusion: The VITOM 3D and rigid sinus and laryngeal video endoscopes can be used during tonsillectomy surgery to improve visualization by providing an unobstructed view of the surgical field. Video endoscopic-assisted tonsillectomy surgical training can be seamlessly integrated into any residency training program to enhance surgical supervision and improve surgical training.

Feeding Issues in Infants Referred for Frenotomy

Jason C. DeGiovanni, MD (Presenter); Alison C. Ma; Mattie R. Rosi-Schumacher, MD; Mark Nagy; Michele M. Carr, MD, DDS, MEd, PhD

Introduction: Frenotomy rates have increased significantly around the world over the past decade. Frenotomy is indicated in infants with ankyloglossia to improve breast-feeding, although there is little scientific evidence of its efficacy. The purpose of this study is to evaluate whether infants who were being referred for frenotomy had feeding issues.

Method: A retrospective chart review was undertaken for all infants under 1 year of age referred to a pediatric otolaryngology practice in 2019 and 2020. Data included age at referral, gender, comorbidities, feeding issues, whether ankyloglossia was present, and whether frenotomy was done. Frequencies and nonparametric comparisons were calculated.

Results: Of 142 infants referred, 92 (64.8%) were male and 50 (35.2%) were female. Mean age was 2 months, and 77 (54.2%) were less than 1 month of age. A total of 17 (12.0%) had reflux already diagnosed. Some 28 (19.7%) had no feeding complaints, and 13 (9.2%) had poor weight gain as the only feeding-related complaint. Of the mothers, 43 (30.3%) had a painful latch, 42 (29.6%) had a poor latch, and 9 (6.3%) infants had prolonged feeding. Ankyloglossia was diagnosed based on inspection and palpation in 118 (83.1%) of infants, and of these, 110 (93.2%) were anterior and 8 (6.7%) were posterior. A total of 90 (63.4%) children had both ankyloglossia and a feeding issue, and of these, 75 (83.3%) underwent frenotomy. In total 96 children, 81.4% of those with ankyloglossia diagnosed, underwent frenotomy. Infants with ankyloglossia diagnosed were as likely to have a feeding issue as those without ankyloglossia (odds ratio 1.07, $P = .539$).

Conclusion: Feeding issues were not specific to infants with ankyloglossia in this group. Almost 20% of infants referred for frenotomy did not have ankyloglossia, suggesting that this entity is still associated with a lack of clinical clarity.

Following Guidelines: Prescribing Practices for Acute Otitis Media in Children

Johanna L. Wickemeyer (Presenter); Margaret Schmit; Heather Weinreich, MD, MPH

Introduction: Acute otitis media (AOM) is the second most common cause of primary care visits and most common cause of pediatric antibiotic prescription in the United States. According to the Clinical Practice Guidelines created by the American Academy of Otolaryngology, prescribers should treat uncomplicated AOM with 3 months of watchful waiting; if a medication is indicated, amoxicillin or cephalosporin is the treatment of choice. This study investigates the adherence to these guidelines across different care settings and clinicians.

Method: An analysis was conducted of an administrative database comprising ambulatory visits for patients evaluated in a large, urban, academic health center. The population was children diagnosed with AOM between the ages of 2 and 12 years and evaluated between March 2018 and June 2020. The outcome variable was the percentage of children treated with the watchful waiting approach (did not receive antibiotic) vs the prescription for an antibiotic. The independent variables included demographic information, location of the visit, and prescriber qualifications.

Results: A total of 949 cases of uncomplicated AOM were identified. Only 107 of 858 treated children (15.2%)

did not receive an antibiotic at the patients' initial encounter. Adherence to watchful waiting practices was low in the emergency room (5.7%) and urgent care (0.8%) and the highest in otolaryngology clinic (56.5%) settings. Watchful waiting practices were the lowest in advanced practice registered nurses (APRNs; 7.3%) and physician assistant (PA; 0%) prescribers, who make up a significant portion of prescribers in primary care physician (APRN: 23.9%) and urgent care (APRN: 58.2%, PA: 16.2%) settings. When a medication was prescribed, the guidelines were followed 87.2% of the time. Of the medications used to treat AOM, the most frequently inappropriately prescribed were macrolides (2.9%), steroids (3.5%), and antihistamines (3.8%).

Conclusion: Adherence to a watchful waiting approach for AOM is not followed in primary and acute care settings. When antibiotics are prescribed, adherence is high regarding the type of medications prescribed. Further efforts are needed to understand the limited adoption of watchful waiting practices in AOM management.

Foreign Body Aspiration Complicated by Pneumothorax in Children: HCUP-KID Perspective

Ellen L. Tokarz, MD (Presenter); Camilla Niedzwiedz;
Cathleen C. Kuo; Benjamin Ritter;
Michele M. Carr, MD, DDS, MEd, PhD

Introduction: Children with airway foreign bodies (AFB) occasionally have pneumothorax complicating their course. We aimed to compare these children to those without this complication.

Method: Data were obtained from the 2016 Kids' Inpatient Database (KID) of the Healthcare Cost and Utilization Project. The *International Statistical Classification of Diseases, Tenth Revision* (ICD-10) code of T17XXXX was used to locate records. They were grouped based on the presence of preoperative pneumothorax, postoperative pneumothorax, or none. Variables included demographics, AFB type and location, length of stay (LOS), mortality, hospital setting, primary payer, and total charges.

Results: A total of 4165 children were identified, 57.8% male and 42.2% female. Of them, 75 (1.8%) patients presented with preoperative pneumothorax, 29 (0.7%) with postoperative pneumothorax, and 4061 (97.5%) with no pneumothorax. The preoperative pneumothorax patients were older than the postoperative pneumothorax and the unaffected patients (mean age 9.5 [95% CI, 7.7–11.3] vs 8.2 [95% CI, 5.4–11.1] vs 5.5 [95% CI, 5.3–5.7]; $P < .001$). Preoperative pneumothorax patients incurred higher total charges than the other groups did (mean US\$939,000 [95% CI, 673,000–1,204,000] vs \$599,000 [95% CI, 377,000–821,000] vs \$228,000 [95% CI, 211,000–244,000]; $P < .001$), had a longer LOS (mean 37.7 days [95% CI, 28.7–46.7] vs 31.6 days [95% CI, 16.9–46.2] vs 15.8 days [95% CI, 15.0–16.7]; $P < .001$), and had a higher mortality rate (16% vs 0% vs 3.7%, $P < .001$).

Conclusion: Pneumothorax can significantly affect a child's hospital course, and preoperative pneumothorax should alert clinicians to potential for increased mortality risk.

Full-Gene Sequencing of Cyst Fluid Cell-Free DNA in Lymphatic Malformations

Kaitlyn B. Zenner, MD (Presenter); Dana M. Jensen;
Victoria Dmyterko; Candace Myers, PhD;
James T. Bennett, MD, PhD; Jonathan A. Perkins, DO

Introduction: Genetic diagnosis in patients with lymphatic malformations (LMs) has opened the door to new, personalized medical therapy; however, obtaining this diagnosis is invasive and typically requires lesion tissue. Full-gene sequencing of cell-free DNA (cfDNA) from LM cyst fluid may provide a less invasive option for obtaining this genetic diagnosis.

Method: Individuals with LM and a known genetic diagnosis were included in this study. Cyst fluid was obtained from individuals either during surgical resection, sclerotherapy, or in clinic under ultrasound guidance. Genetic diagnosis had previously been obtained from cyst fluid cfDNA via droplet digital polymerase chain reaction (ddPCR) for common PIK3CA mutations in LM. The cfDNA was extracted from cyst fluid and sequencing was performed using VANseq, a panel that uses hybridized-capture next-generation sequencing to perform ultra-deep, full-gene sequencing for 44 genes commonly mutated in vascular malformations. Results from VANseq were analyzed by a blinded reviewer and were compared with the previously obtained genetic diagnosis.

Results: In the study, 5 individuals with LM and PIK3CA mutations (p.E542K [2], p.E545K [2], p. H1047R) were included. Previously detected variant allele fraction (VAF) of cyst fluid cfDNA ranged from 0.2% to 6.7%. The correct mutations were detected on VANseq in 4 of 5 individuals. The difference in VAF between ddPCR and VANseq ranged from 0% to 0.9%. The average read depth at the site of mutations was 1990 reads (range, 833–3260). The one individual whose mutation was not detected on VANseq had a VAF of 0.2% on ddPCR and a VAF of 0.15% for the same mutation on VANseq (5/3260 reads), which is below the limit of detection for the assay.

Conclusion: This study demonstrates that high-depth full-gene sequencing of LM cyst fluid cfDNA is feasible and offers a potential option for less invasive genetic diagnosis in LM patients. This may provide patients with the opportunity to initiate medical therapy prior to surgical resection and allow for earlier intervention and decreased morbidity.

The Gap: Pediatric to Adult Transitions of Care in Otolaryngology

Jennifer Shearer (Presenter); Claudia I. Cabrera, MD, MS;
Todd Otteson; N. Scott Howard, MD, MBA

Introduction: The transition from pediatric to adult care is a growing area of research, but this topic remains unexplored in otolaryngology. Our study aimed to investigate clinical practice patterns among pediatric otolaryngologists regarding transition.

Method: A 20-question survey including demographics (setting and time in clinical practice, population served), recognition of transition (use of transition readiness tools, transition topics discussed with patients), and clinical practices

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(transition policies, timing of transition) was developed. The survey was administered to otolaryngologists and members of the Society for Ear, Nose, and Throat Advancement in Children (SENTAC) in December 2020.

Results: The survey was distributed to a mailing list of 271 individuals; 28 participants completed the survey. Most respondents have been in practice for at least 16 years ($n = 17$), worked at a university-based practice ($n = 21$), and served an entirely pediatric population ($n = 24$). Providers' expertise included chronic ear disease, voice disorders, chronic laryngeal stenosis, and head and neck oncology. Few respondents ($n = 8$) had a transition policy formalized at their practice. However, 38% of respondents were interested in developing one. Within their clinical practice, respondents rarely discussed topics such as drugs, tobacco, or alcohol use (mean 30.4%, standard deviation [SD] 28.6%) with patients 14 years and older. On average, only 58.6% (SD 33.9) of providers asked patients 14 years and older to independently describe their condition, medications, or treatment plans. None of the providers were familiar with standardized transition tools such as the Transition Readiness Assessment Questionnaire. On average, providers transferred patients at 21 years old (SD 3).

Conclusion: There is significant variation between otolaryngology providers' awareness and clinical practice patterns surrounding pediatric to adult transitions of care. Further studies are needed to evaluate the implications of these biases for patient outcomes and the opportunities for a standardized approach toward transition within otolaryngology.

Health Care Costs and Medical Outcomes Following Supraglottoplasty

Enrique G. Ortiz Hernandez, MD (Presenter);
Eduardo López Orozco; Eloy Sanchez Hernandez;
Daniela Ocegüera Reyes; Melissa Plascencia Alonso

Introduction: Laryngomalacia is the most common cause of stridor in neonates, with an usually benign course; however, in severe cases, surgical management may be required with supraglottoplasty. This is a procedure that manipulates the upper airways, requiring close postoperative care; nevertheless, there is little information published about this topic and its economic impact.

Method: Supraglottoplasty is performed in our institution in children with severe laryngomalacia using cold steel instrumentation under endoscopic vision and general anesthesia. Postoperative patients were either extubated and sent to a pediatric ward or kept under orotracheal intubation and sent to an intensive care unit. This is an observational retrospective study in which the charts of children who underwent supraglottoplasty in our institution were reviewed. Children were separated into 2 groups: those who required intensive care unit stay (group A) and those who did not require intensive care unit stay (group B). Their medical outcomes, defined as resolution of the inspiratory stridor, no hypoxia episodes, and adequate weight gain, were assessed. The health care costs among the 2 groups were also compared.

Results: In total, 22 children who were diagnosed with severe laryngomalacia had supraglottoplasty performed by the same senior surgeon. Group A had 11 patients (50%) with an average hospital length of stay of 9 days and an average cost of hospital stay of Mex\$40,000 (US\$2,127). Of group A patients, 45% had associated comorbidities. Group B was composed of 11 patients (50%) with an average hospital length of stay of 4.4 days and an average health care cost of Mex\$12,000 (US\$638). None of these patients had any comorbidities. All patients in both groups had a resolution of their disease.

Conclusion: Supraglottoplasty is the standard of care for children with severe laryngomalacia, with excellent results after the procedure. The patient's progress depends on the need for postoperative mechanical ventilation, which was seen to be needed mainly in patients with other existing comorbidities, thus increasing health care costs.

Hearing Loss Prevalence Among Children in the Western Dominican Republic

Matthew J. Urban (Presenter); Chris Wojcik; Aidan Jagasia;
Shannon Barry; Rachel Hammond; Ashok Jagasia

Introduction: In the Dominican Republic (DR), there is poor access to hearing health care, especially outside of large urban areas. Our objectives in this study are to understand the extent of hearing loss and common otologic disorders among school-age children in the rural western region of the DR and to chronicle our experience initiating a limited-resource hearing screening program.

Method: Peralta, a small rural village in the western DR, is the site of a biannual otolaryngology mission and was chosen as the site for hearing screening to facilitate continuity of care. Hearing screenings were completed over 5 days in various locations of the village hospital. Screening was performed with otoscopy and screening audiometry on all age-appropriate patients. Patients who failed audiometry screening were tested with tympanometry screening and distortion product otoacoustic emission (OAE) testing. Patients with a type A tympanogram and OAEs present at 4 out of 6 test frequencies passed the screening.

Results: A total of 578 children (1156 ears, age 10 months to 18 years old) were screened. Abnormal otoscopic exams were present in 47 (8.1%). Of those tested, 64 children failed screening audiometry (11%), 31 were unable to condition (5.4%), and 30 patients failed OAEs (5.2%). Some 21 children had normal tympanometry, suggesting they were free of middle ear involvement (3.6%), and 7 children with chronic otitis media with effusion underwent tube placement (1.2%).

Conclusion: Further testing would be required to confirm hearing aid candidacy; however, roughly 20 children were expected to be potential hearing aid candidates. Of the children, 8% of children had an abnormal otologic examination, sometimes easily remedied by otolaryngologic intervention. This protocol highlights the feasibility of incorporating hearing screening into limited-resource otolaryngologic missions.

Hearing Screening of School-Age Children in Region of Central Asia

Piotr H. Skarzynski, MD, PhD, MSc (Presenter);
Weronika Swierniak; Elzbieta Gos;
Katarzyna Beata Cywka; Henryk Skarzynski

Introduction: Hearing impairment among all ages is estimated to occur in about two-thirds of cases in developing countries. Screening is considered the method of secondary prevention for assessing large population groups to detect early stages of a disease. This study reports the data (feasibility and performance) from a pilot hearing screening in school children in Bishkek, Kyrgyzstan, and refers pupils with positive results for further diagnostic testing.

Method: The study was conducted in a general, pediatric, nonclinical population of children from Bishkek, Kyrgyzstan. In June 2019, hearing screening was conducted in 2 public primary schools. The study sample consisted of 452 children aged 7 to 13 years. Pure-tone air conduction hearing thresholds were obtained at 0.5 to 8 kHz. Each audiogram with a positive result was divided into low-frequency hearing loss (LFHL) and high-frequency hearing loss (HFHL). Data were also obtained from follow-up visits of children who failed the initial screening.

Results: Based on audiograms, the rate of failed results was 27.2% (123 children). There was a statistically significant difference in the frequency of positive results between the younger and older children: $\chi^2 = 9.98$; $P = .002$. HFHL was more frequent than LFHL both in the younger group ($P < .001$) and in the older group ($P = .041$). The rate of HFHL was significantly higher in younger children than in older children ($P = .040$). In 21 of the 27 children with a positive outcome of hearing screening, some hearing problem was found (ie, the true-positive rate was 78%). The low follow-up rate among children referred for further diagnostic suggests a low level of support for the program from parents.

Conclusion: The study has important implications for health policy. In view of the significant number of children in the study with positive screening results, we conclude it is imperative to implement a universal school hearing screening programs in Kyrgyzstan. There is a need for systematic monitoring of hearing status among children of this age, and parents and educators need to be made aware of the significance of hearing loss.

Higher BMI Is Associated With Malignancy in Pediatric Thyroid Nodules

Jean-Nicolas Gallant, MD, PhD (Presenter); Carlos Ortega;
Ryan H. Belcher, MD; Vivian Weiss, MD, PhD

Introduction: Rates of pediatric thyroid cancer in the United States have been increasing for the past 2 decades among all sexes, races, and ethnic groups. This trend cannot be explained solely by increased surveillance or improved detection because the incidence of small, early-stage, and larger, late-stage, tumors has increased. We hypothesized that the increase in childhood rates of obesity was associated with the risk of pediatric thyroid cancer. Specifically, we hypothesize that

increases in body mass index (BMI) were associated with a higher likelihood of a malignant thyroid nodule.

Method: A retrospective study of pediatric patients (<21 years) who underwent thyroid surgery between 2003 and 2019 at a tertiary care center was performed. Demographic and clinical data were manually extracted from the electronic health record. Median household incomes were extracted from the Census Bureau. BMI z-scores (BMI normalized to age and sex) were calculated using World Health Organization nomograms. Multiple regression analyses were made between BMI z-scores (BMIz), pathology (benign vs malignant), disease aggressiveness, and patient outcomes.

Results: A total of 116 patients (mean 15.1 years of age; range, 0.4–21 years; 16% prepubertal, 80% female) were evaluated. Some 54 patients (47%) had a malignant nodule on final pathology. BMIz was significantly associated with malignancy on pathology ($P = .009$). There was no association between BMIz and disease aggressiveness or patient outcomes. Multivariable analyses demonstrated a significant link between BMIz, lower median household income, public insurance status, smoking in the home, and the risk of malignancy.

Conclusion: Increases in BMI are significantly associated with malignancy rates of pediatric thyroid nodules. The increases in BMI appear to be tightly linked to socioeconomic factors, as indicated by their relationship with household income, insurance status, and home smoking habits.

Impact of Volume on Pediatric Aerodigestive Foreign Body Management

Vraj P. Shah (Presenter); Mehdi Lemdani; Chris B. Choi;
Christina H. Fang, MD; Jean Anderson Eloy, MD;
Christen Caloway, MD

Introduction: The aim of this study is to investigate associations between hospital volume and costs/outcomes in pediatric patients with aerodigestive foreign bodies.

Method: The 2016 Kid's Inpatient Database was used to identify pediatric patients with aerodigestive foreign bodies and subsequent procedures and complications via *International Statistical Classification of Diseases, Tenth Revision* (ICD-10) codes. Hospital volume was categorized by cases per year as high volume (HV; 57–130), intermediate volume (IV; 10–56), or low volume (LV; 1–9). Chi-square and linear/logistic regression were used to determine statistical associations in patient data among hospital volume.

Results: A total of 5996 identified patients were divided into HV (n = 1484), IV (n = 3054), and LV (n = 1458). Patients at HV hospitals were younger than those at IV and LV hospitals, respectively (4.22 years, 5.06 years, 7.67 years; $P < .001$). Multivariate analysis indicated that patients at LV hospitals had lower total charges than at HV hospitals (mean cost \$137,755.96 vs \$237,790.00, $P < .001$), had a shorter length of stay (LOS; mean LOS 11.13 vs 13.91 days, $P = 0.045$), and underwent a lower number of procedures (mean procedures 3.26 vs 3.69, $P < .001$). When comparing LV with HV hospitals, there was no difference in ventilator use (odds ratio [OR], 1.141; 95% CI, 0.931–1.399; $P = .203$), respiratory failure

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complications (OR 0.643, 95% CI, 0.023–1.269, $P = .812$), endoscopic esophageal extirpation (OR 1.067, 95% CI, 0.842–1.352; $P = .592$), or mortality rate (OR 0.866, 95% CI, 0.530–1.413; $P = 0.564$).

Conclusion: Patients treated at LV hospitals are older and have lower total charges, LOS, and number of procedures than those at HV hospitals. With no associated differences in mortality or complications, these data suggest that pediatric patients with aerodigestive foreign bodies are being appropriately treated at all volume hospitals.

In-Office Tympanostomy Tube Tolerability in Children Under Age Two Years

Joseph N. Badaoui, MD (Presenter);
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Grace Nimmons, MD; Jay Raisen, MD;
Shelagh A. Cofer, MD

Introduction: The aim of this study was to investigate the tolerability profile of office tympanostomy tube insertion (O-TTI) using a standardized methodology encompassing audio/video (A/V) recording.

Method: As part of a prospective multi-institutional single-arm clinical study, children aged 6 to 24 months were consecutively enrolled to undergo A/V recording of O-TTI between February 2020 and May 2020. The procedures were uniformly recorded, and anesthesia was performed with topical tympanic phenol (TTP). Recordings were reviewed by 3 independent pediatric experts, the patient response was studied at 5 different stages of the procedure, and the level of tolerability was determined using a standardized scale. Analyzed features included crying patterns, facial expressions, interaction with the environment, and body position. Response patterns were divided into 4 categories: no patient response or baseline state, mild patient response, moderate patient response, and significant patient response. Afterward, the reviewers stated if, in their opinion, the child tolerated the procedure adequately. Finally, a 5-question survey was distributed to legal guardians to assess their overall satisfaction with the procedure.

Results: A total of 30 patients had bilateral O-TTI A/V recorded. First- and second-pass success rates were 93% and 100%, respectively. Median procedural time was 3.9 minutes (range, 2.0–9.9 minutes). A total of 90 A/V reviews were analyzed. The highest significant patient response rate was reported during TTP and TTI. At the final stage of the procedure, patient response rates were almost similar to the ones recorded at the initial stage of the procedure. All experts judged that the cohort tolerated the procedure adequately (100%). According to the parental survey, 75% of responders believe that an alternative to general anesthesia is necessary in TTI.

Conclusion: We present data that provides objective evidence of clinically reasonable patient tolerability of O-TTI in patients aged 6 to 24 months. O-TTI using TTP seems to offer adequate analgesia to perform this procedure safely and effectively.

Intraoperative Ketorolac and Posttonsillectomy Hemorrhage

Jason C. DeGiovanni, MD (Presenter); Francesca Viola;
Kiana Saade; Matthew Kabalan;
Mattie R. Rosi-Schumacher, MD;
Michele M. Carr, MD, DDS, MEd, PhD

Introduction: There is controversy regarding the effect of using nonsteroidal anti-inflammatory medications posttonsillectomy on risk of bleeding. Our goal was to review local outcomes when 1 intraoperative dose of ketorolac was used during pediatric tonsillectomy.

Method: Charts were reviewed for all pediatric patients undergoing tonsillectomy by pediatric otolaryngologists in a single institution between January 2019 and May 2020. Age, gender, indication for surgery, comorbidities, surgeon, resident participation, technique, intraoperative medications, and postoperative medications were reviewed and logistic regression calculated for postoperative hemorrhage.

Results: A total of 1093 patients had complete data. The mean age was 7.0 years (95% CI, 6.8–7.3), 526 were female (48.1%), and 567 were male (51.9%). There were 893 (81.7%) who had surgery for obstruction, and 200 (18.3%) had surgery for recurrent infection. For 331 (30.3%), otolaryngology residents were involved in their surgery. Patients having monopolar dissection done were 846 (77.4%), 237 (21.7%) had bipolar dissection, and 9 (0.8%) had coblation tonsillectomy. A total of 662 patients (60.6%) had intraoperative ketorolac used; 1085 (99.3%) had intraoperative dexamethasone, 1003 (91.8%) had intraoperative morphine, and 47 (4.3%) had intraoperative fentanyl. All were advised to use ibuprofen postoperatively. In total, 72 (6.6%) had a postoperative hemorrhage and 7 (0.6%) were within 24 hours. Three had von Willebrand's disease, and none of these had postoperative hemorrhage. Logistic regression showed that only age was significantly associated with postoperative hemorrhage ($\beta = .138$, $P < .001$), with a mean age of children with postoperative bleeding of 8.8 years (95% CI, 7.7–9.9) vs 6.9 years (95% CI, 6.7–7.1; $P < .001$) for those without.

Conclusion: We did not demonstrate that a single intraoperative dose of ketorolac in this population was associated with a change in posttonsillectomy hemorrhage.

Long-term Follow-up of Pediatric Mandibular Fractures Requiring Operative Repair

Julie A. Highland, MD (Presenter); Jordan Peacock;
Duane Yamashiro; Charles Teames; Kaylee Lebaron;
Albert Park

Introduction: Repair of pediatric mandibular fractures (PMFs) can be challenging because of the lack of or unstable dentition for immobilization and the risk to developing dental tissue and growth plates. Because of the infrequent nature of PMFs, the literature on the surgical methodology for PMFs is sparse, and data on long-term outcomes are limited. Our objective is to review our 16-year experience with this

condition and to discuss an innovative surgical approach using an extradental splinting technique.

Method: Pediatric patients requiring operative repair for mandibular fracture at our tertiary care institution between 2004 and 2020 were included in this retrospective review. Subjects were assessed for short- and long-term outcomes (greater than 1 year). Descriptive statistics were obtained, and a chi-square test was used to determine differences in complication rates between various surgical methods.

Results: In total, 53 children were included in the study. Of these children, 26% were female with an average age of 11 years (range, 2–18 years). The most common fracture site was the condyle, occurring in 34 children (64%). Most of these fractures were managed with closed reduction and maxillomandibular fixation (MMF) alone (66%); only 7 underwent open reduction with internal fixation alone (13%). There were 96% children placed into MMF with an average duration of 32 days (range, 10–82 days). External dental (Gunning) splints were placed by a dental surgeon in 43% of cases. The average length of follow-up was 5 years (range, 1 month to 16 years). Nine children (17%) had short-term complications including abscess, persistent trismus, and prolonged hospitalization for poor oral intake; 6 children (16%) experienced long-term complications, including persistent malocclusion requiring further intervention and exposure of hardware. There was no association between method of surgical repair and complications, $\chi^2(1, N = 53) = 2.6, P = .10$.

Conclusion: PMFs resulting in malocclusion can be safely and effectively managed with operative repair, with few reported short- and long-term complications. External dental splints are effective tools in aiding with MMF.

Management of Patients Susceptible to Malignant Hyperthermia: A Surgeon's Perspective

Kevin J. Carlson, MD (Presenter); Sara Sun, MD; Timothy Liu; Carol Swan, CRNA; Matthias Koenig, MD; Craig Derkay, MD

Introduction: Otolaryngologists are disproportionately involved in the care of patients susceptible to malignant hyperthermia (MH). While precautions are often taken for a vague family history of an anesthesia reaction, genetic testing is an emerging way to assess MH susceptibility. We aim to evaluate the use of MH susceptibility testing at a freestanding children's hospital.

Method: This single academic institution, retrospective cohort study identified patients who received general anesthetics using MH precautions between January 1, 2015, and December 31, 2019. The electronic medical record was further queried for patients diagnosed with MH. The indication for MH precautions and uses of susceptibility testing were evaluated. Secondary outcomes included a diagnosis of bona fide MH.

Results: A total of 125 patients received 174 anesthetics with MH precautions at a mean age of 114 months (0–363 months) over the study period. Among specialties, otolaryngology was most frequently involved in the care of the cohort (n = 45; 26%). A reported family history of MH (n = 102;

59%) was the most common indication for precautions, followed by muscular dystrophy (n = 29; 17%) and other neuromuscular diseases or myopathies (n = 13; 8%). No MH events occurred in the cohort, and further review of *International Statistical Classification of Diseases, Ninth Revision (ICD-9)*, and *Tenth Revision (ICD-10)* diagnosis codes found no MH diagnoses. Muscle contracture testing was not performed on any study subjects. While 33 subjects (26%) were evaluated by the genetics service, only 5 (4%) underwent testing for mutations known to cause MH susceptibility. Patients with a personal or family history of MH were less likely to be evaluated by genetics than those with another indication for MH precautions ($P < .00001$).

Conclusion: Preventive measures at our institution are effective at avoiding MH events but often employed gratuitously. Conversely, MH susceptibility testing, including genetics evaluation and muscle contracture testing, is an underutilized resource. This disparity is illustrated by further discussion of 5 subjects who may have benefited from further evaluation. A protocol for MH susceptibility testing is proposed.

Mandibular Distraction Osteogenesis in Series of Syndromic Patients

Mary Roz Timbang, MD (Presenter); Courtney Hunter; Tyler Merrill, MD; Adam Johnson, MD, PhD

Introduction: There is growing evidence that mandibular distraction osteogenesis (MDO) is effective in treating upper airway obstruction in patients with Pierre Robin sequence (PRS). However, few studies focus on results of mandibular distraction in syndromic patients. We present data on syndromic patients treated with mandibular distraction at our institution over a 10-year period and compare them with nonsyndromic patients.

Method: Retrospective data were obtained through chart review of syndromic and nonsyndromic pediatric patients with PRS treated with MDO for airway obstruction from 2006 to 2016. Our primary outcome measurement was the rate of extubation/prevention of tracheostomy, and/or decannulation. Other outcome measurements included duration of postoperative intubation, duration of inpatient hospital stay, G tube status, length of distraction, and postoperative complications. When possible, statistical analyses between syndromic and nonsyndromic patients were performed.

Results: A total of 21 patients (9 syndromic, 12 nonsyndromic) were included in our analysis. Two of 9 syndromic patients without tracheostomy prior to MDO required tracheostomy after MDO, compared with 0 of 12 nonsyndromic patients. All other patients were extubated. There was no statistically significant difference between syndromic and nonsyndromic patients with regard to duration of postoperative intubation and length of mandibular distraction. Not surprisingly, syndromic patients had statistically significant longer overall hospital stay after distraction. All 9 syndromic patients remained G tube dependent. There were a total of 9 postoperative complications in the syndromic group and 7 in the nonsyndromic group.

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Conclusion: MDO can be successful in patients with PRS and concomitant syndromes. These limited data also suggest that MDO is less successful in patients with a syndrome and may also have a continued feeding issues and longer hospital stay compared with their nonsyndromic counterparts.

Melnick-Fraser Syndrome—Analysis of Auricular and Branchial Anomalies in Children

Srinivasa Rao-Merugumala (Presenter); Fadumo Farah; Gaurav Kansal

Introduction: Objectives of this study included analyzing auricular and branchial cleft anomalies (ABCAs) in children and presenting a rare case of Melnick-Fraser syndrome for timely management of hearing and associated potentially renal anomalies. The second challenging case of branchial fistula presented as a recurrent neck abscess requiring multiple operations.

Method: A retrospective analysis of ABCAs in children was performed over a 9-year period. Sex, age, location of the opening, side, surgical history, and complications were recorded.

Results: A total of 36 patients had ABCAs; 18 were preauricular sinuses (14 bilateral), 9 were bat ears, 5 branchial fistulae (3 unilateral), and 4 unilateral branchial cysts. The first representative case of Melnick-Fraser syndrome was of a 3-year-old girl presenting with bilateral preauricular sinuses (PAS) and branchial fistulae. She underwent bilateral excision of the bilateral bronchial fistulae PAS. She was noted to have significant deafness as confirmed on audiometry and required a hearing aid. Further ultrasound examination showed renal anomalies that were treated accordingly by the nephrologist. The second 18-year-old male patient had 2 neck explorations for suspected brachial cyst elsewhere by the age of 6 years. He underwent tonsillectomy at the age of 4 years. The preoperative computed tomography (CT) scan reported a recurrent infection of the residual branchial cyst. Contrary to the CT findings, there was very thick 1.5-cm-wide tapering fistula noted intraoperatively ascending between the carotids that was traced up to the tonsillar fossa via a stepladder incision and removed. He required further minimal resection of the tonsillar remnant for the recurrent infection.

Conclusion: This study illustrates the challenges to clinicians in the management of ABCAs and the need to be aware of a rare, potentially lethal genetic condition such as Melnick-Fraser syndrome. It is prudent to have an audiogram and ultrasound of the abdomen to assess hearing and exclude renal abnormalities. Rare occasions may require nephrologists consultation for timely management.

Narcotic Use Following Pediatric Sinus Surgery: A National Analysis

Sydney Thomas (Presenter); Guodong Liu, PhD; Meghan N. Wilson, MD

Introduction: This study aims to provide greater understanding of postoperative pain management in the pediatric population after endoscopic sinus surgery (ESS), specifically relating

to narcotic medication use. We aim to determine the frequency and types of narcotics prescribed as well as the association between narcotics and patient age, surgical procedure, and 30-day postoperative complications.

Method: The MarketScan database identified United States patients younger than 18 years who underwent ESS in 2016 to 2018. Data regarding type and frequency of pain medications prescribed, demographics, comorbidities, surgical procedure, and 30-day postoperative course (inpatient stay, complications, emergency department [ED] visits, readmissions) were collected. Univariate and multivariate analyses were performed to analyze the use of narcotics based on demographics and surgical procedure and to investigate the relationship of narcotics to 30-day postoperative morbidity.

Results: Inclusion criteria were met by 2981 patients; 55.7% were male. The largest portion of patients (59.1%) were 13 years of age or older, with 17% being less than 8 years old at the time of surgery. Three or more sinuses were operated on in 65.7% of children, and 25.7% also received adenoidectomy at the same time. Narcotic medications were prescribed in 10.0%. Narcotics were more likely to be prescribed in children >12 years old (odds ratio [OR], 2.363; 95% CI, 1.59–3.52) and in certain parts of the country. In multivariate analysis, narcotic use was significantly associated with higher rates of complications in the first 30 postoperative days (OR 1.87, 95% CI, 1.38–2.54) as well as ED visits (OR 2.68, 95% CI, 1.81–3.98) and readmissions (OR 2.45, 95% CI, 1.59–3.78). Further analysis looked at comorbidities and geographic region to provide greater insight into narcotic use and postoperative morbidity.

Conclusion: Children 13 years of age and older were more likely to be prescribed narcotics than younger children. When narcotics were prescribed following endoscopic sinus surgery, 30-day postoperative complications, ED visits, and readmissions were elevated.

National Management of Acute Croup in the Pediatric Population

Bryan D. Le (Presenter); Sudeepti Vedula; Aksha Parry; Christina H. Fang, MD; Jean Anderson Eloy, MD; Christen Caloway, MD

Introduction: The aim of this study was to investigate the management of acute croup in pediatric patients, including the variations in management by hospital region and the associations between insurance type and outcomes.

Method: This study is a retrospective database review. The 2016 Kids' Inpatient Database (KID) was used to identify pediatric patients with acute croup via the *International Statistical Classification of Diseases, Tenth Revision* (ICD-10) codes. Chi-square tests were used for univariate analysis. Multivariate logistic regression was used to determine association between insurance type and outcomes.

Results: A total of 8204 patients were included. Laryngoscopy or nasopharyngoscopy was performed in 4.9% (N = 404) of cases. Univariate analysis showed patients were more likely to be observed at home if they were treated at hospitals in the Northeast (13.9%; $P = .001$) or West (13.1%; $P = .030$) when

compared with those treated in the South (10.4%; $P = .005$) or Midwest (9.9%; $P = .009$). A total of 8195 patients had a primary expected payer recorded. Patients were divided into 3 cohorts: Medicaid, private insurance, and remaining payers (eg, Medicare, other). Length of stay was higher in the Medicaid cohort than in both private insurance and remaining payers cohorts ($P < .001$). On multivariate analysis, Medicaid insurance status was associated with a greater likelihood of inpatient admission (odds ratio [OR], 1.215; 95% CI, 1.045–1.412; $P = .011$) compared with both private insurance (OR, 0.915; 95% CI, 0.786–1.065; $P = .25$) and remaining payers (OR, 0.705; 95% CI, 0.545–0.913; $P = .008$). Insurance type showed no significant association with likelihood of endoscopy.

Conclusion: This study revealed that Medicaid insurance status is associated with increased inpatient admissions and length of stay of patients who present with acute croup. Patients treated in the Northeast and West were more likely to be observed at home.

A National Retrospective Study of Nasal Fractures Among Pediatric Patients

Sudeepti Vedula (Presenter); Sayeeda Rab; Christen Caloway, MD

Introduction: Trauma is the leading cause of death in children, and 11% of pediatric emergency room visits are due to craniofacial trauma. Nasal bone fracture is the second most common cause of craniofacial fractures, representing 30% such fractures. The purpose of this study is to analyze the differences in settings and characteristics of nasal fractures in pediatric patients.

Method: A retrospective review of the National Electronic Injury Surveillance System (NEISS) from the Consumer Product Surveillance System (CPSC) was done to analyze nasal fractures in the pediatric population. The database was searched for patients between the ages of 0 to 21 years from 2009 to 2019 who visited the emergency department for nasal fractures. It was analyzed using SPSS for patient demographics, primary diagnosis, and associated products/activities with subset age groups, including toddlers (0–4 years), children (5–12 years), teenagers (13–17 years), and young adults (18–21 years).

Results: There were 11,182 cases of nasal bone fractures in patients 0 to 21 years. Across all age groups, more males (69.4%) had nasal fractures. Most nasal fractures occurred at home in toddlers (60.3%), but they occurred during sports and recreation for all other age groups (32.2%, 45.8%, and 41.2%, respectively). The most common cause of nasal bone fractures was tables in toddlers (10.6%), baseball in children (25.8%), and basketball in teens and young adults (24.9% and 27.8%).

Conclusion: The trends of the causes of nasal fractures in the pediatric patients within different age groups can inform physicians and parents alike. Parents of infants should be advised on the importance of taking preventative measures around the house for furniture such as tables. Older patients should be advised on the importance of safety while playing sports.

Open Versus Endoscopic Laryngotracheal Reconstruction for Laryngotracheal Stenosis in Children

Ziyao E. Lu (Presenter); Chris B. Choi; Corina Din-Lovinescu, DO; Christina H. Fang, MD; Jean Anderson Eloy, MD; Christen Caloway, MD

Introduction: Treatment of laryngotracheal stenosis in children can be accomplished by open and endoscopic approaches. We assess potential differences in outcomes of laryngotracheal reconstruction (LTR) between open and endoscopic approaches to better understand risks and benefits of surgical/endoscopic interventions.

Method: This study is a retrospective database review using the 2016 Kids' Inpatient Database (KID). Patients were identified using the *International Statistical Classification of Diseases, Tenth Revision* (ICD-10) procedural codes for LTR. Chi-square analysis and an independent-samples t test were used in conjunction with ICD-10 diagnostic codes to assess for primary outcomes of postoperative respiratory complications and length of stay (LOS).

Results: A total of 180 patients were identified to have undergone LTR for treatment of laryngotracheal stenosis. There were 147 patients who were treated by open surgery while 33 patients were treated endoscopically. On univariate analysis, patients undergoing endoscopic treatment were statistically less likely to have respiratory complications of any kind (18.18% vs 34.69%, $P = .041$). Endoscopic treatment was statistically associated with lower rates of complications from tracheostomy (6.06% vs 17.69%, $P = .03$) and fewer but not statistically significant incidences of postoperative acute respiratory failure (6.06% vs 14.29%, $P = .113$). LOS was not significantly different for patients undergoing endoscopic vs open treatment (27.97 vs 20.37 days, respectively).

Conclusion: Patients treated endoscopically had significantly fewer postoperative respiratory complications overall, including complications from tracheostomy. Endoscopic surgery also had less incidence of postoperative acute respiratory failure, though the association was not statistically significant. LOS was not significantly different between endoscopic and open procedures.

A National Retrospective Study of Orbital Fractures Among Pediatric Patients

Yash S. Shah (Presenter); Sudeepti Vedula; Rushi Patel; Christen Caloway, MD

Introduction: In developed countries, injuries are a leading cause of emergency department visits in pediatric patients. Trauma is also a leading cause of facial fractures, with orbital fractures comprising up to 25% of facial fractures. This study investigates differences in characteristics and setting of orbital fractures in pediatric patients.

Method: The National Electronic Injury Surveillance System (NEISS) from the Consumer Product Surveillance System (CPSC) was used to analyze orbital fractures in pediatric

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patients between the ages of 1 month and 22 years from 2010 to 2019 for patient demographics, primary diagnosis, and associated products using SPSS. Subset analyses by age groups of toddlers (age 0–4), children (age 5–12), teens (age 13–17), and young adults (age 18–21) were also performed.

Results: There were 19,896 weighted cases of orbital fractures in patients 0 to 22 years of age. As age increased, the proportion of males in each age group also increased. A higher proportion of orbital fractures in toddlers and children were treated and admitted for hospitalization (17.2% and 13.2%) vs teens and young adults (9.1% and 6.3%). Most orbital fractures occurred at home in toddlers (51.6%) but during sports or recreational activities in the other age groups. A higher portion of orbital fractures in children and teens were associated with baseballs than with toddlers and young adults.

Conclusion: For pediatric patients, an increased severity of orbital fractures was observed in younger age groups compared with the older age groups. In addition, the setting and products associated with each age groups were also strikingly different. Parents of toddlers should be encouraged to enhance safety measures in the home. Older children should be encouraged to wear adequate protection during their participation in sports and recreational activities.

Otolaryngologic Manifestations of Pediatric Patients With Trisomy 13, Trisomy 18

Candace Stewart, MPH (Presenter); Jalen Benson; Margaret Kenna, MD, MPH; A. Eliot Shearer, MD, PhD

Introduction: Trisomy 13 (T13; Patau syndrome) and Trisomy 18 (T18; Edwards syndrome) are rare chromosomal abnormalities previously considered fatal in the neonatal period. However, more aggressive clinical and surgical management has led to longer life expectancy for children with these diagnoses. To date, there have been no published reports detailing the otolaryngologic manifestations of T13 and T18. Our goal was to describe the otologic, sinonasal, aerodigestive, craniofacial, and sleep-related clinical characteristics of children with these disorders.

Method: An institutional review board-approved retrospective chart review of Boston Children's Hospital (BCH) patients was conducted using an enterprise-specific software (Hound Dog) to search electronic medical records for patients with a diagnosis of T13 or T18 seen by the otolaryngology team between January 2002 and August 2020. Medical records were reviewed, and clinical findings were summarized.

Results: A total of 51 patients, 13 with T13 and 38 with T18, were identified ranging in age from 0 days to 32 years when first seen by otolaryngology. The most common clinical otolaryngologic manifestations identified were hearing loss, cleft palate, eustachian tube dysfunction, laryngomalacia, and acute otitis media for T13; hearing loss, narrow external auditory canal, pneumonitis/bronchitis, and obstructive sleep apnea/disordered breathing were most common for T18. One patient with T13 and 2 patients with T18 who had tracheostomy tubes in situ at first presentation. The most common

otolaryngologic surgical procedures were direct laryngoscopy and bronchoscopy, adenoidectomy, and myringotomy with tympanostomy tube placement. One patient with T13 and 3 patients with T18 received tracheostomy tube placement at BCH, each for management of chronic respiratory failure or respiratory insufficiency.

Conclusion: Trisomy 13 and Trisomy 18 are diagnoses that affect multiple organ systems. In this study, we present the largest series of patients with these conditions with a focus on otolaryngologic manifestations. These data will improve our understanding and management of these rare genetic disorders.

Pain Management and Socioeconomic Status in Pediatric Adenotonsillectomy Patients

Jennifer L. McCoy, MA (Presenter); Rachel L. Whelan, MD; David H. Chi, MD

Introduction: Extensive literature assessing the barriers of pain management postadenotonsillectomy (AT) have been provided. An observation during a randomized clinical trial (RCT) after AT revealed caregivers who self-reported lower household income and educational level were less frequently administering analgesics in the 14-day postoperative period. We hypothesized that caregiver socioeconomic status (SES) affects the administration of analgesics postoperatively.

Method: A retrospective chart review was performed on patients ages 3 to 17 years who previously participated in a RCT for pain management after AT. Pain scores were self-reported using the Wong-Baker Faces Pain Rating Scale for 14 days after AT. Duration of acetaminophen, ibuprofen, and opioids were recorded. Data included demographics, self-reported income and educational level, household composition, and 8 different zip code-specific variables using census statistics.

Results: A total of 144 patients were included. The median (mdn) total drug duration was 10 days (range, 3–14 days). When self-reported income and highest educational level were dichotomized, those with less education (some college or less) and less income (\$0–50,000) administered ibuprofen fewer days (mdn 8 vs 10 days for both; $P = .041$ and $P = .047$, respectively). The number of caregivers and children in a household did not affect the total duration or each pain medication duration ($P > .05$). Compared with the national median percentage of those who hold a bachelor's degree or higher, 32.1%, caregivers who lived in zip codes below the median percentile administered opioids an average of 1.86 days vs 0.97 days at or above the median ($P = .040$). No differences were found in pain scores before and after pain medication for self-reported education and income nor census variables ($P > .05$).

Conclusion: While we found no differences between SES measures and pain scores, those with less education and income were found to administer nonopioid analgesics fewer days while administering opioids more days. Caregiver health literacy is important after AT. The importance of proper pain management and tailoring caregiver education is indicated.

Pain Management Following Microtia Reconstruction: Deescalation and Opioid Use Reduction

Madison V. Epperson, MD (Presenter);
Adam Van Horn, MD; Jennifer Kim, MD; Dave Zopf, MD, MS

Introduction: Rib harvest for microtia reconstruction is notoriously painful. Complex postoperative pain regimens including catheter-based infusions and significant narcotic usage are often used, but these generate added costs, invasiveness, and excessive narcotic exposure. We sought to evaluate the effectiveness of a deescalated regimen without use of complex interventions.

Method: A consecutive series of pediatric patients who underwent stage 1 microtia reconstruction with a modified Nagata/Firmin technique from 2017 to 2020 was identified. All patients received intraoperative bupivacaine rib blocks and were placed on scheduled Tylenol. Adjunct medications administered and subjective and objective pain scores at scheduled intervals 2 to 72 hours postoperatively were recorded. Narcotic use (morphine milligram equivalents/kg [MME/kg]), peak and median pain scores, and length of stay (LOS) were compared with published means using Wilcoxon signed-rank tests.

Results: Twenty patients were included with a mean age of 12 years (6.7–18.4 years) and LOS of 2.8 days (1–4 days). Average postoperative Faces Pain Scale scores were 3.5, 4.0, 3.7, 3.5, 1.8, 1.8, and 0.7, at 2 (n = 20), 4 (n = 20), 12 (n = 20), 24 (n = 20), 36 (n = 17), 60 (n = 14), and 72 hours (n = 3), respectively. The average peak pain score was 6.1 (± 2.0). FLACC (face, legs, activity, cry, consolability) scores at 2 hours were ≤ 2 in 11 of 12 recorded. Thirteen patients received scheduled ibuprofen; 2 of these patients first received scheduled ketorolac for 24 hours. Narcotics (0.59 ± 0.35 MME/kg) were given to 17 patients; 2 patients received lidocaine patches. Compared with Shaffer et al (paravertebral nerve block catheters), total narcotic use ($P = .12$), peak pain ($P = .0001$), and LOS ($P = .001$) were less. Compared with Woo et al (catheter-based infusions), median pain scores (same time intervals used) were lower ($P = .04$).

Conclusion: A deescalated regimen of scheduled Tylenol with adjunctive ibuprofen/ketorolac and lidocaine patches is an adequate baseline regimen for stage 1 microtia pain control. This noninvasive regimen did not mandate higher narcotic usage, had lower pain scores, and decreased LOS.

Patterns in Pediatric Otolaryngologic Case Completion Following COVID-19–Related Surgical Deferment

Emily Savoca, MD (Presenter); Rema Shah; Sina Torabi;
David Kasle, MD; Kiley Trott, MD; Erik Waldman, MD

Introduction: We analyzed patterns of case completion following COVID-19–related surgical deferments to better delineate the trends and persistent need for surgical intervention in the pediatric populations.

Method: We conducted a single-institution retrospective study analyzing surgical cancellations in the division of pediatric otolaryngology during the 62-day period from March 16, 2020, to May 17, 2020 (COVID-19 cancellation period). Parents of the patients were contacted to complete a survey about their experience during this interval. A retrospective chart review was also completed. Chi-square and Kruskal-Wallis multivariate analyses were applied to determine whether patient or surgical factors influenced surgical completion or time to completion, respectively.

Results: There were 86 surgical cancellations in the division over the 2-month period of COVID-19–related hospital changes. Over the subsequent 2 months following resumption of elective surgery, only 111 cases were completed, compared with 128 cases over the corresponding dates the year prior. Of 29 survey respondents, 75.9% of parents still felt that their child needed surgery, but 58.6% were uncomfortable returning to the hospital environment. By the time of analysis, only 51.4% of canceled cases had been completed, and 76% of these were completed within 1 month following resumption of elective surgery. There were no significant associations between patient factors or type of surgery and case completion. However, a surgical indication of sleep-disordered breathing and adenotonsillar hypertrophy trended toward higher rates of completion, while acute otitis media trended toward lower rates of completion.

Conclusion: There were no significant associations between surgical or patient factors and case completion following COVID-19–related deferments. Nonetheless, the persistent need for surgical intervention for sleep-disordered breathing and adenotonsillar hypertrophy trended toward significance, and perhaps these cases should be prioritized should future events threaten normal operations.

Patterns of Dysphagia Associated With Craniofacial Microsomia

Robert G. Hill (Presenter); Ching Siang Tey; Laura Brooks;
Sean Evans; Nikhila P. Raol, MD, MPH; Steven Goudy

Introduction: Craniofacial microsomia (CFM) is a congenital condition characterized by mandibular hypoplasia and facial asymmetry with the potential to impact swallow function resulting in dysphagia. This study aims to analyze video fluoroscopic swallow studies (VFSS) of patients with CFM to identify any common impairments in the various phases of swallowing and define compensatory feeding modifications.

Method: A retrospective chart review of patients aged 0 to 18 years with a diagnosis of CFM at a single institution from January 2015 to May 2020 was performed. Patients who did not receive VFSS or had a primary diagnosis other than CFM were excluded. Severity of CFM was determined using the Pruzansky–Kaban classification (PKC), while all VFSS were scored using the penetration–aspiration scale (PAS).

Results: Nineteen patients met inclusion criteria for this study. Seven patients (36.84%) were male. The median age

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at the time of VFSS was 8.1 months (interquartile range, 2.1–30.3). Eight patients were PKC grade 1, 3 patients were 2a, 3 patients were 2b, and 5 patients were grade 3. The most frequent oral phase impairments were anterior labial escape (12, 63.16%) and premature pyriform sinus spillage (15, 78.95%). The most frequent pharyngeal phase impairment was decreased tongue base movement resulting in vallecular and pyriform sinus residue (11, 64.71%). Pharyngeal residue was present in 17 (89.47%) of the patients, with the base of tongue (14, 73.69%) and vallecula (11, 57.90%) being the most common anatomical location. Thirteen patients (68.42%) demonstrated laryngeal penetration (PAS 2-4), while 7 revealed aspiration (PAS 7 and 8). Eight patients (42.11%) had nasogastric feeding tubes, while 2 patients had a gastrostomy tube and 1 patient had a gastrostomy–jejunostomy tube.

Conclusion: Patients with CFM demonstrated multilevel dysphagia including impaired labial closure and bolus control, pharyngeal residue, and significant penetrationspiration. Universal screening protocols and compensatory feeding strategies may help identify those at highest risk and optimize clinical outcomes.

Pediatric Invasive Fungal Sinusitis: Investigation in a Children's Cancer Center

Gustavo Rangel, MD (Presenter); Tate Naylor; Anthony Sheyn, MD

Introduction: Early detection of invasive fungal sinusitis (IFS) has been vital in treating children, and timely surgery is crucial for better outcomes. Recently publications focus on pediatric cohorts, as clinical findings and outcomes can diverge from the adult population. This retrospective analysis, conducted in a solely pediatric tertiary cancer center, aimed to validate the institutional approach that has been shown to decrease mortality.

Method: Pediatric patients (<21 years of age) with ISF during their clinical course from 2009 to 2020 had their chart reviewed. Only 19 patients have been proven to have a definitive diagnosis of IFS. Collected data included demographics, clinical, laboratory, and radiologic findings, and biopsy.

Results: The age average was 8.5 years. Nine patients had acute lymphocytic leukemia, and 7 had acute myelogenous leukemia. Nine had a relapsed disease, and 7 were submitted to an allogeneic hematopoietic stem cell transplantation. At IFS presentation, 63% (12 of 19) had pain as the first symptom ($P < .01$), 52% (10 of 19) had fever, with an average temperature of 38.4°C, and 2 cases had central nervous system involvement. The physical exam showed a necrotic mucosa in 73% (14 of 19) of the cases. The nasal septum was involved in 17 of the cases, middle turbinate in 13, inferior turbinate in 8, maxillary sinus in 6, ethmoid in 5, and sphenoid sinus in 1 one case. Pathological analysis identified fungal invasion in all cases. Of the cases, 15 had an absolute neutrophil count less

than 30 cells/mm³ with an average of 57 days of a neutropenic period. Eighteen patients had previous fungal prophylaxis; 11 patients achieved remission after the invasive fungal rhinosinusitis diagnosis. A 16% of the disease-specific mortality rate was found.

Conclusion: Pediatric patients with ISF during their clinical course from 2009 to 2020 had their chart reviewed. Only 19 patients have been proven to have a definitive diagnosis of IFS. Collected data included demographics, clinical, laboratory, and radiological findings, and biopsy.

Pediatric Sleep–Disordered Breathing During the COVID-19 Pandemic

Kevin M. Connolly, MD (Presenter); Emily Hamburger; Lauren Gee; Laura Kaddis; Kevin Pereira, MD, MS; Amal Isaiiah, MD, PhD

Introduction: Children with sleep-disordered breathing (SDB) are evaluated using polysomnography (PSG) and parent-reported measures prior to tonsillectomy and adenoidectomy (T&A). Elective T&As continue to be delayed during the COVID-19 pandemic. Therefore, we hypothesized that the average severity of SDB was greater in children presenting during the pandemic.

Method: We performed a prospective study of children aged 5 to 17 years who presented to our tertiary care academic pediatric otolaryngology practice for evaluation of SDB between June 15, 2020, and December 12, 2020. We assessed parent-reported disease severity using the Pediatric Sleep Questionnaire Sleep-Related Breathing Disorder (PSQ-SRBD) scale and objective severity using PSG. We compared SDB severity in these children with an age- and sex-matched prepandemic cohort. We compared average total PSQ score, apnea-hypopnea index (AHI), and oxygen saturation (SpO₂) nadir in these 2 groups using *t* tests. A *P* value <.05 was considered significant.

Results: A total of 23 patients have been enrolled in this study through December 3, 2020. The mean ± standard deviation (SD) PSQ total score was 11.4 ± 4.7 during the pandemic compared with 10.5 ± 4.0 in the prepandemic control group ($P = .24$). The mean ± SD AHI was 13.5 ± 14.3 in the pandemic cohort compared with 15.6 ± 18.1 in the prepandemic control group ($P = .45$). Similarly, the mean ± SD SpO₂ nadir was 0.9 ± 0.1 in the pandemic cohort compared with 0.9 ± 0.1 in the control group ($P = .25$).

Conclusion: There was no difference in SDB severity between children referred during the pandemic compared with those referred prior to it. These results suggest that caregivers and pediatricians view SDB as a problem that merits further evaluation and management even in the context of the pandemic. A strength of this study is the age- and sex-matching of controls. Weaknesses include the small sample size and the selection bias related to a single center. Future studies will focus on expanding the enrollment and the effect of T&A on the pandemic cohort.

Pediatric Soft Tissue Perineuriomas in the Head and Neck

Bridgette Bolshem (Presenter); Luke Stanisce; Donald H. Solomon; Gord Guo Zhu; Nadir Ahmad

Introduction: Soft tissue perineuriomas (STPs) are benign, perineurial tumors that are extremely rare in children. To date, of only 19 cases of soft tissue perineurioma in children, just 1 has been reported in the neck. This case study describes the second case of STP in a child and surveys the current literature on pediatric STP.

Method: A systematic review was conducted of the current literature from various scientific databases following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement guidelines.

Results: Nineteen cases of pediatric STP were identified through our search strategy. Twelve of these were in the head and neck region, and 1 was in the neck. All (100%) of pediatric STPs in the head and neck exhibited a whorled pattern, while only 83% of STPs outside the head and neck were whorled. Immunohistochemical staining was varied among both groups, with 42.8% of head and neck STPs and 58% outside head and neck STPs positive for epithelial membrane antigen and negative for S100. Four cases were associated with a genetic abnormality.

Conclusion: Clinicians should keep STP in mind as a differential diagnosis of pediatric soft tissue mass in the head and neck, despite the rarity of this tumor, for prompt diagnosis and intervention.

Pediatric Thyroid Nodules: Ultrasound Characteristics as Predictors of Malignancy

Brandon E. Fornwalt, DO (Presenter); Matthew Kubina; Manasa Melachuri; Janice McDaniel; Anita S. Jeyakumar, MD, MS

Introduction: Pediatric thyroid nodules are uncommon but carry a 25% malignancy risk. Adult patients have well-established ultrasound characteristics that are predictive of malignancy, but these are not as clearly defined in pediatric patients.

Method: A retrospective review of pediatric thyroid nodule ultrasound characteristics was conducted. The findings were correlated with pathology. The retrospective review included all pediatric thyroid nodules with ultrasounds from 2006 to 2016 at a pediatric tertiary care center.

Results: We identified 116 pediatric thyroid nodules; of those, 17% (20/116) were malignant. The mean patient age was 14.2 years, there was a female to male ratio of 4:1, and 94% were White. In patients with malignant nodules, the average presenting age was 15.5 years with a female to male ratio of 5.6:1. Of the total, 70% of malignant nodules had accompanying microcalcifications, 50% had abnormal lymph nodes, and 40% had irregular margins. In the benign nodules, 6% had microcalcifications, 15.6% had abnormal lymph nodes, and 9% had irregular margins. The presence of microcalcification (odds ratio [OR], 35.00; 95% CI, 9.89–123.88), irregular borders (OR, 6.44; 95% CI, 2.09–19.9), abnormal lymph nodes

(OR 5.4; 95% CI, 1.92–15.21), and size greater than 3.5 cm (OR, 12; 95% CI, 3.18–48.2) were associated with thyroid cancer.

Conclusion: Our data suggest that abnormal lymph nodes, microcalcifications, irregular margins, and size greater than 3.5 cm could be better defined predictors of malignancy in the pediatric population and influence clinical decision making.

Pediatric Tonsillectomy in England 2014-2019: An Analysis of Administrative Data

Annakan V. Navaratnam, MBBS (Presenter); William K. Gray; Arun Takhar; Andrew Marshall

Introduction: Efficiency in health care delivery is increasingly important as health care services look to recover from the COVID-19 pandemic. Day-case elective surgery can help keep hospital beds free and reduce the risk of nosocomial infection. We aimed to investigate outcomes for day-case and overnight stay elective pediatric tonsillectomy in England.

Method: Data on tonsillectomies in patients aged ≤ 18 years were extracted from the Hospital Episodes Statistics (HES) data set from April 1, 2014, to March 31, 2019. HES contains data for all National Health Service-funded hospital admissions in England. Data were categorized as those seen as day cases and those that involved an overnight stay. Primary outcome was readmission within 30 days of discharge. Multilevel logistic regression modeling was used to explore the relationship between tonsillectomy, day-case surgery, and 30-day readmission. Covariates included age, sex, year, indication for operation, additional procedures (eg, adenoidectomy), and surgical technique (coblation).

Results: A data set of 156,942 tonsillectomy procedures across 133 hospital trusts (centers) was identified over a 5-year period. Of these procedures, 88,354 (56.3%) were day-case procedures. Patients who were seen for day-case surgery were significantly older, with 39.8% of 0- to 4-year-olds seen as a day case compared with 73.1% of 15- to 18-year-olds. Patients with hypertrophy, obstructive sleep apnea, or adenoid involvement were much less likely to have day-case surgery than those without (70.8% vs 46.6%, respectively). The lowest rates of readmission were in patients aged 5 to 7 years and patients with hypertrophy, adenoid involvement, or obstructive sleep apnea. Centers that had higher day-case rates have lower 30-day readmission for infection.

Conclusion: Our study provides further evidence of the safety of day-case tonsillectomy surgery for the majority of paediatric patients.

PICU Admission After Cleft Palate Surgery: Can It Be Anticipated?

Musse Hussein (Presenter); Christopher Shumrick; Bridget Ebert; Andrew R. Scott, MD; Brianne B. Roby, MD

Introduction: Previous reports have suggested a relatively high rate of adverse perioperative events associated with cleft palate repair, including reintubation, airway obstruction, and unplanned admissions to the pediatric intensive care unit

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(PICU). The goal of this study is to examine the incidence of PICU admissions following primary repair of cleft palate by otolaryngologist-trained cleft surgeons at 2 tertiary centers and to identify potential diagnoses associated with admission or unanticipated PICU transfer.

Method: A multi-institutional retrospective case series was conducted. Children who underwent primary repair of cleft palate at 2 tertiary cleft centers over a 10-year period were identified. Charts were reviewed for demographics, comorbidities, and whether PICU admission was required.

Results: From 2009 to 2019, 464 patients underwent primary repair of a cleft palate by otolaryngology-trained cleft surgeons. The incidence of PICU admission was 9.05% (42 children); of those PICU admissions, 81% (34) were planned and 19% (8) were unexpected transfers. Syndromic conditions were associated with most planned and unanticipated PICU admissions, with CHARGE syndrome and Robin sequence the most likely.

Conclusion: The incidence of unanticipated postoperative PICU admission following cleft palate repair by an otolaryngology-trained cleft surgeon is low. Risk stratification by a surgeon with experience in airway management may inform decisions regarding postoperative disposition of patients with medical or airway complexity who undergo cleft palate repair.

Polysomnographic Changes Following Adenotonsillectomy in Children With OSA and CSA

Chaewon Hwang (Presenter); Maya Ramagopal, MD; Kelvin Kwong, MD

Introduction: While a decrease in obstructive apnea-hypopnea index (oAHI) is expected following adenotonsillectomy (T&A), not much is known about the changes in central apneic parameters post-T&A. Here we compare the changes in polysomnographic (PSG) parameters pre- and post-T&A in children with dual obstructive and central sleep apnea (OSA+CSA) and obstructive sleep apnea (OSA) only.

Method: A retrospective review of patients ≤ 18 years of age who underwent T&A with recorded PSG between June 30, 2013, and June 30, 2018, was studied. All pre- and post-PSG parameters were analyzed. There were 2 groups: OSA only group and OSA+CSA group. Inclusion criteria for the OSA-only group was oAHI >1 and central apnea index (CAI) >1 .

Results: There were 21 OSA+CSA patients and 13 OSA-only patients who had pre- and post-T&A PSG recorded. In the OSA+CSA group, there was a statistically significant decrease in CAI, 3.05 ± 2.17 pre-T&A to 1.80 ± 1.46 post-T&A ($P < .05$), and for oAHI, 18.33 ± 17.95 pre-T&A to 3.55 ± 4.14 post-T&A ($P < .05$). There was also a statistically significant decrease in the following PSG parameters post-T&A: central apnea (CA) mean duration, CA max duration, CA events, and arousals due to respiratory events ($P < .05$). For OSA-only patients, there was a statistically significant decrease in oAHI of 10.35 ± 7.32 pre-T&A to 5.73 ± 10.59

post-T&A ($P < .05$). There was also a statistically significant decrease in the following PSG parameters post-T&A: arousals due to respiratory events, arousals, N1 and N2, and N3 ($P < .05$). The percentage decrease in oAHI and arousals due to respiratory events post-T&A was not statistically different between OSA only and OSA+CSA ($P = .23$ and $P = .88$, respectively).

Conclusion: In patients with OSA+CSA, there is not only a significant decrease in central apneic parameters, such as CAI, CA max duration, CA mean duration, and CA events but also a significant decrease in oAHI and arousals due to respiratory events post-T&A. Therefore, obstructive events may play a contributory role in central apnea in patients with dual OSA+CSA.

Postoperative Outcomes in Pediatric Septoplasty

Annie E. Moroco, MD (Presenter); Robert A. Saadi, MD; Vijay Patel, MD; Meghan Wilson, MD

Introduction: A deviated nasal septum is a common cause for impaired breathing in children, and the timing of surgical intervention in these patients has been widely debated, citing the role of septal cartilage on midface development. We sought to assess postoperative outcomes in children undergoing septoplasty.

Method: A retrospective review using the American College of Surgeons National Surgical Quality Improvement Program pediatric database was conducted from 2018 to 2019 to identify cases of septoplasty (Current Procedural Terminology code 30520) performed for deviated nasal septum (*International Statistical Classification of Diseases, Tenth Revision* code J34.2). Patient demographics, preoperative comorbidities, operative data, and postoperative outcomes were assessed. Age was categorized into 3 groups (15 years).

Results: A total of 1461 pediatric cases of septoplasty were identified with 729 patients meeting inclusion criteria. Most pediatric patients undergoing septoplasty were older than 15 years (63.9%), White (71.3%), and male (69.0%). Pediatric otolaryngologists performed most cases (71.6%). Overall, 30-day postoperative complications were low at a rate of 0.6%. Only a history of asthma was significantly related to complication rate ($P = .035$). For most patients (93.3%), length of stay (LOS) was less than 24 hours. However, LOS was significantly related to race ($P = .060$) and certain medical conditions, including history of asthma ($P = .050$), structural pulmonary abnormality ($P = .002$), developmental delay ($P = .010$), and hematologic disorders ($P < .001$). No significant role for age was identified on postoperative outcome.

Conclusion: Pediatric patients can safely undergo septoplasty with complication rates $<1\%$. Furthermore, the procedure can safely be performed on children of any age. Children with a history of asthma may be at increased risk for complication and prolonged hospital course.

Postoperative Pain Following Pediatric Bilateral Myringotomy

Margaret Mills (Presenter); Alexander Gertel, MD; Mabeline Velez, MS; Maua Mosha, MPH; Christopher Grindle, MD; Katherine Kavanagh, MD

Introduction: There is currently little consensus on the optimal analgesic treatment during pediatric bilateral myringotomy tube (BMT) procedures, with anesthesiologists often selecting fentanyl, ketorolac, or both based on personal preference. Our aim was to assess the impact of analgesic choice on immediate and 1-day postoperative pain as well as time in the postanesthesia care unit (PACU) following pediatric BMT.

Method: Patients aged 6 months to 7 years undergoing BMT were enrolled from September 2019 to February 2020. The electronic medical record (EMR) was reviewed for intraoperative analgesic (fentanyl, ketorolac, or both), PACU rescue analgesic administration, time in PACU, and PACU face, legs, activity, cry, and consolability (FLACC) score. Guardians completed the Postoperative Pain Measure (PPPM) questionnaire 1 day after surgery.

Results: A total of 35 patients met inclusion criteria and returned PPPM. No patients received rescue analgesics. The 3 groups showed no significant difference in mean maximum FLACC score after receiving fentanyl (0.60 ± 0.89), ketorolac (0.65 ± 1.46), or both (1 ± 3.16) ($H [2] = 1.123, P = .57$). The difference in time in PACU was also not statistically significant ($F [2, 32] = 0.390, P = .68$). Similarly, there was no difference in the number of patients with clinically significant pain, represented by a PPPM score ≥ 6 ($P = .666$). Of parents, 14.2% reported clinically significant pain over the first 24 hours after BMT.

Conclusion: Our pilot study found no significant difference in time spent in PACU or immediate and 24-hour postoperative pain between pediatric patients receiving fentanyl, ketorolac, and both for BMT. One in 7 parents reported clinically significant pain, which may help guide preoperative counseling.

Postsupraglottoplasty Disposition to Pediatric Intensive Care Unit: A Systematic Review

Esther ShinHyun Kang (Presenter); Sena Turkdogan, MD, MPH; Jeffrey Yeung, MD, FRCSC

Introduction: Patients undergoing supraglottoplasty are routinely admitted postoperatively to the pediatric intensive care unit (PICU) in many centers due to rare but potentially fatal complications such as airway compromise, despite most cases not requiring extra respiratory support. This review summarizes the best practice for determining patient disposition to the PICU postoperatively following supraglottoplasty based on the available literature.

Method: A systematic review was completed with the following inclusion criteria: human subjects between 0 and 18 years of age, supraglottoplasty procedure, admission to PICU and PICU-level respiratory support, and all types of studies. Articles not written in English or including an age range older than 18

years were excluded from the review. Three databases, CINAHL, MEDLINE, and Embase, were queried with the key search term “supraglottoplasty” or “supraglottoplasties.” Findings were critically appraised by 3 independent reviewers.

Results: Nine studies met inclusion criteria, totaling 922 patients. The mean age at supraglottoplasty was 7.9 months (0.9–45.7 months). In the studies in which patients were not routinely admitted to the PICU, only 11.4% (105 of 922) of patients met the reported requirements for PICU admission. Excluding 1 study in which all patients remained routinely intubated for 24 hours, only 9.4% (74 of 784) of patients required invasive oxygenation postoperatively, including prolonged intubation or reintubation. Risk factors for PICU admission and airway intervention postsupraglottoplasty included young age (<3 months), preoperative need for intubation or positive pressure ventilation, and significant comorbidities (eg, neurologic conditions).

Conclusion: Given the wide heterogeneity of outcome measures, further studies are needed to narrow down the ideal PICU admission criteria. This review suggests that routine PICU admission of all supraglottoplasty patients may be avoided by careful patient selection and thereby significantly reduce the utilization of intensive care resources.

Predicting Prolonged Length of Stay After Laryngeal Surgery in Children

Ellen L. Tokarz, MD (Presenter); Alison C. Ma; Cathleen C. Kuo; Michele M. Carr, MD, DDS, MEd, PhD

Introduction: Our goal is to identify factors associated with prolonged hospital stay in children undergoing laryngeal surgery for benign tumors.

Method: A retrospective analysis of pediatric patients who underwent laryngeal surgery (Current Procedural Terminology code 31541) with a postoperative diagnosis of a benign tumor was performed with the American College of Surgeons Pediatric National Surgery Quality Improvement Program database from 2014 to 2018. Clinical variables analyzed included comorbidities, total length of stay (LOS), readmission, and reoperation.

Results: There were 1775 patients identified with a mean age at time of surgery of 8.95 years (95% CI, 8.76–9.14). Of these patients, 966 (54.4%) were males and 809 (45.6%) were females. The mean LOS was 0.22 days (95% CI, 0.12–0.32). Only 128 (7.3%) patients had an LOS of 1 day or more. Children with a variety of comorbidities, including but not limited to premature birth, oxygen support, tracheostomy, developmental delay, and cardiac risk factors, had a significantly prolonged LOS ($P < .001$). In addition, younger children were significantly more likely to stay overnight ($\beta = .041, P < .001$). A total of 23 (1.3%) patients were readmitted, 2 (0.1%) were reintubated, and 13 (0.7%) underwent reoperation for related reasons. Despite the association of premature birth, ventilator dependence, oxygen support, chronic lung disease, tracheostomy, esophageal/gastrointestinal disease, previous cardiac surgery, developmental delay, seizure, neuromuscular disorders, congenital malformations,

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and steroid use with LOS, only ventilator dependence was associated with readmission.

Conclusion: This study suggests that laryngeal surgery for benign tumors is safe but recognizes that patients with comorbidities or young children may require a prolonged stay. Awareness of this may help guide management decisions and reduce reoperations and readmissions.

Predictive Clinical Exam Findings in Posttonsillectomy Hemorrhage

Harleen K. Sethi, DO (Presenter); David J. Lafferty, DO; Jane Tong; David Zwillenberg, MD

Introduction: The objectives of this study were to examine the postoperative course of patients presenting to St. Christopher's Hospital for Children with posttonsillectomy hemorrhage (PTH) and to compare patients with and without a blood clot visualized in the tonsillar fossa at time of presentation to determine if outcomes regarding return to the operating room differ.

Method: A retrospective chart review was conducted at an academic, tertiary, pediatric hospital. Pediatric patients who underwent a tonsillectomy with adenoidectomy and were admitted for observation following secondary PTH were reviewed. The effects of age, gender, indication, and clinical exam findings on admission on the rate of eventual return to the operating room (OR) for control of hemorrhage were also analyzed. Chi-square analysis and Fisher exact test were used to compare the significance of categorical frequencies.

Results: The rate of blood clot presence was 50.9% (28 of 55). Return to OR rates were defined as patients who began actively hemorrhaging following admission for observation, further stratified by presence or absence of clot on admission physical exam. There was a statistically significant higher rate of return to OR in patients who presented with a clot (46.6%) on clinical exam vs no clot (18.5%) after resolved posttonsillectomy hemorrhage ($P < .027$). Patients with a blood clot were significantly more likely to require the OR sooner (21.31 hours from admission) than those without a clot (100.75 hours from admission; $P < .012$). There was no statistically significant higher rate of blood clot presence or rate of return to the OR in groups based on age, gender, or indication.

Conclusion: Pediatric patients presenting after resolved secondary PTH with a blood clot in the tonsillar fossa are more likely to require return to the OR for hemostasis and cautery than are those without a blood clot, and this is more likely to occur within 24 hours of admission. Thus, patients with a blood clot on initial presentation may benefit from admission for a 24-hour observation period, while a similar observation period may be unproductive for patients without a blood clot.

Prenatal Consultation Outcomes for Cleft Lip With or Without Cleft Palate

Rachel L. Thompson (Presenter); Heidi Thorson; Robert Tibesar; Siva Chinnadurai; Brianne B. Roby, MD

Introduction: Prenatal consultation for cleft lip patients with or without cleft palate diagnosed on ultrasonography has

become more common; however, no studies have assessed the impact on patient outcomes. This study sought to determine if prenatal consult improves neonatal outcomes.

Method: A retrospective analysis was performed comparing patients with prenatal consultation with patients who were seen for cleft care after birth. Charts were reviewed for patients either diagnosed with cleft lip and/or cleft palate between June 1, 2005, and December 31, 2019, at a tertiary center. Information was extracted from outpatient encounters, inpatient hospitalizations, and surgeries. Primary outcome measures included likelihood of correct diagnosis on prenatal ultrasound, hospitalizations for feeding difficulties, and length of hospital stay.

Results: Some 31 patients with prenatal consultation for cleft lip with or without cleft palate were compared with 23 patients without consultation. Prenatal ultrasound correctly diagnosed cleft lip defects 28 of 31 times. The most common inaccuracy was prenatal bilateral diagnosis with actual unilateral cleft lip on exam. Of 31 patients, 6 (19.4%) receiving prenatal consults were hospitalized due to feeding difficulties as compared with 9 of 23 (39.1%) patients without. All 31 patients who received prenatal consultation established feeding plans, while patients without consultation did not discuss feeding until after birth. Prenatal consultation resulted in decreased postoperative hospital stay after cleft palate repair (1.41 days) compared with no consultation (1.84 days); however, there was no decrease in hospital stay after cleft lip repair.

Conclusion: Prenatal consultation for patients with cleft lip with or without cleft palate results in decreased postpartum hospitalizations and length of postoperative hospital stay.

Presentation and Management of Pediatric Dog Bites to the Face

Alyssa J. Smith, MD (Presenter); Joseph N. Badaoui, MD; Andrew Bowen, MD; Shelagh Cofer, MD

Introduction: The objective of this study is to examine the presentation, management, and outcomes for pediatric patients presenting with dog bites to the face.

Method: All patients younger than 18 years presenting to a tertiary care center's clinical enterprise for evaluation of dog bite to the face from January 2015 to May 2020 were identified. A retrospective chart review was performed to obtain demographic information, characteristics of the incident and presenting injuries, and treatment approach.

Results: In total, 177 patients met inclusion criteria. Median age at presentation was 6 years (range, 3 months to 17 years). The most commonly involved location was the cheek ($n = 70$, 40%), followed by the upper lip ($n = 35$, 20%) and lower lip ($n = 25$, 14%). A total of 156 patients (88%) had superficial injuries, 5 (3%) had full-thickness injury, and 2 (1%) had complete avulsion. In total, 78 patients (44%) had more than 1 facial wound; 108 patients (61%) underwent primary closure of at least 1 wound. Repair was performed in the emergency department (ED) for 95 patients (88%), in the operating room for 11 (10%) and in the clinic for 2 (2%). Repair was performed by ED providers in 69% of cases and by the surgical

facial trauma team in 31%. In the ED, sedation was used for 22% of patients and local anesthesia for 60% of patients. Repair was performed with absorbable sutures only for 42 patients (39%) and involved nonabsorbable sutures for 47 patients (44%). The mean time to suture removal was 6 days (range, 3–10 days). Repair involved dermabond, staples, or steri-strips alone for 19 patients (18%). There were 148 patients (84%) placed on antibiotics, which was most commonly Augmentin. Four patients (2%) developed wound infection despite antibiotics. Thirteen patients (7%) developed esthetic concerns related to scarring, although only 2 patients underwent scar revision.

Conclusion: Pediatric patients with dog bites to the face often have injuries that are superficial and involve the cheek or lips. When performed, repair can often be accomplished in the ED without sedation, using either absorbable or nonabsorbable sutures. Patients are frequently placed on prophylactic antibiotics to prevent infection.

Prevalence of Hearing Loss Among Polish Children From Rural Areas

Piotr H. Skarzynski, MD, PhD, MSc (Presenter);
Henryk Skarzynski; Weronika Swierniak;
Malgorzata Karpowicz; Natalia Czajka

Introduction: Community screening programs allow identifying a subgroup of people in whom there is a high probability of finding a disease or a risk factor for developing a disease, but they are also a source of knowledge about health status and health needs of people. Hearing loss in children is a relevant health issue, both for its prevalence and for its physical, emotional, and social consequences. The aim of this study is to estimate the national prevalence of hearing loss in children from rural areas in Poland.

Method: The study was conducted in the general, pediatric, nonclinical population of children from rural areas in Poland. It was conducted between September 2016 and June 2017. It was a population-based, epidemiological study. The participants were 67,416 children aged from 6 to 13 years old (mean = 8.65 years; standard deviation = 2.54 years). Pure-tone air conduction hearing threshold was obtained at 0.5 to 8 kHz. Examinations were conducted using the Senses Examination Platform. Hearing loss (HL) was defined as a pure-tone average higher than 20 dB in 1 or both ears in at least 1 of the following pure-tone averages: 4-frequency pure-tone average (FFPTA), high-frequency pure-tone average (HFPTA), and low-frequency pure-tone average (LFPTA).

Results: Based on audiograms, the rate of positive results of hearing screenings was 16.4% (95% CI, 16.1%–16.6%). It was nearly equal in boys and girls (odds ratio [OR], 1.03; 95% CI, 0.99–1.07; $z = 1.37$; $P = .17$), but it was significantly higher in younger children than in older children (OR, 2.05; 95% CI, 1.95–2.15; $z = 29.24$; $P < .001$). The rate of LFPTA HL was estimated to be 6.2% (95% CI, 6.1%–6.4%). The high-frequency pure-tone average HL was estimated to be 7.4% (95% CI, 7.2%–7.6%).

Conclusion: A hearing screening program can not only provide information on the prevalence of hearing problems in children but is also an avenue for providing the local community with valuable knowledge about how to care for hearing. This study demonstrated a strong need for systematic monitoring of the hearing status of children and the importance of increasing awareness among parents and educators of the significance of hearing loss.

Puberty's Impact on Procedure Frequency for Lymphatic and Venous Malformations

Nadine H. Haykal, MD, MPH (Presenter);
Kelly E. Daniels, MD; Jennifer L. McCoy, MA;
Michael Bykowski, MD; Sabri Yilmaz, MD;
Reema Padia, MD

Introduction: Puberty has been shown to play a role in the growth of lymphatic (LM) and venous malformations (VM). This study aims to determine the frequency of procedures performed before and after puberty in patients with LM and VM.

Method: A retrospective review was performed on patients currently aged ≥ 13 years diagnosed with a LM or VM through a multidisciplinary vascular anomalies center between 2009 and 2019. Patient demographics, lesion characteristics, and the number and type of treatments were recorded. Patients were excluded if they had not yet reached puberty, had nonhead and neck lesions, non-LM or non-VM lesions, or if they had treatments performed at outside facilities. Postpuberty was defined as 12 years old in females and 13 years old in males.

Results: After initial screening of 357 patients, 83 patients were included in the study. There were 34 patients with LM (41%) and 49 with VM (59%). The average age at diagnosis was 6.1 ± 10.9 (LM: 4.2 ± 7.0 , VM: 7.4 ± 12.9 , $P = .5$). The average ages at diagnosis in the pre- and postpuberty groups were 2.2 ± 3.5 and 24.2 ± 15.6 years, respectively. There was no difference in number of treatments for mucosal vs nonmucosal lesions ($P = .19$). Patients were significantly younger at time of first treatment in the LM vs VM groups when assessing all patients (8.7 vs 13.2; $P = .01$) and for those diagnosed before puberty (7.0 vs 11.0; $P = .01$). The average number of treatments per patient was 3.5 ± 4.8 (LM: 3 ± 3 , VM: 4 ± 6 , $P = .6$). Patients diagnosed prepuberty were more likely to undergo treatments vs those diagnosed after puberty (odds ratio 10.00, $P < .001$). Complications included nerve injury, thrombosis, and skin breakdown.

Conclusion: This is the first study to assess the number of procedural interventions for LM/VM that a patient undergoes before and after puberty. Prospective studies are needed to analyze pre- and postoperative symptoms in patients who undergo procedures before and after puberty. Determining differences in symptom severity may help the provider in decision making regarding interventions, especially if interventions are associated with preventing future symptoms and if earlier diagnosis is correlated with worse disease.

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Public Perception of Tympanostomy Tubes: A Social Media Analysis

Nicholas A. Rossi, MD (Presenter); Katherine R. French, MD; Chad L. Evans; Jason F. Ohlstein, MD, MS, MPH; Wasyl Szeremeta, MD, MBA; Harold S. Pine, MD

Introduction: Although tympanostomy tube insertion is the most common outpatient procedure performed on pediatric patients in the United States, little is known regarding public perception of the procedure. Previous authors have used social media to analyze perceptions surrounding tonsillectomy; however, no studies to date have similarly used social media to study tympanostomy tubes.

Method: Instagram and Facebook were searched for public posts including the search terms “ear tubes,” “ear tube surgery,” “tympanostomy,” and “myringotomy.” Posts were excluded if they were unrelated to tympanostomy. All relevant posts from the years 2018 and 2019 underwent classification and subgroup analysis based on author (patient, parent, physician, etc), topic (apprehension, complications, advertisement, reassurance, etc), time frame (preoperative, perioperative, postoperative, nonoperative), popularity (number of likes and shares), and overall tone (positive, negative, neutral).

Results: A total of 1864 public social media posts were included in the final analysis. Most (83.3%) were made by the patient’s parents, while the rest were made by physicians (5.5%), hospitals (8.8%), and chiropractors (3.4%), with the fewest posts made by patients themselves (0.7%). The majority (79.3%) of posts portrayed tympanostomy tubes positively, followed by a neutral portrayal (13.9%); negative portrayals were the least common (6.7%). Most negative posts were made by the patient’s parents (50.8%) and chiropractors (46.8%). A large majority (95.9%) of posts made by parents were positive, with 68.7% of these posts being made in the perioperative period. The most common themes of posts were reassurance regarding surgery (74.8%), advertisements (12.4%), apprehension (12.3%), and informational (7.6%); some posts had multiple themes.

Conclusion: Most social media posts portrayed tympanostomy tubes in a positive way, and most posts were made by parents in the perioperative period. This information could be used by otolaryngologists to optimize their interactions with patients and parents in the perioperative period.

The Pupillometer: An Investigation in Posttonsillectomy Pediatric Pain

Carolina C. Coleman (Presenter); Alisa Ricker, DNP, RN; Heather Wright, MS, CRS; Kathleen Neville, MD, MS, MBA; Adam Johnson, MD, PhD; Gresham Richter, MD

Introduction: Measuring postoperative pain in pediatric patients following tonsillectomy can be challenging due to developmental limitations. Current pain assessment tools are subjective including visual analog scales (VAS). The pupillometer has been used as a tool for objective postoperative pain assessment in adults and children with sickle cell disease. However, it has not been tested in children in the

postoperative period. This pilot study aims to compare VAS scores with pupillometer measurements to determine this tool’s accuracy in measuring postoperative pain following pediatric tonsillectomy.

Method: In the immediate postoperative recovery unit, pupillometer scans were paired with routine VAS pain assessments in children following ambulatory tonsillectomy. Time of assessment, VAS pain score, pupillometer readings, and interventions were recorded. Pearson correlation coefficients (r) and t tests were used to calculate statistical significance ($P < .05$).

Results: In total, 46 pediatric patients and 106 pupil scans were included in this study. Regardless of pre- or postoperative pain medication administration, there was a weak correlation between VAS and average pupillary constriction velocity (CV; $r < 0.50$, $P < .05$). In addition, there was a weak correlation between postoperative pain medication administration and maximum CV ($r < 0.50$, $P < .01$). There was lack of linearity between the VAS score and medication administration. When controlling for age and weight, secondary analysis revealed correlations between gender and medication administration. Males were administered pain medication more often than females were preoperatively by anesthesia (40.0% vs 17.5%, $P < .001$). In the postoperative unit, females were administered pain medication more often than males were (61.0% vs 49.0%).

Conclusion: The data neither refute nor support the efficacy of the pupillometer as an objective tool for pain assessment in posttonsillectomy pediatric patients. However, our findings suggest there are significant gender differences with regard to perioperative pain medication administration in this population.

Quality of Life Outcomes in Pediatric Patients With Vascular Anomalies

Madison C. Lampkin, MD (Presenter); Jay Patel; Lindsey O’Neal, RN; Teresa Wright, MD; Regan Williams, MD, MS; Anthony Sheyn, MD

Introduction: Patients with vascular anomalies (VA) tend to have poorer health-related quality of life (QOL) outcomes: lower QOL scores, higher bodily pain, and lower mental health scores. Undergoing treatment and multidisciplinary care will improve both parent-reported and patient QOL.

Method: Patients included in this study ($n = 112$, preliminary) were evaluated in a multidisciplinary vascular anomalies clinic at a single tertiary care pediatric hospital. Patient- and parent-reported QOL surveys (PedsQL™ Measurement Model) were prospectively collected at each clinic visit. Parents completed a similar survey assessing perceived patient QOL. Parent and patient QOL scores were examined. Pre-/posttreatment and first/last clinic visit QOL scores were compared. To assess statistical significance, t tests were used ($P < .05$).

Results: Preliminary data obtained included 47% were male ($n = 53$), and the mean age at enrollment was 9.1 years. The anomalies were categorized as venous malformations

(41.1%, n = 46), lymphatic malformations (36.6%, n = 41), infantile hemangiomas (5.4%, n = 6), arteriovenous malformations (4.5%, n = 5), or other (12.5%, n = 14). Modalities employed to treat these lesions included medical (8%, n = 9), surgical (22.3%, n = 25), sclerotherapy (68.8%, n = 77), or other (0.9%, n = 1). The data were normally distributed. Mean patient QOL scores improved from initial (80.8) to final clinic visit (85.9, $P = .045$), although there was no significant difference in parent-reported QOL scores ($P = .166$). There was no significant difference in the parent-reported or patient QOL measures pre- vs posttreatment for the medical or surgical treatment arms. However, there was a statistically significant improvement in patient-reported QOL pre- vs postsclerotherapy, with mean QOL scores of 81.5 and 85.7, respectively ($P = .0347$).

Conclusion: Based on preliminary data, multidisciplinary care and sclerotherapy may improve QOL, although differences were identified between patient- and parent-reported data.

Reliability of a Pediatric Sleep Endoscopy Scoring System

Adrian Williamson, MD (Presenter); Samira Ibrahim; Wei Fang, PhD; Matthew Kaban; Steven W. Coutras, MD, FRACS; Michele M. Carr, MD, DDS, MEd, PhD

Introduction: The surgical management of obstructive sleep apnea (OSA) can be guided by drug-induced sleep endoscopy (DISE), but there is no universally accepted scoring system for DISE. The purpose of this study is to evaluate the intrarater test-retest and the interrater reliability of a novel scoring system for DISE in children.

Method: Some 30 pediatric DISE videos were reviewed and scored twice by 5 raters with a range of experience levels. The videos were scored using the VOTE (velum, oropharynx, tongue base, epiglottis) system and a novel scoring system. The raters were also asked to recommend surgical intervention based on the DISE exam alone. Intrarater test-retest analysis of the responses was conducted using weighted kappa statistic and percentage agreement. Interrater reliability analysis of responses was evaluated using Krippendorff's alpha reliability coefficient (KA). Using a proportional odds model, a comparison of the weighted kappa statistic for the VOTE and the novel scoring systems was conducted.

Results: For the novel DISE scoring system, the test-retest weighted kappa coefficient was 0.62 and 0.87, and the percentage agreement was 64% and 82% at the first and third quartile, respectively. KA was 0.55 and 0.71 at the first and third quartile. For the VOTE system, the test-retest weighted kappa coefficient was 0.50 and 1.00, and the percentage agreement was 75% and 100%, at the first and third quartile, respectively. KA was 0.36 and 0.77 at the first and third quartile. There was no significant difference regarding the weighted kappa statistics between the novel DISE scoring system and the VOTE system ($P = .15$). Responses to the surgical intervention survey analysis yielded a test-retest weighted kappa coefficient of 0.40 and 1.00 and a percentage agreement of

71% to 100% at the first and third quartile, respectively. KA was 0.40 and 0.61 at the first and third quartile, respectively.

Conclusion: Our novel scoring system demonstrated test-retest and interrater reliability similar to the VOTE system. There was a high degree of agreement for surgical decisions made based on DISE.

Resolving Heterogeneity in Pediatric OSA by Dimensionality Reduction

Emily Hamburger (Presenter); Kevin M. Connolly, MD; Lauren Gee; Laura Kaddis; Kevin Pereira, MD, MS; Amal Isaiyah, MD, PhD

Introduction: Pediatric obstructive sleep apnea (OSA) is typically described using demographic, clinical, and polysomnographic characteristics. The contribution of each of these characteristics to the overall presentation of pediatric OSA remains unknown.

Method: We prospectively enrolled children aged 5 to 18 years who presented with sleep-disordered breathing from June 15, 2020, to December 3, 2020, to a tertiary-level pediatric otolaryngology practice. The primary caregiver completed surveys of (1) symptoms using the Pediatric Sleep Questionnaire, (2) daytime sleepiness using the Modified Epworth Sleepiness Scale, (3) disease-specific quality of life using Obstructive Sleep Apnea-18 (OSA-18), and (4) problem behaviors using Behavior Rating Inventory of Executive Function (BRIEF). They also underwent standard overnight polysomnography. We used principal component analysis (PCA), a dimensionality reduction method, to determine the contributions of these variables to the overall variance in the characteristics of the enrolled children. We isolated the top k principal components (PCs) representing features accounting for the maximum variance within the study population. We further assessed the contribution of individual variables to these PCs.

Results: The study included 24 children: 10 male (42%) and 12 Black (50%). The mean age was 8.3 ± 2.6 years. The mean body mass index percentile was 86 ± 20.7 , and the apnea-hypopnea index was 13.5 ± 14 . A total of 24 features were identified before PCA. The top 2 PCs accounted for 51.1% of the total variance. The first PC (32.6%) was largely represented by BRIEF and OSA-18.

Conclusion: The variance in the presentation of children with OSA is accounted for by behavior and disease-specific quality of life, supporting the significant role of these parent-reported measures as important indicators of the OSA-related morbidity. Notably, none of the polysomnographic parameters were identified in the results of the PCA. Our study represents a novel approach for identification of outcomes of clinical relevance in pediatric OSA.

Retrospective Diagnosis of Congenital Cytomegalovirus Infection using Birth Souvenirs

David R. Lee, MD (Presenter); Mark Schleiss, MD; Albert Park, MD; John Germiller

Introduction: Congenital cytomegalovirus (cCMV) is the most common nonhereditary cause of congenital sensorineural

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hearing loss (SNHL). Definitive diagnosis is possible only before 3 weeks of age. After that time, it can only be made by testing stored neonatal dried blood cards, but many states discard those cards after several months of storage. We describe 2 patients in whom a diagnosis was made years later by testing dried umbilical blood or tissue parents had kept as birth souvenirs.

Method: A retrospective case series was conducted of 2 patients evaluated by 2 collaborating tertiary pediatric centers.

Results: Two patients presented at age 2 and 4 years with progressive SNHL well after their neonatal blood cards had been discarded. One progressed to bilateral deafness requiring cochlear implantation, while the other had unilateral moderate SNHL. Inner ear anatomy was normal by magnetic resonance imaging, and genetic testing was negative. Fortunately, both parents had saved perinatal souvenirs; 1 was a plastic umbilical clamp with a dried blood stain on its surface, and the other was a dried section of umbilical cord. Both had been stored at room temperature since birth. Abundant, high-quality DNA was present in both samples, and both were strongly positive for CMV DNA (viral load 192–284 copies/ μ g genomic DNA), confirming the diagnosis.

Conclusion: Retrospective diagnosis of congenital CMV was formerly assumed impractical in the absence of an archived neonatal dried blood card. Via a unique approach, we demonstrate that diagnosis remains possible if parents have kept any dried blood or tissue as birth souvenirs, even after several years of storage. Diagnosis identifies children at risk for further progression, helps avoid unnecessary further diagnostic testing, helps direct workup for other possible CMV sequelae, and can help families understand the cause of their child's hearing loss.

Risk Factors Affecting Treatment Outcome of Pediatric Foreign Body Aspiration

Eui-Suk Sung (Presenter); Minhyung Lee; De-Hee Park; Seong-Wook Choi; Jin-Choon Lee

Introduction: The aim of this study was to identify the factors affecting the prognosis of children with foreign body aspiration (FBA) after undergoing rigid bronchoscopy.

Method: This was a case series with a chart review of 49 children younger than 3 years of age who underwent rigid bronchoscopy for suspected FBA at a single tertiary institution.

Results: The time from symptom onset to hospitalization positively correlated with the total hospitalization time ($P < .001$), postoperative hospitalization time ($P = .006$), and operation time ($P = .013$). The time from symptom onset to operation positively correlated with the total hospitalization time ($P < .001$) and operation time ($P = .046$). The time from hospitalization to operation and the operation time positively correlated with the total hospitalization time ($P = .026, .044$) and postoperative hospitalization time ($P = .049, .003$). The time from symptom onset to hospitalization positively correlated with the incidence of pneumonia ($P = .028$).

Conclusion: Rapid hospitalization after symptom onset, rapid surgery after symptom onset, and rapid surgery after hospitalization improve the prognosis of patients with FBA. Further, a short operation time also plays a role in improving patient prognosis.

Safety of Adenoidectomy in Patients Aged 18 to 24 Months

Isabelle Fournier, MD (Presenter); Carol Nhan, MD; Chantal Giguere, MD; Mathieu Bergeron, MD

Introduction: There is currently no consensus regarding need for hospitalization for children undergoing adenoidectomy, particularly for those 2 years of age and younger. The main objective of this study is to assess the safety of performing adenoidectomy in patients aged 18 to 24 months as an outpatient procedure.

Method: A total of 50 consecutive patients aged from 18 to 24 months who had undergone an adenoidectomy or an adenoidectomy with myringotomy and tube placement at our tertiary pediatric care center were included (2017–2020). Patients with a cardiovascular anomaly or with a genetic syndrome were excluded. Data regarding demographics, comorbidities, postoperative complications, and length of hospital stay were gathered.

Results: Some 50 patients underwent an adenoidectomy with or without myringotomy and tubes. Of these patients, 8 (16%) were known to have childhood asthma and 7 (14%) were former premature babies. No patients were obese. Main indications for surgery included chronic nasal congestion with adenoid hypertrophy (27, 54%) or sleep-disordered breathing (23, 46%). No major complications were reported. One patient (1/50, 2%) had a postoperative desaturation that required transient oxygen use. No patients required hospitalization for more than 1 night.

Conclusion: No major postadenoidectomy complications occurred in patients aged between 18 and 24 months. Considering the judgment of the otolaryngologist, it seems safe to offer adenoidectomy as an outpatient procedure for patients aged between 18 and 24 months.

Sphenopalatine Artery Injection Induced Trigemino-cardiac Reflex: A Case Report

Motassem Nashawaty (Presenter); Luke Jakubowski, MD

Introduction: An injection of local anesthetic containing epinephrine near the sphenopalatine artery (SPA) is a common method of maintaining hemostasis during endoscopic sinus surgery. We present a case of trigemino-cardiac reflex (TCR) activation with local anesthetic injection during injection in the region of the SPA.

Method: This is a case report of a 14-year-old 56.4-kg female with cystic fibrosis and associated chronic sinusitis undergoing bilateral revision endoscopic sinus surgery. Routine injection of 3 mL of 1% lidocaine with 1:100,000 epinephrine into the region of the right SPA was performed. The patient developed immediate sinus bradycardia without

palpable pulses. The patient's clinical course is outlined, including intraoperative findings and a timeline of resuscitation efforts.

Results: Preoperative assessment was unremarkable with the exception of cystic fibrosis. General endotracheal anesthesia was induced, and oxymetazoline pledgets were placed in bilateral nasal cavities. Polyps occupying the bilateral nasal cavities were debrided. A total of 3 mL of 1% lidocaine with 1:100,000 epinephrine was injected into the region of the right SPA. Immediately, anesthesia noted sinus bradycardia to 20 bpm with loss of carotid pulses. Surgery was halted. Glycopyrrolate, atropine, and epinephrine were administered. Chest compressions were performed until sinus tachycardia and return of pulses were noted. An epinephrine infusion was started. An electrocardiogram, transthoracic echocardiogram, and chest X-ray demonstrated ST depression, left ventricular dysfunction, and pulmonary edema, respectively. Following resuscitation efforts, the patient was transported to the pediatric intensive care unit in stable condition.

Conclusion: The trigeminocardiac reflex is a well-established reflex that can result in a sudden-onset sinus bradycardia terminating in asystole. Stimulation of any branch of the trigeminal nerve can activate the TCR. This case demonstrates TCR activation via stimulation of a branch of the trigeminal nerve, likely the nasopalatine nerve, from injection of local anesthetic during routine functional endoscopic sinus surgery.

Spontaneous Recovery After Vocal Fold Avulsion: Report of Two Cases

Morgan R. Bliss, MD (Presenter); Tina Friesen

Introduction: Vocal fold avulsion is a rare complication of emergent pediatric bronchoscopy and the removal of airway foreign body. Outcomes of conservative management following vocal fold avulsion in pediatric patients are not well described. We aim to present 2 cases of pediatric vocal fold avulsion which healed well with only conservative management.

Method: This is a case series of 2 children who underwent emergent bronchoscopy for the removal of an airway foreign body complicated by a partial vocal fold avulsion injury at a pediatric hospital.

Results: Intraoperative exam findings of the larynx were recorded with laryngoscopy at the time of the injury and after recovery. After discussing treatment options, patients were managed conservatively. One 2-year-old was treated with inpatient observation, systemic steroids, reflux medication, and behavioral reflux precautions. Another 11-month-old infant was given intraoperative steroids only and discharged the same day with close follow-up. Both children recovered completely from vocal fold injury as documented by video laryngoscopy, exam, and parent-reported voice and swallowing outcomes.

Conclusion: While many surgical options for vocal fold avulsion repair have been reported, a thorough discussion of treatment options should include the option of conservative

management in addition to surgical interventions in the pediatric patient population.

Surgical Management for Subglottic Hemangioma: A Systematic Review

Stephanie Tominaga, MD (Presenter); Matthew Mendelsohn; Sam Schild, MD; Jennifer Liang, MD; Richard Rosenfeld, MD; Ann Plum, MD

Introduction: Surgical management of subglottic hemangioma is used in patients who do not respond to conservative management, including corticosteroids and/or propranolol, or in cases of severe obstruction. This study compares endoscopic laser ablation and open surgical excision for the management of focal airway hemangioma of the subglottis.

Method: This systematic review included studies of patients with subglottic hemangioma who were managed surgically. Two independent investigators assessed study eligibility, rated the quality, and extracted data for analysis. Comparisons between different interventions were made using analysis of variance.

Results: Of the 872 studies identified, 31 met inclusion criteria. There were 409 patients with subglottic hemangioma treated surgically with reported outcomes. Regardless of surgical approach, most patients had resolution of symptoms. No significant difference was found in comparing outcomes for the different interventions. The rate of complete resolution of symptoms was 89.6% for open excision, 92.4% for CO₂ laser excision, 95.4% for potassium titanyl phosphate (KTP) laser excision, and 90.5% for diode laser excision. The average number of treatments required for CO₂ lasers was 2.25, 1.35 for KTP laser, and 1.6 for diode laser. There were also no differences in rates of complications including subglottic stenosis, formation of granulation tissue, and prolonged need for tracheostomy.

Conclusion: Our systematic review demonstrated that both open surgical excision and endoscopic laser ablation with CO₂, KTP, and diode lasers result in good outcomes and the resolution of symptoms in patients with subglottic hemangioma. Further prospective and controlled studies comparing the efficacy of each treatment are necessary to determine new treatment paradigms after failed medical management.

Surgical Volume's Effect on Outcomes and Costs of Pediatric Tracheostomies

Mehdi Lemdani (Presenter); Vraj P. Shah; Chris B. Choi; Christina H. Fang, MD; Jean Anderson Eloy, MD; Christen Caloway, MD

Introduction: The objective of this study is to determine if there is an association between the surgical volume of a hospital and the outcomes of pediatric tracheostomies.

Method: The 2016 Kids' Inpatient Database was reviewed using *International Statistical Classification of Diseases, Tenth Revision* (ICD-10) codes for tracheostomies and ICD-10 diagnosis codes for postoperative complications related to tracheostomies. Chi-square tests were used for univariate

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analysis. Multivariate analysis was used to assess the independent effect of covariates on the complication.

Results: A total of 3113 pediatric patients were identified who underwent tracheostomy. The mean age was 5.93 (0–18 years). Neonates were more likely to receive tracheotomy in high-volume (HV) (24.1%, $P = .008$) or intermediate-volume (IV) hospitals (25.5%, $P < .001$) than low-volume (LV) hospitals (18.6%). Univariate analysis showed incidence of any complication was significantly higher in HV hospitals compared with LV ($P < .001$) and IV ($P < .038$) hospitals. On multivariate analysis, charges were lower at LV hospitals (mean: \$815,513.75) than at IV (mean: \$1,378,621.51, $P < .001$) and HV hospitals (mean: \$1,478,116.68, $P < .001$). Length of stay was lower in LV hospitals (mean: 56.18) than in HV (mean: 89.71, $P < .001$) and IV hospitals (mean: 87.86, $P < .001$). HV hospitals were more likely to have any complication (odds ratio [OR], 1.901; 95% CI, 1.254–2.881; $P = .002$) and other tracheostomy complications (OR, 3.941; 95% CI, 1.433–10.842; $P = .008$) vs LV hospitals and had a greater likelihood of upper respiratory tract diseases (OR, 1.594; 95% CI, 1.128–2.254; $P = .008$) compared with IV hospitals.

Conclusion: This study revealed that increased surgical volume of a hospital is associated with increased cost, length of stay, and multiple postoperative complications of pediatric tracheostomies.

Temporal Bone Imaging in Children With 22q11 Deletion Syndrome

Chengetai R. Mahomva, MD (Presenter); Michael Cohen; Tuleen Sawaf; Katherine Reinshagen; Stephen Hadford, MD; Samantha Anne, MD

Introduction: Hearing impairment is common among children with 22q11 deletion syndrome (22q11DS). The objective of this study was to identify the most common inner and middle ear anomalies associated with 22q11DS on imaging and determine if there is a correlation with hearing thresholds.

Method: A retrospective chart review was conducted for all patients less than 18 years of age presenting with 22q11DS from 2010 to 2020 at 2 tertiary care academic centers. Patients with temporal bone imaging with computed tomography or magnetic resonance imaging were included. Patient demographic and audiometric information was collected when available.

Results: Of 24 patients identified, 13 were female and 11 were male. A total of 48 ears were evaluated on imaging. The most common anomalies were abnormal semicircular canals, with 18 ears affected (37.5%) and ossicular anomalies in 8 ears (16.7%). Vestibular anomalies were found in 6 ears and cochlear anomalies in 4 ears. Cochlear nerve deficiency was noted in 3 ears and facial nerve anomalies in 2 ears. Imaging was normal in 10 patients. Three of 10 patients with normal imaging had hearing loss in comparison to 8 of 11 patients with abnormalities on imaging ($P = .086$). Hearing loss ranged from mild to profound, and normal imaging did not preclude patients from having hearing loss.

Conclusion: Ossicular, semicircular canal, and vestibular anomalies were common middle and inner ear anomalies detected in patients with 22q11DS. Imaging abnormalities were not predictive of hearing loss.

Tracheotomy Safety Initiative at St. Christopher's Hospital for Children

Garrett K. Ni, MD (Presenter); Harleen K. Sethi, DO; Tanner Lyons, DO; Meha Patel; Alyssa Terk, MD

Introduction: Tracheotomy is generally performed in the critically ill, with more than 4500 pediatric tracheotomies performed annually in the United States. However, there is no current consensus on the appropriate time for surveillance endoscopy. The St. Christopher's Hospital for Children (SCHC) implemented the Trach Safe Initiative to improve airway safety in tracheotomy-dependent children (TDC). A major component of this initiative is surveillance endoscopy. The objectives of this study are to describe the prevalence of abnormal airway changes in trach-dependent patients, to identify and describe the frequency of airway interventions, and to ultimately minimize morbidity in this population.

Method: A report consisting of a list of patients meeting our inclusion criteria was generated using Current Procedural Terminology codes for tracheotomy and direct bronchoscopy and laryngoscopy at SCHC. A retrospective chart review of patients under the age of 18 years who has had a tracheotomy from 2018 to 2020 was conducted to describe airway abnormalities after tracheotomy quantitatively and qualitatively.

Results: Our study found an overall rate of abnormal findings on endoscopy after tracheotomy of 70.2% ($P < .05$). The average time from tracheotomy to the time of initial surveillance endoscopy at SCHC was 1032 days (95% CI, 778–1286). The most common abnormal finding was granulation tissue (31.9%), followed by suprastomal collapse (12.7%) and subglottic stenosis (10.6%). Of patients undergoing endoscopy, 57% had an intervention. The most common intervention during endoscopy was excision of granulation tissue (23.4%) and trach change (23.4%), followed by tracheoplasty/stomoplasty (8.5%).

Conclusion: Our study found a high rate of airway abnormality on surveillance endoscopy with a significant percentage of our patients requiring airway intervention. Our findings necessitate a guideline for routine surveillance endoscopy for our tracheotomy patients and the development of a database tracking airway abnormalities of patients to prepare a safe airway plan.

Utility of Intraoperative Neural Response Telemetry in Pediatric Cochlear Implants

Tuleen Sawaf (Presenter); Rachel Vovos, AuD; Stephen P. Hadford, MD; Erika Woodson, MD; Samantha Anne, MD

Introduction: The objective of this study is to evaluate the relationship between intraoperative neural response telemetry (NRT) and threshold (T) and comfort (C) levels

postoperatively and to evaluate their correlation over time after cochlear implantation (CI).

Method: A retrospective chart review was conducted of patients younger than 18 years who had CI with a cochlear device and NRT at an academic center from 2010. Data collected included the following: demographics; comorbidities; extrapolated NRT threshold (tNRT); slope of amplitude for electrodes 1, 6/7, 11/12, 16, and 22; and postoperative T and C levels at initial activation and 1 month, 3 months, and 1 year postactivation. Groups were compared with respect to slope of amplitude, tNRT, and T and C levels using Wilcoxon rank-sum tests. Associations between T and C levels, each slope of amplitude, and tNRT were assessed using Spearman rank correlation.

Results: A total of 39 patients (65 CIs) were included. In all patients, intraoperative tNRT correlated strongly with T and C levels at postactivation at 1 month, 3 months, and 1 year on nearly all electrodes. Only electrodes 6/7 and 11/12 at 3 months and electrodes 6/7 at 1 year did not show correlation with T and C levels. In patients with connexin-related hearing loss, there was strong correlation of tNRT with T and C levels at all time intervals. In children with neurocognitive disorders, T and C levels overall and an average of all electrodes at 3 months and at 1 year are significantly higher than in typically developing children. Patients with anomalies on imaging had significantly higher T levels at electrodes 6/7 and electrodes 11/12 at 1 year, and significantly lower C levels on electrodes 1, 11/12, 16, and the average of all electrodes. There was no significant difference between any cohorts with regard to slope of amplitude.

Conclusion: NRT is invaluable, with significant correlation found between tNRT and T and C levels over time, especially with connexin-related hearing loss. There are changes in T and C levels in the mid-electrode over time, and close surveillance is beneficial to tailor programming as needed.

Professional and Personal Development

Accuracy and Misrepresentation of Reported Publications Among Otolaryngology Residency Applicants

Dominic J. Catalano, MD (Presenter); Linda X. Yin, MD; Susan E. Bischo; Christine M. Lohse, MS; Janalee K. Stokken, MD; Matthew L. Carlson, MD

Introduction: Otolaryngology residency remains highly competitive in the United States, with recent match rates of 71%. Surveys of program directors have shown that applicants' publication records are often emphasized in resident selection. The accuracy of reported publications and successful publication of submitted works among otolaryngology applicants has not been fully explored.

Method: A retrospective review was conducted of applications submitted to the authors' otolaryngology residency program through the Electronic Residency Application Service in 2014 and 2015. PubMed and Google searches were performed

by 3 investigators to assess the accuracy of reported publications and unpublished works. Associations with match success and publication accuracy were evaluated using Wilcoxon rank-sum, chi-square, and Fisher exact tests.

Results: Of 582 included applicants, most were White (n = 325, 60%), male (n = 387, 66%), and matched at US residencies (n = 457, 79%). Higher United States Medical Licensing Examination (USMLE) scores and higher numbers of research experiences were significantly associated with ability to match ($P < .001$). Reported publications per applicant ranged from 0 to 18. Only 9 (1.5%) applicants reported publications that could not be verified. Applicants with foreign medical degrees ($P = .01$) or citizenship ($P = .02$) and lower USMLE step 1 scores ($P = .04$) were significantly more likely to inaccurately report publications. Applicants with inaccurate reporting were more likely to go unmatched ($P = .03$). A total of 167 (29%) applicants reported unpublished works that were never ultimately published; of these, 9 (5%) reported accepted publications, 4 (2%) reported provisionally accepted publications, and the rest all reported submitted works. Applicants with a higher number of research experiences ($P = .03$) were more likely to report unpublished works that never reached publication.

Conclusion: There is a low rate of inaccuracy in reported publications among otolaryngology residency applicants. In contrast, a large percentage of submitted works never reach publication, and this should be considered during the resident selection process.

Asynchronous Learning Among Otolaryngology Residents in the United States

Ronit E. Malka, MD (Presenter); John P. Marinelli, MD; Travis R. Newberry, MD; Matthew L. Carlson, MD; Sarah N. Bowe, MD

Introduction: Otolaryngology resident learning has historically relied on didactic lectures, textbook reading, and repeated exposure during patient care. However, evidence suggests that an increasing proportion of residents in other specialties are deviating from this paradigm. The primary aim of the current work was to characterize otolaryngology residents' asynchronous learning practices (ie, personal learning outside didactics and patient care).

Method: A cross-sectional survey of otolaryngology residents in the United States was performed from October 1, 2020, to December 1, 2020.

Results: Among 91 residents who started the survey, 100% completed the survey with a similar distribution across postgraduate year (PGY)-1 (25%), PGY-2 (18%), PGY-3 (22%), PGY-4 (19%), and PGY-5 (16%) residents. Of these, 98.9% reported engaging with educational materials outside of didactics and case prep, the majority of whom (66%) spending 3 or more hours weekly. Textbook reading comprised 27% of residents' total study time, with board review books (20%), searching the web (18%), watching online videos (15%), and listening to podcasts (10%) collectively comprising most of residents' remaining time. Residents' highest-ranked resources surrounding most beneficial use of time

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were watching videos, board review book reading, textbook reading, and listening to podcasts. Among electronic and multimedia resources, Iowa Head and Neck Protocols (91%), BoardVitals (75%), UpToDate (60%), YouTube (57%), Google (56%), and Headmirror (54%) were most commonly used.

Conclusion: Asynchronous otolaryngology resident learning in the modern era involves significant use of multimedia. Watching videos, board prep, and listening to podcasts compete with textbook reading and underscore the need for a paradigm shift within academic otolaryngology away from textbook writing to the generation of high-quality multimedia resources for resident learning.

COVID-19 and Virtual Fellowship Interviews: Did It Change Match Results?

Brianne B. Roby, MD (Presenter); Reza Rahbar, MD, DMD; Diego A. Preciado, MD, PhD

Introduction: In March 2020, interviews for the pediatric otolaryngology fellowship had to transition to virtual due to the COVID-19 pandemic. Although some programs had already completed in-person interviews, others were forced to transition to a virtual model.

Method: Surveys were conducted of all pediatric otolaryngology fellowship applicants and program directors to determine if outcomes of the match may have been affected by the change in interview style.

Results: Of 32 US-trained fellowship applicants, 24 completed the survey. Twenty of 36 fellowship directors completed the survey (10 with virtual interviews, 6 with in-person interviews, and 4 combination). Of the 36 programs, 18 completed at least some interviews virtually. Of the 18 programs with virtual interviews, 10 (55%) had a spot unfilled in the match, whereas 22% of the in-person interviews had spots unfilled ($P = .04$). Half of applicants matched at programs they interviewed in-person, and half matched at programs interviewed virtually. While 70% of applicants felt they did not get the same experience with virtual interviews compared with in-person interviews, 75% did not feel it changed how they ranked programs. Some 60% of fellowship directors who did not feel applicants had the same experience interviewing virtually compared with in-person and felt that programs with virtual interviews would be ranked lower. Only 10% of directors felt that virtual interviews would increase the number of applicants if held virtually in the future.

Conclusion: Based on the survey, both applicants and fellowship directors had a less favorable perception of virtual interviews compared with in-person interviews, and it appears that virtual interviews significantly affected match results.

COVID-19 Pandemic on Mental Health in Pediatric Otolaryngologists in Latin America

Daniel Peñaranda, MD (Presenter);
Lucía C. Pérez Herrera, MD; Sergio Moreno-López, MSc;
Augusto Peñaranda, MD

Introduction: The current COVID-19 pandemic has placed an unprecedented burden on health care specialists who perform high-risk aerosol procedures, such as pediatric otolaryngologists. This study aims to assess the prevalence and associated factors of anxiety, depression, and stress as well as changes in daily and occupational activities due to the COVID-19 pandemic in otolaryngologists in Latin America.

Method: An observational, cross-sectional ongoing study was conducted. Mental health tools such as the Generalized Anxiety Disorder-7, the Patient Health Questionnaire-9, and the Perceived Stress Scale-10 were applied. Sociodemographic, daily activities, and clinical questionnaires were applied. Multivariable logistic regression analysis was performed to determine the associated factors with these mental health outcomes.

Results: To date, 55 pediatric otolaryngologists have been included; 72% to 73% of them are located in Argentina. The prevalence of anxiety, depression, and stress were 70.91%, 40.00%, and 45.45%, respectively. Up to 49.02%, 35.29%, and 9.80% of the population reported moderate to severe symptoms of stress, anxiety, and depression, respectively. The factors associated with these psychological outcomes are yet to be established when we achieve the expected sample size. Most of the specialists expect to incorporate long-term (>1-year) drastic changes in their clinical setting and daily activities due to the pandemic.

Conclusion: The prevalence of anxiety, depression, and stress was high among otolaryngologists in Latin America compared with previous mental health reports. Education strategies for early detection of psychological disorders are urgently required for health care specialists to be aware of their own mental health issues. Psychological and/or psychiatric support without occupational stigmatization should be granted by the institutions.

Culture and Burnout in Academic Otolaryngology

Sarah R. Akkina, MD, MS (Presenter);
Kathleen C. Sie, MD; Waleed M. Abuzeid, MD;
Neal Futran, MD, DMD; Tanya K. Meyer, MD

Introduction: There is a paucity of research on evaluating and improving workplace culture in academic otolaryngology departments.

Method: A single academic department of otolaryngology was assessed during efforts to evaluate and improve upon workplace culture in 2020. An independent consultant performed a qualitative analysis of department culture. During analysis, the consultant met with all department members including residents, faculty, and administrative staff ($N = 77$) in individual, confidential interviews. The consultant then led a department-wide conference in which a deidentified qualitative analysis was presented. This was followed by a workshop during which bias, equity, and inclusion education as well as a framework for subsequent communication were discussed. The primary outcome was response to a burnout survey completed by department members 2 weeks prior to and 4 months after the workshop.

Results: The burnout survey was completed by 26 department members before the workshop and 29 members 4 months after. The average burnout score preworkshop was 38 compared with 36 after, falling in the burnout category of “at risk of burnout.” Changes were not statistically significant in paired *t*-test analysis ($P = .50$). The maximum burnout score prior to the workshop was 66 compared with 60 after, both in the category of “severe risk of burnout.” While the percentage of members in the severe burnout category was stable, there was a marked shift from the at risk category to the mild risk category (65% vs 52%).

Conclusion: This study evaluated an effort to improve an academic otolaryngology department’s workplace culture through an independent consultant analysis and workshop. While department member burnout scores did not significantly change before and after the workshop, they trended toward improvement. The impact of the coronavirus pandemic may influence these results, though also makes efforts toward improving wellness and burnout that much more important. Culture change is a process, and further work is needed to understand how culture change may improve department member burnout over time.

Descriptors in Letters for Applicants Are Similar Between Gender/Racial Groups

Benjamin Aunins (Presenter); Zachary Conroy; Mekibib Altaye; Alice Tang

Introduction: Previous studies have demonstrated that writers of both narrative and standardized letters of recommendations (NLORs/SLORs) for otolaryngology head and neck surgery (OHNS) residency use different language to describe male and female applicants. This study uses visual LORs (VLORs)—a LOR introduced in 2019 that depicts LORs via word clouds—to combine SLORs, NLORs, and medical student performance evaluations (MSPEs) and examine if descriptors of applicants differed based on race and gender in 2 application cycles.

Method: A total of 433 LORs (284 NLORs, 149 SLORs) and 63 MSPEs were reviewed from 104 interviewees at the University of Cincinnati OHNS residency program in 2014 and 2019. Descriptors from LORs/MSPEs were collected by 2 reviewers, and the Quality System Regulation (QSR) NVivo 12 was used to generate a word cloud that grouped words by synonym and weighted them by frequency. Reviewers then coded these synonyms into 1 of 8 descriptor categories. Race and gender were self-reported from residency applications. The average of each category frequency for each race and gender were compared using *t* tests.

Results: Overall, 62.5% (65/104) of applicants were male vs 37.5% (39/104) female. A total of 7.6% (8/104) identified with a race that is underrepresented in medicine (URM) vs 85.6% (89/104) non-URM applicants and 6.7% (7/104) who preferred not to answer. In 2014 only, more “humor” words were used to describe male applicants than female (0.7 vs 0.1% of total descriptors, $P = .01$). More “intelligence” words

were used to describe URM than non-URM applicants (8.1% vs 5.1%, $P = .03$); however, no significant differences were found when comparing White vs Asian applicants. All other descriptors were similar across gender and race.

Conclusion: In VLORs for OHNS residency, only slight differences were seen between male and female as well as between URM and non-URM applicants, with no difference noted between Asian and White applicants. Our study shows that there may be few differences between race and gender groups when evaluating descriptors; however, further study is needed to see if linguistic differences appear in other forms, such as tone and overall quality of LORs.

Developing a Social Media Ontology Across Otolaryngology

Candace A. Flagg (Presenter); John P. Marinelli, MD; Matthew L. Carlson, MD; Sarah N. Bowe, MD

Introduction: Use of social media to disseminate new information within otolaryngology is becoming commonplace. However, across the myriad patients, physicians, researchers, industries, academic societies, and patient-support organizations that use social media, there exist variable hashtags used to discuss the same topics. In this way, the absence of a standardized social media ontology limits dissemination of data among key stakeholders. Other specialties have taken efforts to standardize a social media ontology for this reason.

Method: Based on the 2019 SCImago journal rankings, the Twitter posts from the accounts of the top 3 journals covering each otolaryngology subspecialty were reviewed from October 1, 2020, to December 1, 2020. Twitter posts from the primary otolaryngology-related academic societies were also reviewed during this time frame. A list of hashtags was generated based on a combination of the most common otolaryngologic procedures and most commonly used hashtags in the social media space. This list was then crowdsourced with 10 fellowship-trained otolaryngologists for each subspecialty.

Results: Hashtag use among key stakeholders in the otolaryngology social media space varies considerably. For example, during the first week of November 2020, cochlear implants and its associated hashtags were used a total of 72 times on Twitter. The various hashtags used that week included #CochlearImplant, #CochlearImplants, #Cochlear (most commonly followed by free-text “implant” or “implantation”), #CI, #CochlearImplantation, and #CochlearImplantResearch. In 53 of the 72 instances (74%), only 1 hashtag was included in the social media post. The most commonly used hashtags were #CochlearImplant and #CochlearImplants, both of which were used independently 36% (26/72) and 31% (22/72) of the time, respectively. Relevant examples for each otolaryngology subspecialty along with proposed hashtags will be presented.

Conclusion: Adoption of a standardized social media ontology within otolaryngology will improve data dissemination across key stakeholders.

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Diversity in Otorhinolaryngology Society Leadership

Michele M. Carr, MD, DDS, MEd, PhD (Presenter);
Kelcy McIntyre; Andrew Kelly

Introduction: Gender disparities in medicine are well documented, particularly among surgical specialties. Our goal was to compare gender trends in leadership of otorhinolaryngology societies.

Method: We conducted a review of the presidents of 8 otorhinolaryngology professional societies from 1990 to 2019 through review of their websites. Trends between genders in relation to professional age, defined as the number of years since graduating medical school, and h-index at induction of leadership position were assessed. Regression analysis and *t* tests were used for analysis.

Results: A total of 242 presidential inductees from 8 different professional organizations were accounted for over the past 30 years. Of those, 224 (92.6%) were male and 18 (7.4%) were female. Of the 8 professional societies, 2 have not had any women serve as president in the past 3 decades. The average professional age was 30.1 years (standard deviation [SD] = 7.2). The average preinduction h-index was 24.6 (SD = 13.2). From 1990 to 2019, we observed a significant upward trend in the number of female presidents ($r^2 = 0.296$, $P = .002$), preinduction h-index ($r^2 = 0.020$, $P = .035$), and professional age ($r^2 = 0.035$, $P = .006$). There was no significant difference between men and women with regard to preinduction h-index ($P = .682$) and professional age ($P = .155$).

Conclusion: There has been a scarcity of women in leadership positions in otorhinolaryngology professional societies, although numbers are increasing. Future study should include a more comprehensive look at leadership roles apart from president and the effect of specific efforts to increase representation of women and minorities in recent years.

Effect of the COVID-19 Pandemic on Otorhinolaryngology Residency Training

Isa Eloi, MD (Presenter); Ana Beatriz Ramada, MD;
Davide Marques; Joana Gonçalves, MD;
João Carlos Ribeiro, PhD; Luís Filipe Silva

Introduction: The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has created challenges to otorhinolaryngology practices. Despite statements aimed at guiding the 2019 novel coronavirus disease (COVID-19) response, data reporting its effects on otorhinolaryngology case volume and residency are lacking. The aim of this study is to discuss the challenges otorhinolaryngology residents encountered through data analysis during the SARS-CoV-2 first outbreak in a tertiary care hospital.

Method: Data were retrospectively collected by chart revision. Two periods were analyzed and compared from March 15 until May 31 of 2019 and 2020, respectively. We collected data from appointments, surgeries performed, and emergency department admissions including demographic data from patients.

Results: From March 15, 2020, to May 31, 2020, residents participated with the primary surgeon in 331 procedures compared with 63 procedures between the same period in 2019. There was a 55.28% reduction in otorhinolaryngology appointments during the outbreak (22% in-person appointments, 78% telehealth appointments). Data also showed a reduction in emergency department admissions of 57.4% and 60.3% in adults and children, respectively, although demographic features did not differ. One resident demonstrated COVID-19 symptoms with no hospitalization needed for a total 30 work-days lost.

Conclusion: These data provide the real-world impact on workload and learning opportunities for otorhinolaryngology residency needs during the first COVID-19 outbreak. While measures had to be taken to support the COVID-19 response, the reduction observed will probably affect residents experience and overall competence.

Gender Disparities in Medical Advertising: Past and Present

Theodore Klug, MD, MPH (Presenter);
Sarah R. Yeakel, MHA, MBA; Doreen Nakku, MD;
Amina Seguya, MBChB, MMed ENT; Hannah Ernst, MD;
Joshua Wiedermann, MD

Introduction: Billions of dollars are spent each year to push medical advertising content related to disease-specific processes and pharmaceutical options to consumers, often in a gender-biased manner. This article presents opinions and literature from otorhinolaryngology head and neck physicians within high and low/middle income countries to better define the contributing factors and ultimately how to address gender disparities and stereotypes in medical advertising worldwide.

Method: Team members within the Otolaryngology–Head and Neck Surgery (OHNS) Initiative defined gender disparity and analyzed all medical advertising content related to the specialties of otorhinolaryngology, allergy, neurology, and psychology between 1990 and 2021. The team conducted a broad search to identify medical advertising across all platforms, including social media, television, and websites. The examples were selected by identifying companies that chose to display their products and associated disease entities as gender specific.

Results: Allergy had the largest number of disparities related to gender within televised medical advertising, particularly within otorhinolaryngology and associated specialties. Products like Benadryl, Allegra, Zyrtec, Xyzal, Mucinex, and Nasacort consistently employed an almost all-female cast for their commercials over the 30-year period to demonstrate the specific disease processes for which they were offering solutions. Only one product, Claritin, showed a consistent effort to change in their selection of actors for their pharmaceutical advertisements, depicting both men and women afflicted with disease and experiencing allergy-related symptoms between 1990 and 2021.

Conclusion: Gender disparities are present in today's medical advertising, specifically in the subspecialty of allergy.

Efforts are needed to address this underscored and long-held televised paradigm of women being more often affected by allergies than men. More research is needed to compare and contrast gender disparities in medical advertising via newer formats of social media.

How Gender Disparities Affect Otolaryngology Specialty Selection

Sarah Nuss (Presenter); Holly Sprow; Davina Daudu; João Vitor Porto Araújo; Alexa Denton; Thomas Hampton, MBBS

Introduction: The number of women entering surgical subspecialties has remained disproportionately low given similar interest between genders, suggesting that there are still barriers preventing women from entering some surgical fields. Within otolaryngology, preliminary studies have demonstrated gender disparities in academic rank and leadership in primarily high-income countries, but no studies have evaluated the influence of gender on choosing otolaryngology as a specialty globally. This study aims to understand how gender affects otolaryngology specialty selection among medical students, residents, and attendings worldwide.

Method: We administered 2 versions of an online qualitative cross-sectional survey. The survey was disseminated to international medical student surgery interest groups and professional otolaryngology societies. The first survey arm asked medical students about gender-related factors that affect interest in surgery and otolaryngology. The second survey arm asked otolaryngology residents and attendings about specialty selection, gender discrimination, and career satisfaction. We will use descriptive statistics to summarize patient demographics and survey responses. Subgroup analysis will be conducted for gender and country income status as defined by the World Bank Country and Lending Groups classifications.

Results: We are currently in the process of data collection and expect results by April 2021.

Conclusion: The results of these surveys will be used to inform regionally specific research in gender disparities in the otolaryngology workforce as well as provide a foundation for initiatives to address gender disparities in otolaryngology programs and increase interest at the medical student level.

Impact of the COVID-19 Pandemic on Professional Fulfillment and Burnout

Rachel Karras (Presenter); Dana Crosby, MD, MPH, FARS, FAAOA; Arun Sharma, MD, MS

Introduction: Otolaryngologists have experienced unique stressors and practice disruption during the coronavirus disease 2019 (COVID-19). The purpose of this study is to assess burnout and professional fulfillment during the COVID-19 pandemic among otolaryngologists.

Method: A cross-sectional survey was performed between April 24, 2020, and May 8, 2020, via email and social media platforms in order to understand the impact of the COVID-19

pandemic on otolaryngologists in both academic and private practice. The 16-item Professional Fulfillment Index (PFI) was used to assess both professional fulfillment and burnout. Burnout was subdivided into work exhaustion and interpersonal disengagement.

Results: A total of 205 out of 244 respondents completed the PFI portion of the survey. Each answer is scored between 0 and 4. A score of >3 on the professional fulfillment portion of the survey correlates with fulfillment, while a score of >1.33 correlates with burnout. Our study found the professional fulfillment average to be 2.95, indicating the average respondent did not feel professionally fulfilled. In total 43.4% of respondents reported lack of professional fulfillment. The average score on the burnout scale was 2.12, indicating that the average practitioner felt burned out at this point in the pandemic. Of respondents, 98.5% scored >1.33 on the burnout scale, indicating that nearly all otolaryngologists were experiencing burnout.

Conclusion: Early in the COVID-19 pandemic, an overwhelming majority of participants experienced burnout, while just under half reported lack of professional fulfillment in their work. Attention to burnout and job satisfaction during a pandemic is critical to ensure appropriate well-being of otolaryngology practitioners.

Information Availability Among Otolaryngology Applicants: An Analysis of FREIDA

Prithwjit Roychowdhury (Presenter); Matthew J. Wu; Elliott D. Kozin, MD; Aaron K. Remenschneider, MD, MPH; Stacey Gray, MD

Introduction: Otolaryngology (ORL) applicants face challenges finding information about residency programs. Due to COVID-19, the Society of University Otolaryngologists released suggestions for students to avoid away rotations and look for programs to expand and update their web presence. However, information on program websites is not always standardized or easily accessible. Many applicants use the American Medical Association's Fellowship and Residency Electronic Interactive Database (FREIDA), a designated, standardized resource of basic and detailed information on residency programs. However, the availability of information within FREIDA is unclear. Herein, we analyze available data within FREIDA on all 124 ORL residency programs to understand the completeness of the FREIDA database.

Method: Data from all 124 otolaryngology-head and neck surgery residency programs within FREIDA was abstracted in early December 2020 and organized into 2 sections: basic information and detailed information (program details, educational features, and occupational benefits). The number of contributing programs in both sections was evaluated.

Results: More than half of the programs (n = 65, 52.4%) did not provide any detailed information within FREIDA. While all 124 programs had their address, contact email, and the names of program directors available, slightly fewer had direct links to their website available (n = 113, 91.1%). Most programs (70.2%) did not include a brief 1-paragraph program description.

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Conclusion: Our findings suggest that FREIDA provides basic information for nearly all ORL programs, but it does not offer detailed information for most programs. As COVID-19 has negatively impacted the ability of ORL applicants to learn about programs, FREIDA is a helpful, centralized resource but is currently incomplete.

Interventions Addressing Implicit Gender Bias in Surgical Residency Training

Nora Ibrahim, MD (Presenter); Ericka Erickson, MBA; Minka Schofield, MD, MPH

Introduction: Implicit gender bias disproportionately affects female surgical trainees. This review seeks to identify the interventions made in different surgical training programs to combat the effects of implicit bias against female surgical residents.

Method: The PubMed database was used to conduct a literature review of English-language publications between the years of 2010 and 2020. A total number of 13 articles were identified using the following search terms and phrases: “implicit bias gender residency programs,” “gender bias residency,” “sex bias otolaryngology,” “gender bias resident,” and “sex bias surgery residency.”

Results: A diverse cohort of literature was examined including randomized control trials, task force descriptions, and literature reviews. Of these studies, 5 identified gender bias workshop training, 5 identified mentorship, 6 identified the Implicit Association Test (IAT), and 3 identified standardized language for evaluations of trainees as key interventions.

Conclusion: Many of the interventions identified in this review can be used in combination to create a more equitable environment for female surgical trainees. The IAT and workshops are useful for identifying and addressing one’s own biases. Standardized feedback helps eliminate bias in evaluations of trainees. Mentorship and faculty buy-in are crucial for establishing a culture open to addressing implicit gender bias. There have been limited guidelines in place to address implicit bias against female surgical trainees. Knowledge of the interventions that can be made to counter implicit gender bias should be disseminated to provide an optimal learning environment for all surgical trainees.

Interviewing in a Pandemic: Utility of Virtual Mock Residency Interviews

Annie E. Arrighi-Allisan (Presenter); Aldo Londino

Introduction: The COVID-19 pandemic has greatly disrupted the otolaryngology residency application cycle. Reliance on virtual meetings, virtual electives, and virtual interviews has caused considerable apprehension for students and faculty alike. The use of in-person mock interviews has been shown to improve preparedness and confidence among interviewees. Less is known, however, about the utility of mock virtual interviews. This study explores the utility of a mock residency interview program in preparing otolaryngology applicants for a virtual interview format.

Method: Pre- and postmock interview surveys were administered to 19 medical students applying into otolaryngology

residency. The mock sessions consisted of 15-minute standard virtual Zoom interviews with senior otolaryngology faculty at the Mount Sinai Hospital, followed by 15 minutes of feedback. Pre- and postinterview surveys contained 12 and 21 questions, respectively, targeting confidence levels, ease of communication, perception of nonverbal cues, technical difficulties, and overall satisfaction.

Results: A total of 17 applicants responded to both surveys, yielding an 89.5% response rate. Applicants were significantly more confident in their ability to perform well during a virtual interview following their mock session (40% confidence before vs 88.2% after, $P = .0009$). Approximately 30% of applicants experienced technical difficulties during their session. Ease of virtual communication (65.0% vs 94.1%, $P = .002$), concern over impaired perception of an interviewer’s nonverbal cues (90.0% vs 58.8%, $P = .029$), and perceived lack of control (55% vs 35%, $P = .043$) all significantly improved following the mock interview program.

Conclusion: With new reliance on virtual platforms for communication during the otolaryngology residency application cycle, a mock virtual interview program is an impactful tool to help improve student confidence and preparedness. As virtual platforms in medicine become increasingly ubiquitous, further research is warranted to explore the longer-term impact these preparatory programs have on applicant success.

Medical School Anatomy Intervention Improves Otolaryngology Interest and Exposure

Norman A. Orabi (Presenter); Garrett H. Jones, MD; Wei Fang, PhD; Anna Lama, MA; Johnathan E. Castaño, MD

Introduction: Otolaryngology is a subspecialty with limited exposure in medical school. Our project aims to assess whether otolaryngology resident instruction in a head and neck anatomy course impacts medical student exposure to and interest in otolaryngology.

Method: Otolaryngology interns served as anatomy instructors for a routine first-year medical student head and neck anatomy course at a single medical school during March of 2020. Interns assisted with dissections, discussed clinical relevance during dissections, and provided a lecture on the field of otolaryngology. Voluntary and anonymous matched precourse and postcourse surveys were distributed to the medical students via a secure online platform. Primary outcomes focused on exposure and interest in otolaryngology, and secondary outcomes assessed participation and ability to learn. Statistical analysis was performed with 1-sample and paired Wilcoxon signed-rank tests using a Likert scale of 1 to 5 and a level of significance of $P = .05$.

Results: Compared with presurveys, we observed increased ability to describe the field of otolaryngology (1.93 vs 3.30, $P < .001$) and the role of an otolaryngologist (2.13 vs 3.30, $P < .001$), career interest in otolaryngology (2.40 vs 2.67, $P = .49$), and exposure to otolaryngology (2.00 vs 2.73, $P = .002$). In addition, there was positive association in understanding clinical relevance (3.77, $P < .001$), participation (3.70, $P < .001$), and

ability to learn head and neck anatomy (3.90, $P < .001$) and a strong recommendation for otolaryngology resident facilitators in future courses (4.27, $P < .001$).

Conclusion: Otolaryngology resident participation in an anatomy course was associated with increased exposure, understanding, and interest in otolaryngology and ability to learn head and neck anatomy.

Mental Health and Daily and Occupational Activities of Otolaryngologists in Colombia

Lucia C. Pérez Herrera, MD (Presenter);
Daniel Peñaranda, MD; Sergio Moreno-López, MSc;
Elizabeth Garcia, MD; Irene Perez Garcia, MD;
Augusto Peñaranda, MD

Introduction: The current COVID-19 pandemic has placed an unprecedented burden on health care specialists who perform high-risk medical procedures and are frequently exposed to the respiratory tract, such as otolaryngologists and allergists. This study aims to assess the prevalence and associated factors of anxiety, depression, and stress as well as changes in daily and occupational activities due to the COVID-19 pandemic in otolaryngologists and allergists in Colombia.

Method: An observational, cross-sectional study was conducted between October and November 2020. Mental health tools such as the Generalized Anxiety Disorder-7, the Patient Health Questionnaire-9, and the Perceived Stress Scale-10 were applied. Multivariable logistic regression analysis was performed to determine the associated factors with these mental health outcomes.

Results: Among 133 specialists (61.65% otolaryngologists, 38.35% allergists), the prevalence of anxiety, depression, and stress was 63.91% (95% CI, 55.45–71.58), 33.83% (95% CI, 26.33–42.24), and 36.09% (95% CI, 28.41–44.54), respectively. Anxiety (odds ratio [OR], 0.34; 95% CI, 0.14–0.81) and stress (OR, 0.38; 95% CI, 0.16–0.9) were less frequent in otolaryngologists and more frequent in individuals who expressed fear of the possibility of a negative outcome (death/sequelae) due to COVID-19 (OR, 2.65; 95% CI, 1.01–7.12). Older age was associated with anxiety (OR, 0.94; 95% CI, 0.90–0.98) and depression (OR, 0.96; 95% CI, 0.93–0.99). The reduction in consultation and surgery during the pandemic was associated with anxiety (OR, 1.03; 95% CI, 1.01–1.05). Most of the specialists expect to incorporate long-term (>1 year) drastic changes in their clinical setting and daily activities due to the pandemic.

Conclusion: The prevalence of anxiety, depression, and stress was high among otolaryngologists and allergists in Colombia compared with previous international mental health reports. Further research on these psychological outcomes is needed to achieve early mental health strategies.

Military Otolaryngology Residency Training and Practice Impact Assessment During COVID-19

Caitlin Haltiner (Presenter); Scott Bevans; Douglas Ruhl;
Eric Wirtz; Steven Hong; Art Ambrosio

Introduction: As SARS-CoV-2 spread widely across the world, it not only affected patient care but also the entire surgical training ecosystem. We assessed multiple factors of the COVID-19 response influencing the training environment by surveying both military otolaryngologists at all levels of training and faculty members at those sites.

Method: An anonymous practice pattern survey was distributed to interns, residents, and faculty at all Defense Health Agency otolaryngology residency training sites. The survey contained 21 questions including, but not limited to, basic COVID-19 knowledge, subsequent response actions, differences in time allocation, exposure risks, and career plans.

Results: Among all 6 training sites, 39 responses were received. Results demonstrated both faculty and residents spent less time overall at the hospital during COVID-19 ($P < .001$). Faculty spent more time on administrative tasks ($P = .003$), but residents did not ($P = 1.000$); residents engaged in academic activities and didactics more frequently during this time ($P = .007$). No significant differences were found between time spent on research or leisure for residents or faculty. Both time in the operating room ($P < .001$) and time spent seeing consults ($P < .001$) decreased significantly for both residents and faculty. Of all respondents, 92.3% felt they had enough personal protective equipment, 35.1% felt significant anxiety working with COVID+ patients, 23.7% were worried about the impact on their financial future, and only 15.8% reported feeling significantly burned out. Most residents (52.6%) were concerned about meeting their minimum Accreditation Council for Graduate Medical Education case requirements for graduation.

Conclusion: Maintaining high-quality patient care, preserving rapidly depleting supplies, and keeping providers safe—while ensuring a robust surgical training ecosystem—are all important challenges unique to each hospital system to identify and address during COVID-19 and any future large-scale disruptive events.

Quantitative Assessment of Statistics in the Otolaryngology Literature

Luis M. Rubio (Presenter); Dana Crosby, MD, MPH;
Arun Sharma, MD, MS

Introduction: Statistical tests and techniques are important for interpreting scientific publications. The objective of this study is to quantify the use of statistical tests and techniques in otolaryngology publications.

Method: Publications representing original research from 9 otolaryngology journals published between January and December 2019 were eligible for inclusion in the study. Review articles, systematic reviews, meta-analyses, opinion pieces, and editorials were excluded. Types of statistical tests were compared between groups of journals using chi-square tests. Continuous variables were compared using the Mann-Whitney U test. Correlations between continuous variables were determined with the Spearman correlation coefficient. Statistical analyses were performed with Stata/SE 14.2 (Stata).

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Results: Of the 2258 studies that met the criteria for inclusion in the study, 1634 (72.4%) used at least 1 statistical test or technique. There was a moderate positive relationship between journal impact factor and the use of statistics (Spearman rho 0.650; $P = .058$). The 3 most commonly used statistical tests were chi-square tests, Student t tests, and Mann-Whitney U tests. The number of statistical tests or techniques per publication ranged from 0-8 (median: 1 [interquartile range: 0-3]). Subspecialty-focused journals used more statistics per publication than otolaryngology-wide journals ($P = .006$). To interpret 90% of otolaryngology publications, knowledge of the 15 most common statistical tests is required.

Conclusion: Knowledge of a broad array of statistics is required to interpret otolaryngology publications, especially for those in subspecialty-focused journals. These findings have implications for residency and fellowship training.

Reimagining Informed Consent: Improving Comprehension and Satisfaction Through Multimedia Tools

Katie L. Holland (Presenter); Alexander Duffy, MD; Raphael Banoub, MD; Marisa Wu; Kelley Yuan; Elizabeth Cottrill, MD

Introduction: The informed consent discussion represents a key moment of communication between physician and patient, but time constraints in a busy office setting and varying levels of patient health literacy place a strain on this process. Multimedia use during the consent process has demonstrated improved patient comprehension and retention within other surgical subspecialties. Our institution produced and administered a unique thyroidectomy educational video (TEV) as an adjunct to traditional informed consent to determine whether multimedia increases patient satisfaction with information related to thyroid surgery.

Method: From September to December 2020, after participating in the traditional informed consent process for thyroid surgery, patients were offered the opportunity to view a TEV created by a surgical and digital design team at our institution. The TEV outlined indications, risks, benefits, and relevant anatomy to thyroid surgery with simple illustrations, animations, and text. Patients completed a Likert-style survey to compare their confidence with risks, benefits, and steps related to thyroidectomy before and after watching the TEV.

Results: A total of 30 subjects viewed the educational video; 76.7% were female and 26.7% were male; 89.7% reported having surgery previously; 19 participants (63.3%) reported an educational level of a 2-year college degree or higher. Patients reported increased confidence in understanding risks (+1.19), benefits (+0.93), and overall knowledge (+1.3) associated with thyroid surgery after watching the TEV ($P < .05$). Subjects rated their overall satisfaction with the video as an average of 4.9/5, and an average of 5/5 was found when asked if the video was easy to understand.

Conclusion: Our study demonstrates that patients feel more confident in their understanding of thyroid surgery after

viewing the TEV. This study served as a pilot for our group prior to undertaking a controlled trial to formally evaluate patient comprehension of surgery-specific information after multimedia intervention, and it also served as a test of feasibility prior to expanding to other otolaryngology surgeries.

Resident-Run Continuity of Care Clinic in Otolaryngology

Jacline Phillips (Presenter); Lyndsay Madden; Shambavi Rao; Eleanor Kiell

Introduction: Continuity of care is important for both resident education and patient care. In the surgical literature, a surprisingly low percentage of residents who assist in a specific patient's operation also see the patient either pre- or post-operatively. With the added limitation of duty hour regulations, many changes to resident rotation structure and models have been proposed to overcome this deficit. We present a model used successfully at our institution in which a primarily resident-run otolaryngology clinic addresses the lack of continuity of care in otolaryngology residency training.

Method: This is a retrospective, descriptive study of the resident-run otolaryngology clinic where the resident surgeon is the patient's primary otolaryngologist. This study further analyzed data from an institutional database of 1639 new patients (>18 years old) presenting for otolaryngology care through the resident-run clinic at an academic medical center from 2015 to 2020. Demographic patient data were analyzed, and diagnosis codes were reviewed.

Results: The resident-run clinic is housed within the otolaryngology outpatient clinic and is immediately supervised by an attending surgeon. The resident surgeon is responsible for all aspects of outpatient, operative, and inpatient care in collaboration with a supervising attending surgeon. Preliminary data revealed that of 1639 new patients, 60% were female and 40% were male. Patients were 57.2% White, 26.1% Black, and 16.7% other and ranged in age from 18 to 95 years. Diagnosis codes were representative of all aspects of outpatient clinical otolaryngology.

Conclusion: A resident-run continuity of care clinic is a successful model to address the lack of continuity of care in resident education. Demographics of patients seen in this clinic mirror the general population, and diagnoses span the otolaryngology spectrum of care.

Statistically Savvy: How Well Do Otolaryngology Residents Understand Biostatistics?

Caitlin W. Pacheco, MD (Presenter); Mulin Xiong; Megan Durr; Jonathan Liang, MD

Introduction: Previous assessments of resident biostatistical knowledge have focused on internal medicine residents and show room for improvement. Given emphasis on scholarly productivity among otolaryngology residents and applicants and the importance of evidence-based medicine, a validated

instrument was used to measure biostatistical knowledge among a selection of otolaryngology residents.

Method: A survey was created to assess prior training, comfort levels with biostatistical analyses, and biostatistical proficiency. This was assessed using a validated instrument. This was distributed to residents in July 2019 through their program directors.

Results: Completed surveys were obtained from 52 of 1875 residents. The average score was 11.2 of 20 possible points (SD = 3.0). Performance on questions relating to double-blinding, *t*-test identification, and relative risk (>80% correct) were better than on questions relating to the interpretation of Kaplan-Meier curves and confidence intervals, and determination of strength of evidence (<20% correct). Articles published in the top 3 ear, nose, and throat journals between March and June 2019 used multivariate statistics in 36% of analyses, while relative risk was used in less than 10%. Linear regression was performed, and a trend found correlating higher test scores with biostatistical training in medical school (relative risk = 6.78; 95% CI, 0.93-12.64). No significant differences in score were found across gender, level of training, or with advanced degrees. Confidence in biostatistical ability was not correlated with test scores.

Conclusion: Despite emphasis on scholarly productivity in otolaryngology residency, residents show variable proficiency in biostatistics with an overall low to fair level of knowledge. Although advanced degrees are not correlated, there is a trend toward increased scores in those with biostatistical training in medical school. These results suggest that further biostatistical training may be needed to improve the ability of otolaryngology residents to interpret research studies, an important part of providing quality care.

Teddy Bear Simulation to Teach Clinical Skills During COVID-19 Lockdown

Saurav Sarkar, MBBS, MS, MRCS-ENT (Presenter); Priyadarshini Mishra; Pradipta Parida

Introduction: The pandemic has been specially challenging for developing countries where simulated teaching and training is not a norm. Teaching practical skills was a daunting task with no patients to examine due to lockdowns and the risk of transmission of infection. Students, however, need to be trained in clinical skills required as part of their health care training in different subjects. An ear, nose, and throat department planned to train undergraduate students in clinical skills on a hybrid simulator using inexpensive and readily available materials.

Method: During the COVID-19 pandemic lockdown, a 1-month observational study was conducted. The medical education of seventh-semester students was examined. Students taught clinical skills with a teddy bear, glass, and balloon. Feedback and scores were given to students for work in stations during a professional examination.

Results: The difficulty index of otoscopy was 23/84 (0.27), and the difficulty index of tuning fork was 2/84 (0.02). The

high score index/performance index for the tuning fork test was 79/84 (94%), and the high score index for otoscopy was 37/84 (44%). In total, 28 of 84 students (33.33%) provided feedback on the training, and 18 of 28 (64.3%) students liked the innovative way of training. However, most students who answered in the affirmative stated that this was the best possible way of getting trained considering the pandemic situation. For tuning fork tests, 22 of 28 (78.6%) were confident that they would be able to transfer the skill learned on the hybrid simulator to a real-life scenario, 4 of 28 said they were not sure if they would be able to transfer the skill, and 2 of 28 students said they would not be able to. For otoscopy simulation, 11 of 28 (39.3%) were confident that they would be able to transfer the skill learned on the hybrid simulator to real-life scenarios; 8 of 28 (28.6%) were not sure if they would be able to transfer the skill, while 9 of 28 (32.1%) students said they would not be able to. On a scale of 1 to 10, the average rating for the teddy bear simulation was 7.3 ± 1.7 , and the average rating for the otoscopy simulation was 5.5 ± 2.4 .

Conclusion: Difficult times call for innovative measures. Using simple materials to create an accessible, inexpensive simulator for teaching clinical skills did help in training the students.

Use of Cognitive Enhancement Drugs in Otolaryngology Residents

Maxwell D. Newby, MD (Presenter); Rusha Patel, MD

Introduction: The aim of this study is to describe the patterns of use of cognitive enhancement drugs in current otolaryngology residents.

Method: An institutional review board exempted multi-institution, cross-sectional assessment was performed. Using an electronic survey, residents in a current Accreditation Council for Graduate Medical Education (ACGME)-accredited otolaryngology residency were solicited via their program directors and/or coordinators in the summer and fall of 2020 to complete a survey regarding patterns of use of caffeine, nicotine, modafinil, amphetamines, methylphenidate, and general use of oral stimulants. Demographic data of gender, postgraduate year (PGY), geographic region of training, history of sleep disorders, postgraduate plans, and structure of call were also collected.

Results: In total, 218 current otolaryngology residents completed the survey, and 60% of the respondents identified as men. Of the current residents, 34% were PGY 1, 17% were PGY-2, 21% were PGY-3, 16% were PGY-4, and 12% were PGY-5 or higher. There were 99% of respondents who reported no sleep disorders, and 82% reported home call structure. Of respondents, 78% reported daily use of a cognitive enhancement drug, as well as 75% reporting at least daily use of coffee. Caffeine was largely the most consumed enhancement drug; however, only 9% of residents obtained caffeine daily through energy drinks. Oral stimulants prescribed by a physician were used at least daily by 5.8% of responders in contrast

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to 0.9% of respondents who reported occasional use of a stimulant not prescribed by a physician. Nicotine was used by 1.9% more than once a day.

Conclusion: Most residents in a current ACGME-accredited otolaryngology residency consume caffeine, in the form of coffee, as the most common cognitive enhancement drug. Other drug options including nicotine, modafinil, amphetamines, methylphenidate, and general use of oral stimulants were less common but upwards of 5.8%. Limitations of the study were potential for self-reporting bias or voluntary self-exclusion from the study. These findings add to the body of knowledge on resident fatigue, cognitive enhancement, and stimulant usage during an otolaryngologic residency.

Utilization of Advanced Practice Providers Within Otolaryngology Residency Programs

Christine M. Clark, MD (Presenter); Elizabeth Borowiec; Lauren Wester, PA-C; Sonya Malekzadeh, MD

Introduction: This study aims to describe the current practices of utilization and resident perception of advanced practice providers (APPs), such as physician assistants and nurse practitioners, among otolaryngology–head and neck surgery (Oto-HNS) residency training programs within the United States.

Method: A cross-sectional online Google survey of Oto-HNS residents nationwide was conducted. The survey was distributed to trainees via residency programs' program coordinators. General demographic information and information regarding APP utilization at respondents' residency training programs as well as respondents' perceptions of APP impact on their training was elicited. Statistical analysis via Pearson chi-square testing will be performed.

Results: Preliminary data from 73 respondents represented residents from all postgraduate years in training and geographic distributions. Of respondents, 97.3% are training at programs that employ an average of roughly 5 APPs working in a mostly outpatient capacity with some inpatient coverage. Of the respondents, 74.6% would support the hiring of additional APPs at their training programs, and 90.1% indicated that APPs favorably contribute to their residency training. In total, 23.9% reported that APPs allow for protected didactic time for residents, 69.0% indicated that APPs allow for earlier operative experiences for residents, and 57.5% felt that APPs help to prevent resident burnout. Among those who indicated that APPs contribute to a negative residency training environment, the primary concern was that APPs detract from residents' operative experiences by assisting in the operating room.

Conclusion: APPs appear to function primarily in the outpatient setting with limited inpatient coverage at most Oto-HNS residency training programs in the United States. APPs may allow for earlier operative experiences and prevent resident burnout but, in some cases, may also detract from residents' operative involvement.

Virtual Landscape Utilization to Increase Underrepresented Minorities Exposure to Otolaryngology

Brandon I. Esianor, MD (Presenter); April Peterson; Carlos Ortega

Introduction: Otolaryngology has been identified as a specialty that is lacking in racial/ethnic representation. In the United States, Black and Hispanic individuals comprise approximately 6% of actively practicing otolaryngologist compared with the 29.4% representation of the total population. The objective of this study is to highlight an innovative approach focused on increasing underrepresented minority (URM) medical students' exposure to the field of otolaryngology.

Method: A virtual session titled "Diversifying Otolaryngology: Guiding the Next Generation of Otolaryngologist" was hosted for URM medical students via Zoom. URM resident physicians from residency programs across the country collaborated to present informative content. The session was advertised via social media platforms. Postsession surveys were distributed to participating students. The study design was a cross-sectional survey.

Results: The live session attracted 120 participants, and the recorded video has been viewed nearly 500 times on YouTube. Postsession survey results and statistical analysis will be presented at the conference.

Conclusion: Virtual platforms provide a collaborative inter-institutional avenue for increasing underrepresented medical students' exposure to otolaryngology that may ultimately lead to increase racial/ethnic representation within the specialty.

What Influences Otolaryngology Residents' Decisions About Post-call Activities?

Michele M. Carr, MD, DDS, MEd, PhD (Presenter); Anne Foreman; Jonathan Friedel; Daniel O'Brien; Oliver Wirth

Introduction: Compliance with the Accreditation Council for Graduate Medical Education work hour restrictions is not universal. The purpose of this study is to identify factors that influence residents' decisions to take a post-call day (PCD) off.

Method: A national sample of otolaryngology residents from 41 programs were surveyed electronically in 2019. The survey included demographic details and a discrete choice experiment (DCE) examining influences on resident decisions to take a PCD off. Participants were presented with 12 choice sets, each consisting of 2 hypothetical scenarios, and asked to choose the scenario in which they would be more likely to take a PCD off. The scenarios varied in terms of the type of attending feedback related to PCD behavior, workload, chief resident comments, coresident expectations, the day's assignment, and whether or not the resident had continuity of care concerns.

Results: Of 397 surveyed 203 (51%) completed all DCE questions. Residents were more likely to take a PCD off if they received positive attending feedback ($\beta = 2.22, P < .001$),

if the workload was covered ($\beta = 0.85, P = .03$), or if they received a chief resident comment about their fatigue ($\beta = 1.26, P < .001$). Residents were less likely to take a PCD off if they had received negative attending feedback ($\beta = -3.14, P < .001$), if they had been looking forward to today's assignment ($\beta = -1.74, P < .001$), and if they had continuity of care concerns ($\beta = -1.53, P < .001$). In terms of interactions, when coresidents expected that each resident should stay on duty postcall, respondents were less likely to take a PCD off when the workload was not easily covered ($\beta = -3.53, P < .001$).

Conclusion: The most important influence on residents' decisions to take a PCD off was related to feedback from their attending physicians, suggesting that compliance with duty hour restrictions can be improved by focusing on the residency program's leadership and safety culture.

Rhinology/Allergy

Are Environmental Factors Predictors of Posterior Epistaxis?

Theodore D. Klug, MD (Presenter); Gurston G. Nyquist, MD; Glen D. Souza, MD; Elina M. Toskala, MD; Marc R. Rosen, MD; Mindy R. Rabinowitz, MD

Introduction: We analyze the impact that changes in temperature, humidity, and ambient pressure have on rates of epistaxis in general; compare the different effects meteorological factors have on anterior vs posterior epistaxis; recognize that episodes of posterior epistaxis do not increase during winter months. This is the first abstract/manuscript looking at whether or not there is a correlation between meteorological factors and episodes of posterior epistaxis. We wanted to have as many patients possible included in the study to increase the power of the study and also ensure that our results and conclusions were accurate.

Methods: A single-center, retrospective chart review between January 2019 and May 2021 was performed on patients undergoing a SPA ligation or embolization for refractory posterior epistaxis. In total, 54 patients were identified, and 101 procedures were performed. Baseline demographic data, previous medical management, comorbidities, and risk factors were collected.

Results: When stratifying according to the year and month of the posterior epistaxis procedure performed, humidity ($P = .270$), temperature ($P = .724$), and ambient pressure ($P = .372$) were not found to be statistically significant risk factors for increased episodes and treatment of posterior epistaxis. Only current use of anticoagulants was found to be statistically significant ($P = .009$).

Conclusion: Posterior epistaxis requiring surgical intervention is unpredictable, with seasonal humidity, temperature, and ambient pressure not correlating with episodes of severe, unrefractory posterior epistaxis.

Blood and Tissue Eosinophil Counts in Recurrent Nasal Polyps Patients

Victoria S. Benson (Presenter); Robert H. Chan; Ana R. Sousa; Shibing Yang; Steven G. Smith

Introduction: The role of eosinophils in the etiology of nasal polyps (NP) is unclear; however, most NP are believed to be eosinophil dominant. We reviewed the literature to determine recurrence rates of NP and associated eosinophil counts/eosinophilia status in NP populations.

Method: Relevant observational studies were identified by searching titles and abstracts published between 2005 and 2019 in Embase and PubMed for either "nasal polyps" and "surgery" or "nasal polyps" and "eosinophils." A stepwise screening process identified studies for inclusion and data extraction of NP recurrence by eosinophilia status or NP recurrence and eosinophil counts.

Results: Ten observational studies reported recurrence of NP in eosinophilic vs noneosinophilic patients (study sample sizes 66–280), and 9 studies compared blood and/or tissue eosinophil counts (BEC/TEC) in patients with and without NP recurrence (study sample sizes 51–387). The methods and cut-off points used to define baseline eosinophilia status or eosinophil count varied between studies and in some cases were not specified. Follow-up periods and definitions of recurrence of NP also varied. In 8 of 10 studies, higher NP recurrence rates were associated with eosinophilic vs noneosinophilic NP (eosinophilic status based on TEC, if specified). NP recurrence in eosinophilic patients ranged from 6.9% ($n = 3/43$) at 12-month follow-up to 100% ($n = 5/5$) at 2-year follow-up in another study. Another study found patients with eosinophilic vs noneosinophilic NP to be $\sim 3\times$ more likely to recur over a median follow-up of 30 months (32.3% vs 10.5%, respectively). BEC and TEC were generally higher in patients with recurrent NP; statistical significance was achieved in the majority of studies when tested.

Conclusion: This review suggests higher BEC and TEC are associated with NP recurrence. However, due to heterogeneous study definitions, methodologies, and study sizes, larger studies are needed to confirm this finding and further investigate the role of eosinophils in NP.

Case Report: Nasal Glial Heterotopia in a Middle-Aged Adult Female

Vincent Honrubia, MD (Presenter); Victor Espinoza; Alexis Garza; Arianna V. Ramirez; Macaulay Ojeaga; Blake Hensler, PA-C

Introduction: Nasal glial heterotopia is a rare benign tumor that is usually present at birth or early infancy. These tumors are composed of normal neuroglial tissues that arise outside the central nervous system in an aberrant location toward the midline. Patients usually present with complaints of nasal obstruction and a polypoid mass identified upon inspection of the nasal cavity. We describe a case of a 44-year-old woman with a history of recurrent sinusitis who was found to have a nasal glial heterotopia causing severe nasal obstruction.

Method: A 44-year-old woman with a history of recurrent sinusitis was referred for a 2-week history of left-sided nasal obstruction and difficulty sleeping. Computed tomography imaging revealed significant rhinosinusitis, nasal polyposis of

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the left nasal cavity, and compromised nasal airflow. The patient had been placed on a full course of oral antibiotics, oral steroids, and intranasal steroid spray prior to surgery, and upon failure of treatment, the patient consented to in-office surgical management.

Results: The polypoid fragments were located in the ostiomeatal complex and were endoscopically removed. Fragments were sent to pathology where the nasal glial heterotopia diagnosis was confirmed.

Conclusion: Nasal glial heterotopia is a rare benign tumor in which normal glial tissue develops in an abnormal location isolated from the nervous system, typically among children. Here we demonstrate the presentation and management of a rare case of nasal glial heterotopia found in an adult and the importance of routine pathology reports.

Closure of Oroantral Communications With Combined Endoscopic Sinus Surgery and Buccal Fat Pad Graft

Tory McKnight, MD (Presenter); Gurston Nyquist, MD; Theodore Klug, MD; Carlotta Pazzi, MD; Mindy R. Rabinowitz, MD; Marc Rosen, MD; Daniel Taub, MD

Introduction: We aim to evaluate the efficacy of combined endoscopic sinus surgery and buccal fat pad advancement flap on closure of oroantral communication (OAC); to evaluate the efficacy of combined endoscopic sinus surgery and buccal fat pad advancement on the treatment of rhinosinusitis in patients with odontogenic sinusitis; and to evaluate precipitating dental conditions in this patient population. This is the largest study of the efficacy of combined endoscopic sinus surgery and buccal fat pad advancement graft to treat odontogenic sinusitis and OAC. The study goes back to 2007 and thus includes all archived notes, which had to be acquired from a storage facility. This process was extremely slow. This abstract is late breaking but includes the largest data set of its kind.

Methods: This is a retrospective study of 102 consecutive surgical patients with odontogenic sinusitis and OAC that underwent surgery between 2007 and 2020 at a single tertiary hospital setting. Presenting signs and symptoms, dental history, and surgical outcomes were interrogated. Descriptive statistics, chi-square and Fisher exact test were implemented as appropriate.

Results: We found that 100% of patients underwent successful closure of the OAC during the first 6 months, with 2 patients requiring 1 additional surgical procedure for successful closure of the OAC. At 12 months postoperatively (n = 55), 96% reported continuous success, with 1 patient undergoing 1 additional procedure. Patients included those who developed an oroantral fistula and odontogenic sinusitis after a previous extraction of a non-restorable maxillary tooth (n = 55), as well as those with radiographic evidence of odontogenic sinusitis who underwent endoscopic sinus surgery and tooth extraction concurrently resulting in an OAC (n = 47).

Conclusion: This is the largest study demonstrating the successful treatment of odontogenic sinusitis with an OAC treated

with combined endoscopic sinus surgery and a buccal fat advancement flap. All (100%) patients had successful closure of the OAC at 6 and 12 months postoperatively, with only 3% of patients requiring a second procedure. The most common indication for surgery was a persistent OAC after dental extraction. In the setting of odontogenic sinusitis that requires tooth extraction, the buccal fat pad is an excellent option to close the OAC.

Comparing Survival Between Open and Endoscopic Resection of Sinonasal Adenocarcinoma

Samer T. Elsamna (Presenter); Minna Alkayat; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Sinonasal adenocarcinoma (SA) is a malignancy of the sinonasal tract that is often treated with surgery. This study aims to identify factors associated with an open or endoscopic surgical approach and to evaluate differences in survival based on approach.

Method: The National Cancer Database was used to identify cases of SA from 2010 to 2016. Patient demographics, tumor characteristics, treatment modality, and survival data were obtained. Kaplan-Meier analysis and a log-rank test were used to compare survival rates by surgical approach.

Results: There were 304 patients included. Most were younger than 60 years (56.3%), female (50.7%), and White (80.1%). A total of 176 underwent open resection (57.9%), while 128 underwent endoscopic resection (42.1%). Most cases were T stage 1 (39.6%), located in the paranasal sinuses (58.5%), had nonintestinal histology (83.2%), and were treated at academic centers (74.3%). Patients with intestinal histology were 1.86 times more likely to undergo endoscopic surgery. Overall, 2- and 5-year survival rates for open surgery were 86.4% and 79.1%, respectively, and 87.3% and 63.1% for endoscopic surgery, respectively. Survival was not found to be significantly different between the 2 surgical approaches for the entire cohort (log-rank $P = .091$) when split by histology (nonintestinal, log-rank $P = .135$; intestinal, log-rank $P = .748$) or when propensity score matched by T stage (log-rank $P = .089$).

Conclusion: Our study suggests that while there is a trend toward significance, there is no significant difference in survival of patients who undergo open vs endoscopic resection of SA.

Comparison of Epistaxis Patients Treated Surgically and Endovascularly

Annie E. Arrighi-Allisan (Presenter); Devin V. Bageac; Blake S. Gershon; Katherine L. Garvey; Reade De Leacy, MD; Alfred-Marc Illoreta, MD

Introduction: Patients with epistaxis refractory to conservative management may be treated operatively or endovascularly. These 2 populations are often deemed commensurable without sufficient evidence. This study aims to compare the

characteristics of patients with refractory epistaxis treated by either modality at a single institution.

Method: A chart review of 81 epistaxis patients who ultimately required surgical or endovascular intervention between December 2016 and December 2020 took place. Demographics, comorbidities, laboratory data, intraoperative factors, and outcomes were compared using chi-square test with Yates correction, *t* test, and Mann-Whitney *U* test where appropriate.

Results: In total, 36 patients were treated surgically and 45 were treated endovascularly. Surgical patients more often presented with posterior epistaxis (66.7% vs 31.1%, $P = .001$), while those treated endovascularly were more likely to have both anterior and posterior bleeds (46.7% vs 13.9%, $P = .001$). Surgical patients' epistaxis more often resulted from sinus surgery (50.0% vs 17.8%, $P = .004$), while endovascular patients' bleeds were more frequently idiopathic (60.0% vs 33.3%, $P = .03$). Endovascular patients were more likely to require subsequent interventions (35.6% vs 5.6%, $P = .003$) and experienced longer lengths of stay (LOS; 4.1 vs 2.0 days, $P < .0001$). Although endovascularly treated patients possessed lower hemoglobin levels at presentation (10.4 g/dL vs 11.8 g/dL, $P = .01$), surgical patients were more likely to experience postintervention anemia (44.4% vs 13.3%, $P = .004$). After-hours presentation (5 PM–7 AM/weekends) did not significantly affect the likelihood of undergoing surgical vs endovascular treatment (41.7% vs 46.7%, $P = .35$) or LOS ($P = .38$).

Conclusion: While patients treated endovascularly for epistaxis experienced poorer postintervention outcomes than those treated surgically, they also presented with more complex and severe bleeding. Retrospective comparisons of these 2 modalities may be confounded by these baseline differences.

Comparison of Revisit After Balloon Versus Traditional Endoscopic Sinus Surgery

Alison Yu, MD (Presenter); Marshall Ge, MD; Stephanie Smith, MD, MS; Bozena Wrobel, MD; Elisabeth Ference, MD, MPH

Introduction: Balloon sinuplasty has been more widely adopted in the recent years for the treatment of chronic rhinosinusitis, yet there is a paucity of literature that compares the revisit rate after balloon vs traditional sinus surgery.

Method: We identified sinus procedures from the State Ambulatory Surgery Database for California in 2011. Cases were linked to the State Emergency Department Database to identify visit encounters occurring within 30 days after the procedure. We defined the study cohort using Current Procedural Terminology codes for balloon and traditional sinus procedures and the *International Statistical Classification of Diseases, Ninth Revision*, codes for chronic rhinosinusitis with nasal polyps and chronic rhinosinusitis without nasal polyps, and excluded patients <18 years old, leaving 8879 for analysis. Mini-ESS was defined as ethmoidectomy with maxillary antrostomy (traditional or balloon). Pan-ESS was defined as ethmoidectomy with maxillary, sphenoid, and frontal sinuplasty (traditional or balloon). Univariate and

multivariable logistic regression models were used to identify risk factors associated with 30-day postoperative revisit for mini- and pan-ESS.

Results: The overall 30-day postoperative revisit rate was 4.3%. Balloon sinuplasty was used in 1.3% of mini-ESS and 7.7% of pan-ESS. The revisit rate for patients who underwent traditional mini-ESS was 4.3% and for balloon/combined was 9.7%. This difference in revisit rate was no longer significant in the multivariate analysis after controlling for patient-related factors ($P = .13$). Among the pan-ESS group, there was no significant difference in the revisit rate for traditional vs balloon/combined method (4.4% vs 5.6%, $P = .62$). Bleeding comprised the majority of revisits for both traditional (33.8%) and balloon/combined surgery (42.9%), followed by neurological diagnoses (20.0% and 28.6%, respectively).

Conclusion: There was no significant difference in the 30-day postoperative revisit between traditional and balloon/combined sinus surgery, suggesting that balloon sinuplasty is a safe option in the ambulatory surgical setting but does not decrease the rate of revisit compared to traditional techniques.

Complication Risk Related to Obstructive Sleep Apnea After Sinonasal Surgery

Nrusheel Kattar, MD (Presenter); Edward D. McCoul, MD, MPH; Dylan A. Levy, MD

Introduction: We recognize that surgical manipulation in the sinonasal cavity may transiently increase airflow resistance in obstructive sleep apnea (OSA) patients; appreciate the importance of counseling OSA patients undergoing sinonasal surgery on the increased risk for postoperative admission; and anticipate that OSA patients undergoing sinonasal surgery will likely require supplemental oxygen therapy in the perioperative period. This project is very relevant due to newly obtained data from a large cohort of patients that may help to improve perioperative care in OSA patients undergoing sinonasal surgery.

Methods: A retrospective cohort study was performed on surgical patients ≥ 18 years of age with or without OSA treated in a large regional health system between January 2013 and December 2020. Patients undergoing sinonasal surgery were compared with those having oropharyngeal, laryngeal, otologic, rotator cuff and inguinal hernia surgery, using readmission and respiratory complications as primary outcomes.

Results: Study groups consisted of 4575 sinonasal, 2301 oropharyngeal, 2057 inguinal hernia repair, 1353 otologic, 1231 laryngeal, and 434 rotator cuff surgical patients. The mean (range) age was 44 years (18–65 years), and 52.8% were men. Among patients undergoing sinonasal surgery, those with OSA had a greater number of admissions (relative risk [RR], 1.52; 95% CI, 1.40–1.65). In all groups, OSA was associated with increased risk of requirement supplemental oxygen therapy (RR, 1.66; 95% CI, 1.55–1.77). Oropharyngeal surgery patients had a greater incidence of oxygen desaturation in the OSA cohort (RR, 1.95; 95% CI, 1.34–2.85).

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Conclusion: Patients with OSA undergoing sinonasal surgery have a greater risk of hospital admission and supplemental oxygen requirement compared with patients without OSA.

Complications Associated With Endoscopic Management of CSF Rhinorrhoea: Institutional Audit

Yash Mittal, MBBS (Presenter); Abhijeet Mishra; Pradeep Pradhan; Anupama Giresh; Vinusree K; Chappity Preetam, MS, DNB, MNAMS

Introduction: Cerebrospinal fluid (CSF) rhinorrhea occurs due to a direct communication between the subarachnoid space and the paranasal sinuses serving as a path for ascending central nervous system infections. Endoscopic repair of CSF leaks provides excellent visualization and outcomes but is also associated with certain complications.

Method: A retrospective analysis was done for 36 patients operated for CSF rhinorrhoea in a tertiary care setting from 2014 to 2020. The patients who underwent elective endoscopic CSF repair were included. Patients with progressive pneumocephalus or iatrogenic pituitary leak were excluded from the study. Multilayer closure (underlay-overlay-glue-fat-surgical-gelfoam) was done for all the cases.

Results: Of a total of 36 cases of CSF rhinorrhoea operated, 7 patients suffered from complications or failure. The average age of presentation was 35.8 years. The common sites of CSF leak was the cribriform area ($n = 24$), the posterior ethmoid skull base ($n = 5$), the frontal sinus posterior table ($n = 5$), and the sphenoid sinus leak ($n = 2$). The most common complication was meningitis ($n = 3$). A patient with a CSF leak from the frontal sinus posterior table defect developed pneumocephalus associated with a prolonged hospital stay (14 days). Another patient with an anterior ethmoid area leak developed frontal sinusitis 5 months postsurgery, suggesting that anatomical localization of frontal recess to avoid injury is crucial. Delayed failure of repair was seen in a patient with suspected benign intracranial hypertension. Immediate failure of repair was seen in a patient with a unilateral skull base defect medial to middle turbinate with CSF leak from the contralateral side.

Conclusion: Idiopathic CSF leaks are associated with delayed failure or a postoperative CSF leak from a new location. Medial leaks need removal of septum and addressing of the opposite nasal cavity. Frontal posterior table leaks and high pressure leaks have a higher chance of failure. Absolute asepsis is imperative to prevent meningitis, especially during harvest of graft and fat. Avoiding prolonged positive pressure ventilation is essential to prevent pneumocephalus.

Complications Associated With Management of Juvenile Nasopharyngeal Angiofibroma: Institutional Audit

Yash Mittal, MBBS (Presenter); Sidharth Pradhan; Abhijeet Mishra; Pradeep Pradhan; Pradipta Parida; Chappity Preetam, MS, DNB, MNAMS

Introduction: Juvenile nasopharyngeal angiofibromas (JNA) are benign but aggressive vascular tumours with the origin epicenter around the pterygoid wedge and sphenopalatine foramen.

Method: A retrospective analysis of the patients with JNA presenting to a tertiary care center between June 2015 and June 2020 was done. The clinical and radiological findings, treatment (surgical or nonsurgical), and postintervention follow-up data were analyzed.

Results: Of a total of 94 cases of JNA presenting to us during the aforementioned period, 89 (94.7%) underwent surgical intervention. The average age of presentation was 14.6 years with epistaxis being the most common symptom (85.1%). All except 4 patients underwent surgical intervention without embolization, of whom 78 (83%) were purely endoscopic. Among the nonsurgical group, 1 patient developed complete blindness following emergency nasal packing for epistaxis while another patient had nonresolving anemia secondary to flutamide use (not yet reported). Complications in the surgical group included a case of permanent unilateral vagal palsy (not yet reported). Another patient developed postoperative temporary compressive ophthalmoplegia secondary to cavernous sinus compression due to hemostat packing. In addition, we had a case of angiosarcomatous transformation of JNA postirradiation who ultimately succumbed to the disease. One case of JNA was misdiagnosed as hemangioma, and 6 others had recurrences due to failure of complete removal (6 endoscopic, 1 with open approach).

Conclusion: Endoscopic approach for JNA is the gold standard of treatment, but unusual complications such as blindness and malignant conversion need to be considered when dealing with extensive lesions. Lack of classical radiologic characteristics can lead to misdiagnosis and undertreatment. The pterygoid base, middle cranial fossa, vidian canal, and cavernous sinus are common sites for potential tumor recurrence. Disruption of blood supply to the optic nerve can lead to sudden blindness, even in the absence of direct injury, and the same should be included in the consent form.

Delayed Presentation of Internal Carotid Artery Injury Following Sinus Surgery

Miriam Smetak (Presenter); Madelyn Stevens, MD; Sarah Tittman; Laura Van de Laar; Paul Russell

Introduction: Internal carotid artery (ICA) injury is a serious complication of endoscopic sinus surgery (ESS). Identification and multidisciplinary management is crucial to prevent morbidity and mortality. Here we present a case of delayed presentation of right cavernous ICA pseudoaneurysm following ESS, treated with a muscle patch.

Method: A single case review was conducted at a tertiary academic center.

Results: A 24-year-old woman presented to the emergency department on postoperative day (POD) 3 with diplopia following ESS at an outside facility. Initial evaluation revealed diplopia with right lateral gaze, no epistaxis, and a normal

postoperative sinus computed tomography (CT) scan. On POD 23, she presented with large-volume but self-limited epistaxis requiring blood transfusion; this resolved overnight with no further bleeding. On POD 31, she presented again with high-volume epistaxis requiring transfusion. A CT angiogram was negative, and she was taken for operative exploration. Intraoperatively, an eschar in the right sphenoid opticocarotid recess was identified, concerning for a cauterization injury to the right ICA during initial ESS. A diagnostic angiography demonstrated a small right cavernous ICA parasellar pseudoaneurysm not amenable to stenting. As she was hemostatic, neurosurgery elected to observe due to the high risk of neurovascular injury with embolization. She remained hemostatic for 7 days but then experienced another episode of large-volume epistaxis on POD 37, at which time she was taken for emergent surgical intervention. The dehiscence portion of the ICA was repaired using a muscle patch harvested from her right lateral tongue. She experienced no further episodes of bleeding, and serial repeat CT angiography showed pseudoaneurysm resolution.

Conclusion: ICA injury following ESS can present weeks after surgery with large-volume sentinel bleeding events. A high index of suspicion should be maintained for occult injury in patients requiring blood transfusions, and prompt evaluation with CTA should be initiated. A muscle patch is a viable and effective option for repair in patients with a defect that can be visualized during endoscopic surgery.

Dental Implant as a Potential Risk Factor for Fungus Ball

Doo Hee Han, MD (Presenter); Sun-A Han; Yuju Seo; Dong-Young Kim; Chae-Seo Rhee

Introduction: The prevalence of maxillary sinus fungus ball (MFB) has recently increased, and MFB accounts for a considerable proportion of unilateral maxillary sinusitis. However, its contributing factors are unclear. This study analyzed the association between MFB and dental implant.

Method: A total of 101 patients who underwent unilateral maxillary sinus surgery were divided into 2 groups based on surgical biopsy results: unilateral bacterial sinusitis (UBS; n = 45) and maxillary sinus fungus ball (MFB; n = 56). Stratified random sampling was performed according to their age (UBS, n = 30 vs MFB, n = 30) to adjust the age variation. The number of dental implants on maxillary teeth was radiologically evaluated. The distribution of dental implants and their degree of penetration into the maxillary sinus were also analyzed.

Results: The number of patients with dental implants was greater in the MFB group ($P = .085$), and the number of implants was significantly higher in the MFB group ($P = .031$). Implants were more distributed in the molar region in the MFB group. There was a positive correlation between the incidence of MFB and the degree of the implant's penetration into the maxillary sinus.

Conclusion: Dental implants can be a potential risk factor for the development of MFB.

Direct Sinus Irrigation Compared to Linear Irrigation Solutions Following ESS

Stephen W. Chandler, MD (Presenter)

Introduction: The CompleteRinse System with the Sinus DirecTip (SDT) was compared with standard, linear nasal irrigation solutions following endoscopic sinus surgery in this educational case report.

Method: The present case report included a group of 40 patients who underwent traditional endoscopic sinus surgery or revision endoscopic sinus procedures involving the maxillary, frontal, and/or sphenoid sinus cavities. Patients were provided and instructed in the use of both standard nasal irrigation as well as the CompleteRinse System with the SDT. Both used distilled water to create buffered isotonic saline.

Results: On postoperative day 7, patients reported preference for the SDT in terms of both effectiveness and ease of use. The endoscopic examination also demonstrated the ability of the SDT to access and provide much more effective debridement of the maxillary sinus cavity compared with the traditional sinus lavage. On postoperative day 15, the initial endoscopic examination demonstrated less intranasal and maxillary sinus crust, debris, and retained packing in the group using the SDT. Also, given the choice between standard sinus irrigation and CompleteRinse with the SDT, a statistically significant percentage of patients selected the SDT as their preferred long-term sinus lavage.

Conclusion: The CompleteRinse System with the SDT was the preferred irrigation solution. Clinically, it was associated with less crusting, drying, and obstruction in the nose for the postoperative period following endoscopic sinus surgery. It was also preferred based on patient comfort, ease of use, and perceived effectiveness.

e-Cigarette Vapor Ingredients-Induced Cytokine/Mucins Expression in Nasal Epithelial Cells

Yong-Dae Kim, MD (Presenter)

Introduction: Glyoxal (GO) and methylglyoxal (MGO) are among the most toxic compounds emitted by electronic cigarette (e-cigarette) and regular tobacco cigarette smoke. Airway diseases presented mucus overproduction as their major pathophysiologic feature. However, the effects of GO and MGO on proinflammatory cytokines and mucin expression in human nasal epithelial cells, as well as the underlying signaling pathway, have not yet been studied. This study is to determine whether GO and MGO induce proinflammatory cytokines, and MUC5AC/5B expression via mitogen-activated protein kinase (MAPKs) and nuclear factor-kappa-light-chain-enhancer of activated B cells (NF- κ B) signaling pathways.

Method: The effect of GO and MGO on proinflammatory cytokines, mucins expression, and the signalling pathway of GO and MGO were investigated using water-soluble tetrazolium salt-1, enzyme immunoassays, and immunoblot analysis with specific inhibitors and small interfering RNA.

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Results: GO and MGO did not affect cell viability up to 2 mM in human nasal epithelial cells. GO and MGO increased production of pro-inflammatory, such as interleukin (IL)-1b, IL-6, and MUC5AC/5B. In addition, GO and MGO significantly activated extracellular signal-regulated kinase 1/2 (ERK1/2), p38 MAPK, and NF- κ B. Depending on whether ERK1/2, p38 MAPK, and NF- κ B signaling pathway were involved in GO- and MGO-induced production of proinflammatory cytokines (IL-1b and IL-6) and MUC5AC/5B, we used specific inhibitors and siRNA transfection. These significantly repressed GO- and MGO-induced expressions of proinflammatory cytokines (IL-1b and IL-6) and MUC5AC/5B.

Conclusion: GO and MGO induced proinflammatory cytokines and MUC5AC/5B expression via ERK1/2, p38 MAPK, and NF- κ B in human nasal epithelial cells. These results suggest that GO and MGO may be involved in mucus hypersecretion related airway diseases.

Endoscopic Management of Rhinolithiasis: A Systematic Review

Ariel Omiunu, (Presenter); Giovanna Mele; Lauren Hutnik; Jordon Grube, DO; Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: Rhinoliths are rare, mineralized masses formed by salt deposition around an exogenous or endogenous intranasal foreign body. They are initially asymptomatic; however, due to their gradual increase in size, patients may develop recurrent or persistent sinonasal infections. This study reviews the presentation, management, and outcomes of patients with rhinolithiasis.

Method: PubMed, Scopus, CINAHL, and the Cochrane Library were used to search the literature. Case reports and case series published from 2000 to 2021 were included. Data collected included treatment modality, complications, recurrences, and follow-up period.

Results: A total of 55 case reports and 5 case series were included (n = 119). Most were female (60.5%). The mean age was 29.4 years (range, 4–80 years). The most common symptoms were nasal obstruction (81.5%), rhinorrhea (81.5%), nasal malodor (38.7%), and headache (28.6%). Computed tomography imaging was obtained in 53 (44.5%) cases. Concurrent sinusitis (40.0%) and deviated nasal septum (29.4%) were commonly identified. Rhinoliths were most frequently found in the right nostril (52.9%) and in between the inferior turbinate and nasal septum (26.9%). All rhinoliths were fully excised using endoscopic sinus surgery that was sometimes accompanied by a septoplasty (9.2%). The nidus was identified in 19.3% of cases. There were no recurrences or complications over an average follow-up of 8.5 months (range, 0.25–36 months).

Conclusion: Rhinolithiasis is an uncommon entity of the nasal cavity and should be suspected in patients with longstanding unilateral nasal obstruction, rhinorrhea, and nasal malodor. Rigid nasal endoscopy and endoscopic sinus surgery are the most important methods for diagnosis and treatment, respectively.

Expanded Endoscopic Endonasal Approach for SMARCB1 Deficient Sinonasal Carcinoma

Michael Li, MD (Presenter); Abdulaziz Alrasheed; Kyle VanKoevinger, MD; Ricardo Carrau

Introduction: SMARCB1 deficient sinonasal carcinoma (SDSC) is a rare and recently discovered subtype of sinonasal carcinoma. There have not been prior reports on the efficacy of endoscopic approaches, especially for cases with intra-orbital or intracranial extent. Here we describe the use of the expanded endoscopic endonasal approach (EEA) for SDSC.

Method: Institutional review board approval was obtained. Patients treated for SDSC from 2014 to 2019 were identified, and their medical records were reviewed for the relevant diagnostic, treatment, and outcome variables.

Results: Three patients, all male, were identified during the study period with all undergoing surgical treatment. One patient was treated with palliative intent and excluded. The other 2 patients, aged 87 and 53 years, underwent EEA for resection of locally advanced tumors in conjunction with the neurosurgery service. Both patients presented with intracranial and intraorbital invasion and received neoadjuvant chemotherapy. One patient required an orbital exenteration with free flap reconstruction. Negative margins were achieved on both patients, and both underwent adjuvant chemoradiation with 1 receiving proton therapy. One patient developed abdominal and lumbar metastases at the 24-month follow-up. At the most recent follow-up (25 and 9 months), both patients remained free of local recurrence.

Conclusion: SDSC is a rare and aggressive subtype of sinonasal carcinoma with high rates of distant metastases. However, advanced local disease should be addressed, and EEAs can be successful for management of intracranial and intraorbital extent. Further research is needed to determine optimal treatment algorithms, especially given the high rates of distant metastases.

Frontal Sinus Discrepancies Using the International Frontal Sinus Anatomy Classification

Lauren A. Howser (Presenter); Alexander J. Jones, MD; Jonathan Y. Ting, MD, MS, MBA; Elisa A. Illing, MD

Introduction: In 2016 the International Frontal Sinus Anatomy Classification (IFAC) system standardized frontal sinus cells and drainage nomenclature to be surgically relevant and remove confusion from the Kuhn classification. However, differences in the frontal cells and drainage pathways using this system have not been delineated between patient sex, race, and presence of chronic frontal rhinosinusitis (CRS), which could have implications in frontal sinus surgery.

Method: A single-center, retrospective review from 2015 to 2020 was performed of patients with computed tomography (CT) sinus imaging. Patients classified into the CRS group underwent frontal sinus surgery for treatment of CRS, and controls were trauma patients with CT face/sinus without

sinus disease. Prevalence of frontal sinus cells and drainage pathways using the IFAC system were recorded. Comparisons were made between patient race, sex, and CRS groups using 2-sided Fisher exact test or Pearson χ^2 when comparing 2 or 3 groups, respectively. Odds ratio (OR) and 95% confidence intervals (CIs) were calculated.

Results: A total of 206 scans (103 patients) were included, 59 (57.3%) of which had CRS. The cohort consisted of 92 (55.3%) men with a mean age of 43.3 ± 17.2 years and a racial distribution of 80 White (38.8%), 84 Black (40.8), and 42 Asian (20.4%) patients. There were no statistically significant differences ($P > .10$) in any frontal cell distributions and drainage pathways between patient races. There were similarly no significant differences ($P > .10$) in frontal cells or drainage pathways between sexes. Patients with CRS, however, were more likely to have a supraorbital ethmoid cell and drainage pathway medial to it ($P = .027$; OR = 2.80; 95% CI, 1.14–6.87). They also had frontal sinus drainage lateral to the supra bulla cell more often ($P = .035$, OR = 1.85; 95% CI, 1.05–3.23).

Conclusion: No significant differences in frontal sinus cells and drainage pathways exist between patient sex and race. However, differences in frontal sinus and anatomy and drainage in CRS patients should be noted prior to frontal sinus surgery to improve surgical awareness and outcomes.

Granulomatosis With Polyangiitis Masking Nasal Cavity Squamous Cell Carcinoma

Peter Nguy, MD (Presenter); Jonathan Giurintano, MD; Timothy Deklotz, MD

Introduction: Our objective is to describe a rare case of nasal cavity squamous cell carcinoma, which was masked in a patient with granulomatosis with polyangiitis (GPA).

Method: A case presentation and review of the literature were conducted.

Results: The patient is a 55-year-old woman diagnosed with systemic vasculitis at age 14 years. After development of pulmonary and renal manifestations, including renal failure requiring multiple renal transplants, biopsy confirmed GPA. Surgical history was notable for resection of a left septal inverted papilloma 15 years ago. Recurrent episodes of sinusitis were attributed to GPA flares by multiple otolaryngologists prior to presentation to our service with severe right-sided forehead and orbital pain. Exam was notable for saddle nose deformity and anterior septal perforation. Nasal endoscopy revealed a large friable, granular mass originating from the posterior nasal septum with extension to skull base superiorly and right nasopharynx and sphenoid floor posteriorly; there was additional anterior involvement of the septal perforation with superficial spread along the lateral nasal wall and ventral surface of the nasal bones. Pathology was consistent with squamous cell carcinoma, arising in a background of inverted papilloma. Imaging demonstrated a soft-tissue density within the right olfactory cleft with continued progression seen on serial imaging dating to 3 years prior to presentation. Tumor board recommendations advocated for induction chemotherapy, followed by definitive radiation and possible surgical salvage. Functional imaging confirmed that the patient remains disease free 6 months after radiation.

Conclusion: GPA is a systemic vasculitis characterized by renal, pulmonary, and sinonasal inflammation, with sinusitis being a common complaint. Treatment is primarily with immunosuppression. Otolaryngologists must maintain a high index of suspicion for malignancy in a patient with GPA and prior history of inverted papilloma.

Immediate Effect of Nasal Irrigations on Nasal Saccharin Test

Eduardo López Orozco (Presenter);
Noraima L. Rodríguez Guevara; Eduardo López Demerutis

Introduction: Nasal irrigation is an intervention that has been described as early as 1902. Although indications for its use are not precise, nasal irrigations are prescribed by up to 87% of family physicians for conditions such as rhinosinusitis, allergic rhinitis, and viral upper respiratory infections. A systematic review evaluating nasal irrigation's efficacy for acute upper respiratory infections found limited evidence of its use. A similar systematic review focused on allergic rhinitis reported there may be an improvement in patient-reported disease severity. However, despite its long history and widespread use, there is little information regarding its mechanism of action.

Method: Fourteen healthy volunteers aged 22 to 32 years were enrolled. None of them were smokers. Basal nasal transit time was measured performing the saccharin test. Posteriorly, the subjects performed nasal saline irrigation, and the saccharin test was repeated. Saline irrigation was performed using Sinus Rinse (NeilMed Pharmaceuticals, Inc), a commercially available high-volume, low-pressure system, under supervision by a physician. Isotonic saline solution was used to perform the irrigation. A paired t test was used to calculate if the difference between basal and postirrigation mucociliary transit time was significant.

Results: The average result for the saccharin test before performing the nasal irrigation was 7 minutes 43 seconds. The average result for the saccharin test immediately after performing the nasal irrigation was 5 minutes 52 seconds. The correlation coefficient was 0.737. The P value was .0036 (with a confidence interval of 95%), meaning the difference in the test results was significant.

Conclusion: It can be concluded that there is a decrease in the nasal saccharin test time immediately after performing a nasal irrigation. Thus, it could be interpreted that nasal irrigation with isotonic saline speeds up nasal transit time and improves mucociliary clearance. This could be a factor explaining nasal irrigation's popularity and positive effects in nasal symptomatology.

Incidence of COVID-19 Olfactory Dysfunction in Tehran, Iran

Mohsen Naraghi, MD (Presenter);
Mohammad Hossein Harirchian, MD;
Hakima Abdullah, MD

Introduction: We aim to acknowledge the importance of the rhinologic symptoms in patient suspected to COVID-19; to be familiar with the incidence of anosmia during the recent pandemic; and to select the proper approach in patients with

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otolaryngologic symptoms of COVID-19. Iran was one of the first countries to be involved in the COVID-19 pandemic. It is currently enduring its fourth pandemic wave, and olfactory dysfunction is a very common presentation in COVID-19 patients. Any patient with anosmia during the COVID-19 pandemic should be ruled out for this disease.

Methods: This cross-sectional study was conducted at Iran's largest tertiary referral center from January to April 2021. All underwent SARS CoV-2 RNA quantitative reverse transcription–polymerase chain reaction viral detection via nasopharyngeal swab. Patients who tested positive were enrolled in the study. Individuals with preexisting olfactory dysfunction, or those requiring intensive care, were excluded. Thus, participants included outpatients with COVID-19 ($n = 900$) and inpatients with COVID-19 pneumonia who were not in intensive care ($n = 144$). Collected data from medical records were statistically analyzed using SPSS 26.0.

Results: All participants completed the initial anosmia questionnaire. The mean age was 55.2 ± 10.5 years. Of the participants, 65% were male and 35% were female. Among COVID-19–positive patients, 65 of 144 (45.1%) inpatients and 360 of 900 (40%) outpatients with COVID-19 reported olfactory dysfunction, at an overall rate of 40.7%. The COVID-19–positive outpatients and inpatients reported 11% and 19% consequent medical comorbidities, respectively. Other otolaryngologic findings were also reported, including ageusia (29.7%), vertigo (12.8%), headache (34.1%), and dizziness (26.1%).

Conclusion: Anosmia represents a ubiquitous clinical finding in COVID-19 patients. Current evidence suggests that SARS-CoV-2-related anosmia may be a new viral syndrome specific to COVID-19; otolaryngologists must be aware of this important finding in medical examinations.

Income Disparities in Patients Undergoing Inpatient Endoscopic Sinus Surgery

Danielle Lee (Presenter); Kelly McManus; Sudeepti Vedula; Christina H. Fang, MD; Jean Anderson Eloy, MD

Introduction: Socioeconomic factors can play an important role in the outcomes of patients undergoing surgery. This study investigates the impact of income disparities on patients undergoing inpatient endoscopic sinus surgery (ESS).

Method: The National Inpatient Sample database was queried for patients who underwent inpatient ESS between 2012 and 2017. Patients were stratified into low- and high-income groups based on their reported annual incomes. The low-income group consisted of patients with incomes less than the median of \$51,000, while patients in the high-income group had incomes greater than \$51,000. Univariate and multivariate analyses were performed to compare demographics and outcomes between the 2 groups.

Results: A total of 14,155 cases of inpatient ESS were identified. Of these, 7405 (52.3%) earned less than the annual median income. Distribution of income status among patient race and insurance payer types was significantly different ($P < .001$). A majority of Black (70.0%) and Hispanic patients (55.8%) were in the low-income status group compared with

48.5% of White patients. Among patients with private insurance, 42.3% had low-income status. In contrast, 55.8% of patients with Medicare, 65.7% of patients with Medicaid, and 62.3% of self-payers were in the low-income status group. Low-income status patients had longer lengths of stay (LOS; 7.72 vs 7.20 days, $P = .021$) but did not incur higher total charges (\$130,511.06 vs \$130,126.71, $P = .187$).

Conclusion: Patients who underwent inpatient ESS with low-income status had longer LOS but not greater hospital charges when compared with patients of high-income status. These findings underscore the important effect income disparities can have on ESS outcomes.

Intraoperative Cerebrospinal Fluid Leak With Acute Angle of Suprasellar Notch

Ethan Miles (Presenter); Hector Perez; Wilson Lao; Kristin Seiberling; Kenneth De Los Reyes

Introduction: The purpose of this study was to determine the risk of intraoperative cerebrospinal fluid (CSF) leak during transsphenoidal pituitary surgery in relation to the angle of the suprasellar notch.

Method: A retrospective chart review on patients undergoing transsphenoidal pituitary surgery from 2015 to 2020 was undertaken. Presurgical computed tomography scans of patients undergoing transsphenoidal pituitary surgery were analyzed to measure the angle of the suprasellar notch and put them into 3 classes: type I (angle $<118^\circ$), type II (angle 118° – 138°), and type III (angle $>138^\circ$). Demographics, risk factors for cerebrospinal fluid leak, presence of intraoperative or postoperative CSF leak, tumor pathology, and operative time were collected from the medical record.

Results: A total of 143 patients were included in the study. Of those, 49 were type I, 74 were type II, and 20 were type III, with rates of intraoperative CSF leak of 65%, 35%, and 30%, respectively ($P = .002$). The rates of postoperative CSF leak were 12%, 7%, and 5%, respectively ($P = .58$). Obstructive sleep apnea and the presence of a pituitary tumor rather than a cyst were associated with increased rates of CSF leaks of 63% ($P = .03$) and 51% ($P = .03$). There was no association between age, body mass index, race, history of sinus surgery, or size of the pituitary mass with increased rates of CSF leaks intraoperatively or postoperatively.

Conclusion: An acute anatomical angle of the suprasellar notch is correlated to an increased rate of intraoperative CSF leak in patients undergoing transsphenoidal pituitary surgery.

Intraoperative Mobile CT Scan: Preliminary Experience in Endoscopic Endonasal and Skull Base Surgery

Chester F. Griffiths, MD (Presenter); Daniel Kelly, MD; Garni Barkhoudarian, MD; Michael Avery, MD; John Rhee, MD

Introduction: We demonstrate the use of mobile intraoperative computed tomography (CT) scan technology; compare traditional and mobile CT scan image quality; explain the

indications, utility, and applicability of intraoperative CT scan; and complete initial validation of the mobile intraoperative CT scan technology.

Methods: Thirty patients undergoing endonasal sinus and skull base endoscopic procedures were enrolled starting in April 2021 at Providence Saint Johns Health Center in Santa Monica, California. Intraoperative mobile cone-beam CT scan and conventional postoperative multidetector CT were performed and analyzed by the surgeon (intraoperative), the radiologist (postoperative), and a second independent radiologist who compared both studies side by side judging the quality of the imaging and comparing 6 parameters (position of bone grafting or fat grafting, position of stents, catheters, and or wires, presence of intracranial air, presence and measurement of midline shift, presence of intraparenchymal or intracranial blood, presence or absence of hydrocephalus).

Results: Preliminary findings documented that the image quality of the intraoperative CT scan is adequate for clinical intraoperative use and comparable to conventional multidetector CT scan. Examples will be presented. Time of intraoperative scan ranged from 5 minutes to 11 minutes. Time of transportation and conventional CT scan ranged from 35 minutes to 55 minutes with added personnel. No adverse events were reported during the study.

Conclusion: Preliminary findings utilizing mobile intraoperative CT scan confirms the ease of use and comparable image quality of this new technology. Potential benefits include the impact of obtaining intraoperative CT scan with immediate alteration of the surgical decision making and obviating the inherent risk of transportation, time and personnel when obtaining a conventional CT scan.

Invasive Fungal Rhinosinusitis Associated With SARS-CoV-2 Infection

Felix Maldonado-Chapa, MD (Presenter);
Josefina Alejandra Morales-del Angel, MD, MSc;
Paola E. Gomez-Castillo, MD; Karla
Marisol Santos-Santillana, MD;
Jose Luis Treviño-Gonzalez, MD, PhD

Introduction: We describe the atypical clinical course of 3 cases of invasive fungal rhinosinusitis (IFRS) in the setting of COVID-19.

Method: In case 1, a 59-year-old man with no remarkable medical history presented with right ocular impairment after 4 weeks since the resolution of COVID-19. Biopsies of nasal mucosa reported the presence of angioinvasive zygomycetes. Endoscopic sinus surgery (ESS) debridement with eyeball preservation was undertaken, obtaining clinical satisfactory results. In case 2, a 64-year-old female patient with no remarkable medical history presented with a 2-month history of left visual impairment. A positive polymerase chain reaction test for SARS-CoV-2 was obtained. Imaging studies reported findings consistent with fungus ball of the left frontal sinus. ESS and surgical debridement was performed. Pathologic evaluation revealed consistent findings with invasive granulomatous aspergillosis. In case 3, a 61-year-old man with a history of type 2 diabetes presented with a 1-month history of

headache, left ocular pain, proptosis, and vision loss. Upon arrival to the emergency department, the patient was intubated and diagnosed with severe ketoacidosis. During endotracheal intubation, necrotic oropharyngeal and palatine plaques were noticed. A positive result for COVID-19 was obtained during the initial diagnostic approach. Biopsy of the left middle and inferior turbinates and palate was performed, and the presence of angioinvasive zygomycetes was reported. The patient presented a rapidly progressive deterioration leading to a fatal outcome.

Results: IFRS can be occasionally seen in immunocompetent patients. SARS-CoV-2 infection can impair the cellular immune response by altering the function of lymphocytes and natural killer cells, leading to higher proinflammatory and anti-inflammatory cytokine levels. This immune function dysregulation might explain a higher predisposition for fungal coinfection in the setting of COVID-19.

Conclusion: Due to the constantly increasing number of cases of COVID-19, otolaryngologists should expect a rise in the cases of IFRS with an atypical clinical presentation.

Inverted Papilloma: The Value of Imaging Features

Nuno O'Neill Mendes (Presenter); João Rito;
Diogo Raposo; Gustavo Pedrosa; Ana Guimarães;
Filipe Freire

Introduction: Diagnosis of sinonasal inverted papilloma (SIP) is histological; however, paranasal sinus computed tomography (CT) scan and magnetic resonance imaging (MRI) may show some typical features of this benign tumour. This investigation aims to ascertain if there is any association between the pattern of radiologic findings and the potential for recurrence or malignant transformation of SIP.

Method: This retrospective study was conducted from May to June 2020 in our hospital. Cases with histological diagnosis of SIP between 2012 and 2019 were reviewed. We excluded patients without preoperative MRI or CT scan on medical reports. Preoperative CT and MRI were reviewed, and cases of recurrence or malignant transformation were identified. Chi-square test was used for statistical analysis.

Results: A total of 31 patients were included in this study; 63.3% were men, and the mean age was 62.4 years with a standard deviation of 13.6 years. The mean follow-up was 4.3 years with a standard deviation of 1.1 years. All patients were surgically treated by endoscopic approach. On preoperative CT, focal hyperostosis was the most common sign (83.9%), and it located the tumor implantation site in all cases. A convoluted cerebriform pattern on MRI showed a sensitivity of 80.6% on identifying SIP. We found a significant association between focal bone resorption on CT and malignant transformation at 2 years ($P = .024$; confidence level of 95%). No imaging feature was associated with potential for SIP recurrence.

Conclusion: While MRI shows satisfactory accuracy on identifying inverted papilloma, hyperostosis on CT predicts its site of implantation. Bone resorption on CT is the only feature that may have prognostic value in terms of malignant transformation.

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Margin Status & Survival Following Resection of Sinonasal Neuroendocrine Carcinoma

Vraj P. Shah (Presenter); Samer T. Elsamna; Christina H. Fang, MD; Jordon Grube, DO; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Sinonasal neuroendocrine carcinoma (SNEC) is a rare malignancy of the sinonasal tract most commonly treated with surgery and/or chemoradiation. This study investigates the impact of surgical intervention and margin status on survival following resection of SNEC.

Method: The National Cancer Database was used to identify cases of SNEC from 2004 to 2015. Patient demographics, tumor staging, treatment modality, margin status, and survival data were obtained. Kaplan-Meier analysis and log-rank test were used to compare survival rates by margin status: positive (PSM), negative (NSM), and no operation (OSM).

Results: Of the 282 patients included, most were younger than 60 years old (53.2%), male (59.6%), and White (85.7%). Most cases were located in the paranasal sinuses (60.6%) and treated at academic centers (75.3%). Nearly half of cases were T stage 4 (47.8%). No surgical resection (OSM) occurred in 49.6% of cases. A total of 29.1% of cases had NSM and 21.3% had PSM following surgical resection. Patients with OSM, PSM, and NSM had 3-year survival rates of 49.1%, 59.0%, and 68.2%, respectively. The 5-year survival rates of patients with OSM, PSM, and NSM were 42.3%, 56.9%, and 54.5%, respectively. Survival was statistically different between patients undergoing surgical resection regardless of margin status and OSM (log-rank = 0.012). Survival was significantly different between PSM and OSM (log-rank $P < .05$, 0.034) but not between PSM and NSM (log-rank $P = .751$). No factors assessed were found to be associated with PSM.

Conclusion: The lack of significant difference in survival between cases of PSM and NSM and also between cases of no surgery and surgery regardless of margin status suggests that treatment of SNEC with surgery may provide survival benefit.

The NASAL Questionnaire: Differentiating Etiologies of Nasal Congestion

Elycia Kazemian (Presenter); Natalia Chreptowicz; Chirag Patel

Introduction: The aim of this study is to identify an accurate, symptoms-based questionnaire that will aid in differentiating diagnoses of nasal symptoms commonly presenting to otolaryngology clinics.

Method: A survey of 17 questions was given to new adult patients with nasal complaints between December 2019 and January 2021. Final diagnosis, per the attending physician, and answers to all questions were recorded. Survey data have been accumulated according to power analyses with additional statistical analysis in progress.

Results: We found that a concise questionnaire can guide the diagnosis of nasal symptoms in patients presenting to the otolaryngologist. Responses to our selected questions show a

consistent correlation the attending physician's diagnosis and can help accurately predict the patient's diagnosis.

Conclusion: Obstructive and congestive symptoms may be differentiated using our NASAL questionnaire. Use of this questionnaire prior to scheduling a new patient may help avoid unnecessary specialist consultation and guide correct patient placement at a tertiary care center.

Navigation-Assisted Transsphenoidal Surgery: Analysis of Patient Factors and Complications

Ariel Omiunu (Presenter); Gregory L. Barinsky, PharmD; Dongmin Kim; Christina H. Fang, MD; Jordon Grube, DO; Jean Anderson Eloy, MD

Introduction: Imaging-assisted navigation in endoscopic transsphenoidal surgery (TSS) can help in the identification of critical neurovascular structures, especially in cases with complex or distorted anatomy. The aim of this study is to examine the preoperative variables associated with navigation usage and to compare postoperative complications between navigated and nonnavigated TSS cases.

Method: All patients who underwent endoscopic TSS between 2011 and 2018 were identified in the National Surgical Quality Improvement Program database. Current Procedural Terminology codes were used to stratify patients into navigation and nonnavigation cohorts. Univariate and multivariate analyses were performed to identify differences in patient demographics, comorbidities, and postoperative complications between the groups.

Results: A total of 212 cases of endoscopic TSS were identified, of which 153 cases (72.9%) used navigation. Black patients were more likely to undergo navigated TSS than nonnavigated (32.4% vs 11.8%, $P = .016$). There was no statistically significant difference in overall complications between navigated (9.2%) and nonnavigated (7.0%) cohorts ($P = .623$). There was also no difference in mean operative time (200.5 ± 86.1 minutes vs 193.9 ± 98.8 minutes, $P = .638$), mean length of stay (5.1 ± 8.7 days vs 5.5 ± 4.6 days, $P = .776$), rates of readmission (5.9% vs 10.6%, $P = .293$), or reoperation (3.9% vs 10.5%, $P = .069$).

Conclusion: Race was the only demographic factor found to be associated with the use of navigation for endoscopic TSS. There were no differences in the incidence of overall complications or rates of readmission, reoperation, mean operative time, or mean length of stay between navigated and nonnavigated endoscopic TSS.

A Nonrandomized Control Trial: Manuka Honey and Atrophic Rhinitis

Saurav E. Sarkar, MBBS, MS, MRCS-ENT (Presenter); Ramadass Balamurugan; Suprava Naik; Suvendu Purkait; Rituparna Maity

Introduction: Atrophic rhinitis is a chronic nasal disease of unknown etiology characterized by nasal mucosal atrophy, abnormal widening of the nasal cavities, formation of viscid secretions, and dried crusts with fetor. This study aims at

searching a noninvasive, readily available, and acceptable treatment for this disease.

Method: This was a 2-year (2018 and 2019) nonrandomized control pilot trial of primary atrophic rhinitis involving 19 subjects suffering from primary atrophic rhinitis. The study was conducted in a tertiary care center in India. Nasal endoscopy was done; a nasal mucosal biopsy was taken from both sides before intervention. Mucosa of the right side was sprayed with honey, and the left (control) side was sprayed with normal saline. Spraying was repeated every week for 8 weeks. At the end of 8 weeks, another biopsy was taken from the nasal mucosa of both sides. Subjective improvement, improvement in endoscopic scores, and improvement in histopathology was studied.

Results: In total, 19 patients (9 male and 10 female) took part, ages 33.84 ± 10.71 years, hemoglobin $11.87\% \pm 1.7\%$, and erythrocyte sedimentation rate 18.63 ± 16.16 . Leucocyte count was 9439 ± 1679.78 . Fisher exact test was performed to compare the improvement in symptoms and endoscopy findings. Subjects presented with nasal obstruction, foul smell, impaired smell sensation, nasal crust, nasal discharge, maggots, epiphora, epistaxis, and headache, with nasal obstruction the commonest presentation. Following intervention, the improvement in nasal obstruction, crusting, and nasal discharge was statistically significant, with a P value less than .05. Endoscopy score was assigned on crusting, nasal roominess, discharge, nasal mucosal congestion, and atrophic turbinate. The improvement in crusting, nasal mucosal congestion, and nasal discharge on endoscopic scores was statistically significant. The postintervention histopathology features that had statistically significant improvement were a decrease in granulation tissue and a decrease in bacterial colonies. There was a significant increase in the number of mucus glands of the test side found on Mann-Whitney U test.

Conclusion: Manuka honey can serve as a noninvasive treatment for atrophic rhinitis.

Novel Device Improves Compliance and SNOT-20 Scores in Allergic Rhinitis

Kashif Mazhar, MD (Presenter); Magda Pugh, MD

Introduction: Nasal saline irrigations are recommended in the management of allergic rhinitis (AR); however, compliance is low. The objectives of the study were to evaluate and compare the impact on compliance and Sino-Nasal Outcome Test (SNOT-20) scores in patients with AR using the novel device in comparison with a standard high-volume, low-pressure sinus rinse device.

Method: A single-center, randomized, single-blinded prospective cohort study was conducted, in which 52 adult patients diagnosed with AR were randomized into 2 groups to receive nasal saline irrigation either with Neosinus Health Inc Nasal Rinse or NeilMed Sinus Rinse. Patients were blinded to the objectives of the study. Both groups also received identical oral antihistamine and intranasal corticosteroid spray. Patients were assessed at baseline and 4 weeks subjectively using the self-administered SNOT-20 questionnaire. A paired t test was used to compare pre- and posttreatment scores. SAS 9.4 was used for statistical analyses.

Results: The average SNOT-20 scores in both groups were similar at baseline ($P = .25$) and improved in both groups at 4 weeks compared with the baseline ($P < .01$). A statistically significant greater improvement was seen in the novel device group vs NeilMed group ($P < .01$). The novel device group also showed higher compliance rates compared with NeilMed group (88% vs 61%, $P < .05$). The most common reason for lower compliance in the NeilMed group was drowning sensation and ear discomfort during rinsing, which was absent in the novel device group.

Conclusion: The Neosinus Health Nasal Rinse demonstrates a significantly improved compliance rate and an average SNOT-20 score improvement compared with NeilMed Sinus Rinse.

Novel Use of a Sealing Device for Excising Intra-nasal Lesions

Vyas M. Prasad, FRCS (Presenter); Stephen Lee, FRCS; Rebecca L. Heywood, FRCS

Introduction: Various devices have been used to cut and remove tissue in endonasal surgery. Our aim is to present our experience in using a powered energy ligating and sealing device that is used regularly in laparoscopic surgery for the removal of 2 intranasal lesions.

Method: We present 2 cases of an intranasal solitary mass. The first case was of a 35-year-old woman with left-sided nasal swelling that was visible and palpable over several months. It had bled occasionally. Given its vasculature nature and imaging profile, it was embolized prior to surgical excision. The second case was a 58-year-old man with pulsatile right sided tinnitus and a large nasal polyp which, on computed tomography imaging, took origin from the middle meatus and ethmoid bulla. There was suspicion of an inverted papilloma.

Results: We used a LigaSure Maryland 23 cm sealer/divider (Covidien) to remove both these lesion in an en bloc manner. The device, although not designed for the nose, proved to be very useful and, given its shape, fitted neatly into the nose without causing any obstruction to the rigid nasendoscope. Complete excision was achieved with no bleeding whatsoever, and both patients were not packed postoperatively. Histology revealed a hemangioma for the first case and a non-inverted fully excised papilloma for the second.

Conclusion: The LigaSure device, despite being slightly longer than conventional functional endoscopic sinus surgery instruments, can indeed be used for intranasal surgery in certain settings. It is not too bulky and can be rotated to handle tissue at different angles, achieving safe division and sealing.

Odontogenic Sinusitis: Indicative Endoscopic and Radiologic Findings

Tyler Halle (Presenter); Devon Barrett; Sarah Clark; Jonathan Mallen; Emily Barrow; John DelGaudio Senior Author

Introduction: Odontogenic sinusitis is a subtype of chronic rhinosinusitis caused by dental pathology which is frequently unrecognized. We review our institutional experience with odontogenic sinusitis, including endoscopic and radiographic features, treatment algorithm, and outcomes.

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Method: A single-center retrospective review was conducted of patients 18 years or older with odontogenic sinusitis who underwent endoscopic sinus surgery (ESS) at our institution between June 1, 2010, and December 31, 2020. Demographic data, prior medical and surgical treatments, symptomatology, and surgical details were recorded. Computed tomography scans were reviewed independently by 2 otolaryngologists and assessed for pattern of sinonasal disease, relationship of dental disease, and Lund-Mackay score. Descriptive statistics and paired and unpaired *t* tests were used for analysis.

Results: In total 40 patients were included. Nasal congestion was the most commonly reported symptom ($n = 38$, 95%) on presentation. Sinus involvement was unilateral in 33 (83%) patients. The mean total Lund-Mackay score was 7.7 ± 4.3 . Among patients with unilateral odontogenic sinusitis, the mean Lund-Mackay score on the side of dental disease was 6.4 ± 2.6 vs 0.6 ± 0.9 on the contralateral side ($P < .001$). Based on imaging, the most commonly involved sites ipsilateral to the dental pathology were the maxillary sinus (100%), ostiomeatal complex (91%), and anterior ethmoid sinus (87%). Medial bulging of the medial maxillary sinus wall was identified ipsilateral to dental disease in 29 (73%) patients. The most common endoscopic findings were severe middle meatal edema ($n = 38$, 95%) and purulence ($n = 31$, 78%). There was statistically significant improvement in symptoms as measured by Sino-Nasal Outcomes Test (SNOT-22) when comparing pre- and post-ESS scores ($n = 28$; mean of 37.0 vs 18.9; $P < .001$).

Conclusion: Odontogenic sinusitis has a predictable pattern of sinus involvement. Bulging of the medial maxillary sinus wall and middle meatal purulence are highly suggestive of odontogenic sinusitis in unilateral cases. ESS, regardless of dental treatment, resulted in significant symptomatic improvement in patients with odontogenic sinusitis.

Olfaction Preservation Following Unilateral Craniofacial Resection of Esthesioneuroblastoma

Tae-Bin Won, MD (Presenter); Sung-Woo Cho; Chae-Seo Rhee; Sun Ha Paek

Introduction: Smell preservation after endoscopic resection of esthesioneuroblastoma has been reported. However, the factors associated with functional preservation are difficult to elucidate due to the small number of cases and discrepancies in surgical techniques and adjuvant therapy.

Method: A retrospective review was performed on consecutive patients who underwent unilateral endoscopic craniofacial resection for esthesioneuroblastoma by a single surgeon from 2010 to 2020. Olfactory function was assessed at least 6 months after treatment. A visual analog scale (VAS) scale of 0 to 10 was used to compare subjective function together with the Korean version of Sniffin' Sticks test (KVSS). Smell was determined to be preserved if the VAS was greater than 7 and the KVSS score was within 30% of the preoperative scores.

Results: A total of 10 patients (6 males and 4 females) were identified with a mean age of 38 years (range, 23–56 years). All presented with an early stage C disease, except 1 who had a cervical metastasis. All underwent unilateral complete transdural resection including bone, dura, and unilateral olfactory bulb and tract. Negative margins were achieved in all patients and 4 patients underwent adjuvant radiotherapy. Mean follow-up time was 50.8 months. There was 1 local and 1 regional recurrence that were consequently treated with no evidence of disease at the time of last follow-up. Six patients (60%) were found to have residual olfaction. Olfaction preservation was higher in the nonirradiated group (83.3%) compared with the irradiated group (25%; $P = .0651$).

Conclusion: In selected patients, smell preservation is possible following unilateral endoscopic resection of esthesioneuroblastoma. Postoperative radiation may decrease the chances of olfactory preservation.

Open vs Endoscopic Resection of Sinonasal Adenoid Cystic Carcinoma

Samer T. Elsamna (Presenter); Anas Qatanani; Ghayoor Mir, DO; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Sinonasal adenoid cystic carcinoma (SNACC) is a rare malignancy that is commonly treated with surgical resection followed by adjuvant therapy. The objective of this study is to examine the impact of open vs endoscopic surgical resection of SNACC on survival.

Method: The National Cancer Database was queried for cases of SNACC resection from 2010 to 2015. Patients were split into 2 cohorts based on open vs endoscopic surgical approach. Variables including patient demographics, tumor staging, treatment modality, and survival rates were compared in relation to surgical approach. Results were analyzed for significance using Fisher exact test, Kaplan-Meier analysis, and log-rank test.

Results: In total, 272 patients who fit inclusion criteria were included. A total of 193 (71.0%) patients underwent open surgery, while 79 (29.0%) underwent endoscopic surgery. The 2 groups did not differ significantly in age, sex, race, hospital setting, or tumor staging. Patients who underwent an endoscopic approach were 3.29 times more likely to have nasal cavity involvement ($P < .001$) and 1.75 times more likely to have negative surgical margins ($P = .049$). Overall, 5-year survival rates of patients who underwent an open vs endoscopic approach were similar (73.5% vs 72.5%, respectively). There was no significant difference in survival between the 2 approaches (log-rank $P = .666$) nor when propensity score matched by T stage (log-rank $P = .254$).

Conclusion: Resection of SNACC using an endoscopic approach was associated with negative surgical margins. After matching cases, the type of surgical approach did not appear to significantly affect survival. Patients may benefit from the endoscopic approach for appropriate cases, but preoperative planning should be individual centered.

Outcomes of Endoscopic Management of Paranasal Sinus Malignancies: Institutional Experience

Yash Mittal, MBBS (Presenter); Pradeep Pradhan; Anurita Swarup; Kalyan Chidambaram; Chappity Preetam, MS, DNB

Introduction: Management of sinonasal malignancies is challenging due to the close proximity of vital structures. Traditionally, open approaches have been considered the treatment of choice, but with better delineation of tumour extent, lower complication rates, shorter hospital stay, and same survival rates as compared with open approaches, endoscopic management is emerging as an effective alternative.

Method: A retrospective review was done of 18 cases of paranasal sinus malignancy that underwent a purely endoscopic excision in a tertiary care setting from 2014 to 2019. The clinical, surgical, and posttreatment follow-up data were reviewed.

Results: The age range was from 16 to 62 years. The average hospital stay was 5.3 days. The blood loss ranged from 200 mL to 1200 mL. Use of image guidance, piecemeal removal, frozen section, drilling, and preservation of the nasolacrimal duct were vital steps to improve outcomes. A margin positivity on histopathology was seen in 3 cases (17.6%); however, the margin-negative rates were seen to be similar to traditional approaches. The results are comparable with the external approach, but the chance of cerebrospinal fluid leak is higher. This mandates good reconstruction.

Conclusion: An endoscopic approach helps to reduce blood loss, hospital stay, and complications in comparison to external approaches. Skin, subcutaneous tissue, maxillary sinus anterolateral wall bony erosion, frontal sinus anterior table erosion, and sphenoid sinus lateral wall invasion are contraindications for a pure endoscopic approach, as per our experience. A small subset of malignant pathologies can be planned for endoscopic management with adequate preoperative planning and stringent postoperative follow-up.

Predictive Value of Olfactory Symptoms in the Diagnosis of COVID-19

SeHwan Hwang, MD, PhD (Presenter)

Introduction: This study evaluates the diagnostic value of the various symptoms of COVID-19 in the screening of this disease.

Method: Two authors (working independently) comprehensively reviewed 6 databases (PubMed, Cochrane Database, Embase, Web of Science, Scopus, and Google Scholar) from their dates of inception until November 2020. Patient-reported symptoms, including otolaryngologic and general symptoms, were evaluated for their predictive values in adults who underwent testing for COVID-19. True-positive, true-negative, false-positive, and false-negative data were extracted from each study. The methodological quality of included studies was evaluated using the Quality Assessment of Diagnostic Accuracy Studies 2 tool.

Results: A total of 28 prospective and retrospective studies were included in the meta-analysis. The diagnostic odds ratio (DOR) of a change in olfaction and/or taste was 10.20 (95% CI, 8.43; 12.34). The area under the summary receiver-operating characteristic curve was 0.8. Olfactory and/or taste changes had a low sensitivity (0.57; 95% CI, 0.47, 0.66) but moderate negative (0.78; 95% CI, 0.69, 0.85) and positive (0.78; 95% CI, 0.66, 0.87) predictive values and a high specificity (0.91; 95% CI, 0.83, 0.96). Olfactory and/or taste changes had a higher diagnostic value than the other otolaryngologic symptoms, a higher DOR and specificity, and a similar or higher diagnostic value than the other general symptoms.

Conclusion: Among otolaryngologic symptoms, olfactory and/or taste dysfunction was the most highly associated with COVID-19 and its general symptoms and should be considered when screening for the disease.

Predictors and Causes of Revisit After Ambulatory Sinus Surgery

Alison Yu, MD (Presenter); Melissa Zheng, MD; Stephanie Smith, MD, MS; Bozena Wrobel, MD; Elisabeth Ference, MD, MPH

Introduction: Revisits to the emergency department can create inconvenience for the patients and incur financial costs to the health care system. Little is known regarding the risk factors and causes for revisit after ambulatory sinus surgery.

Method: We identified sinus procedures from the State Ambulatory Surgery Database for California in 2011. Cases were linked to the State Emergency Department Database to identify visit encounters occurring within 30 days after the procedure. We defined the study cohort using Current Procedural Terminology codes for sinus procedures and the *International Statistical Classification of Diseases, Ninth Revision (ICD-9)* codes for chronic rhinosinusitis with nasal polyps and chronic rhinosinusitis without nasal polyps, and excluded patients <18 years old, leaving 8879 for analysis. Univariate and multivariable logistic regression models were used to identify patient- and procedure-related risk factors associated with the 30-day postoperative revisit.

Results: Among 8879 patients, the 30-day postoperative revisit rate was 4.3%. The most common reason for revisit was bleeding (34.7%), followed by neurological (20.7%), abdominal (17.9%), and infection (12.2%) diagnoses. After controlling for patient-related factors, neither the presence of nasal polyps ($P = .72$) nor the number of operated sinuses ($P = .60$) were significant risk factors for revisit. Patients with 2 to 3 chronic conditions (odds ratio [OR] 1.31 [1.01–1.69], $P = .04$) and >3 chronic conditions (OR 1.74 [range, 1.30–2.34], $P < .001$) were more likely to have revisits as compared with those with <2 chronic conditions. Black (OR 1.70 [1.02–2.84], $P = .04$) and Asian patients (OR 1.51 [1.02–2.23], $P = .04$) were more likely than White patients to have revisits. Patients with Medicaid insurance were more likely than those with private insurance to have revisits (OR 1.92 [1.22–3.02], $P = .01$).

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Conclusion: Neither the extent of surgery nor the presence of nasal polyps were significant risk factors for a 30-day revisit after ambulatory sinus surgery. Factors that were associated with revisit included a greater number of medical comorbidities, being Black or Asian vs White, and Medicaid vs private insurance, suggesting improved discharge planning and follow-up are needed in these patients.

Preoperative BMI and Lymphocyte-to-Monocyte Ratio: Critical Prognosticators in Sinonasal Malignancy

Chandala Chitguppi, MD (Presenter);
Gurston Nyquist, MD; Anza Rizvi, MD; Fatima Rizvi, MD;
Mindy Rabinowitz, MD; Elina Toskala, MD;
Marc Rosen, MD; Chandala Chitguppi, MD

Introduction: We aim to understand the effect of pretreatment nutritional status of the patient with sinonasal malignancy on survival outcomes; interpret the association between pretreatment inflammatory biomarkers (neutrophil-to-lymphocyte ratio, lymphocyte-to-monocyte ratio, and platelet-to-lymphocyte ratio) on patient survival in sinonasal malignancy; and recognize the importance of nutritional and inflammatory biomarkers especially in the current-day context of tumor microenvironment and immune therapy. This is a high-impact study that assesses the nutritional and inflammatory biomarkers in sinonasal malignancy. It is a preliminary analysis of a larger study. Patient inclusion and follow-up data in the study are currently being updated in real time. Hence, this is a late-breaking abstract, and we plan to include 240+ patients.

Methods: A cross-sectional study was conducted of 135 patients with sinonasal malignancy (SNM) treated at a single institution between 2011 to 2021. Optimal cutoff values for these markers were determined using receiver-operating characteristic curves and Youden's (J) index for survival prediction. Survival rates were compared using the Kaplan-Meier method and log-rank test.

Results: Overall, 88% were primary tumors and 44% had advanced TNM stage. Subnormal levels of preoperative hemoglobin was observed in 40%. The optimal cutoff value for body mass index (BMI) was 21.2 kg/m² ($P = .02$; sensitivity: 75%; specificity: 91.7%; J index: 0.67). Some 8% had a preoperative BMI lower than the cutoff value. A high BMI (≥ 21.2) significantly improved overall survival as compared with patients with a BMI < 21.2 (94.99 ± 2.03 vs 50.45 ± 16.79 months; $P < .001$). Patients in the low-BMI group were 51 times less likely to be alive at 1-year follow-up ($P < .002$). The optimal cutoff value for lymphocyte-to-monocyte ratio (LMR) was noted to be 2.48 ($P = .008$; sensitivity: 77%; specificity: 64.9%; J index: 0.42). Some 19% had a preoperative LMR lower than the cutoff value. The mean disease-free survival duration for those with a high LMR was significantly better (76.16 ± 11.26 vs 33.49 ± 7.51 months; $P = .03$). Patients with a low LMR were 5 times more likely to have recurrent disease ($P = .02$).

Conclusion: This is the first study to identify the preoperative inflammatory and nutritional biomarkers in patients with

SNM. Both elevated preoperative LMR (> 2.48) and BMI (> 21.2 kg/m²) are favorable prognostic indicators.

Racial/Ethnic and Gender Variations in Sinonasal Anatomy

Marta Kulich, MD (Presenter); Ryan Long; Hyunjung Yi;
Audrey Hao; Sung Min (Jane) Han; Kevin Hur, MD

Introduction: Anatomic variations in the paranasal sinuses have been associated with disease pathologies and complications during endoscopic sinus surgery. The objective of this study is to identify racial/ethnic and gender differences in the prevalence of sinonasal anatomic variants.

Method: This retrospective cross-sectional study included consecutive subjects who underwent computed tomography (CT) imaging of the paranasal sinuses from January to November 2020 at a tertiary academic center. Demographic information and medical/surgical history were collected through chart review. CT scans were analyzed systematically by 3 trained study personnel for the presence of critical sinus anatomic variants that endoscopic sinus surgeons typically evaluate for preoperatively. Chi-square tests and analyses of variance were conducted to detect differences in the prevalence of structural findings between genders and races/ethnicities.

Results: A total of 141 subjects (46% male) were included: 33 Hispanic/Latino, 6 Black/African American, 61 White, and 41 other. Among racial/ethnic groups, Hispanic subjects had a lower prevalence of Haller cells (18% vs 51% in other, $P < .05$) and maxillary septations (9% vs 43% in White, $P < .01$), and Black subjects had a higher prevalence of bilateral sphenoid lateral recesses (100% vs 34% in other, $P < .01$). Men had significantly higher rates of carotid artery dehiscence (37% vs 18%, $P < .05$), mesenteric anterior ethmoid arteries (72% vs 47%, $P < .01$), type 2 and 3 optic nerves (37% vs 21%, and 14% vs 3%, $P < .05$), and asymmetry of the lateral lamella of the cribriform plate (20% vs 7%, $P < .05$) compared with women.

Conclusion: Certain sinonasal anatomic variants, which have direct implications for complications during endoscopic sinus surgery, were found to be significantly more prevalent in some demographic groups. Surgeons should be aware of these differences in their review of preoperative imaging and in safe surgical planning for their patients.

A Real-World Characterization of Nasal Polyp Patient Burden

Victoria S. Benson (Presenter); Guillaume Germain;
Mei Sheng Duh; Shijing Yang; Jared Silver

Introduction: Nasal polyps (NP) often recur in a subpopulation of patients and may require repeat surgery. This study used a large US claims database to profile the burden of disease in patients with NP by surgery status.

Method: This retrospective cohort study used medical and pharmacy claims from the Optum Clinformatics Data Mart database (2007-2019). Patients were ≥ 18 years old with ≥ 1 NP

claim and had continuous health insurance coverage for ≥ 180 days prior to (baseline period) and following (observation period) the first medical claim for NP (Index). Number and type of surgeries, patient demographics, blood eosinophil count (BEC), comorbidities, health care resource utilization (HRU), and costs were assessed. NP surgeries were considered new if time between surgeries was ≥ 180 days. NP prevalence was estimated among patients continuously enrolled during 2018.

Results: The estimated standardized prevalence of NP was 0.186% (95% CI, 0.163, 0.208). A total of 119,357 patients with NP were identified; 28.3% had ≥ 1 surgery during the observation period (median observation duration: 29.0 months), of which 9.7% required ≥ 2 surgeries. Most (73.0%) first surgeries included a functional endoscopic sinus surgery; 91.9% occurred in an outpatient setting. Patients with ≥ 1 vs 0 surgeries were younger (mean age: 51.6 vs 53.5 years), had slightly higher baseline BEC (eosinophil ≥ 150 cells/ μL ; 67.0% vs 63.9% patients), and had a greater burden of comorbidities (mean Quan-Charlson Comorbidity Index score: 0.52 vs 0.40 points), with a higher proportion with asthma (37.8% vs 21.8%) and allergic rhinitis (34.0% vs 15.1%). All-cause and NP-related HRU and costs per patient per year increased with surgery number.

Conclusion: Findings suggest that patients with ≥ 1 surgery are associated with elevated BEC and increased comorbidities; HRU and costs compared with patients without surgery indicated increased disease burden in this subpopulation. Further research is needed to understand the relevance of endophenotyping based on biomarkers and clinical characteristics to foster improved NP patient care, including the role of additional therapeutic options.

Revision Rates and Symptom Trends in FESS

Firas Hentati (Presenter); Kenneth Rodriguez

Introduction: The purpose of this study is to determine the revision rates and degree of symptomatic improvement and revision rates in endoscopic sinus surgery (ESS) in surgery-naïve patients and to determine the factors that predict these measures.

Method: A retrospective review was conducted of patients between 18 and 89 years of age undergoing ESS for chronic sinusitis between 2015 and 2019. Patients included were primary surgical patients that had no history of previous ESS. The variables collected were presence of asthma, allergic rhinitis (AR), polyposis, aspirin sensitivity, smoking history, pre-operative (pre-op) Sino-Nasal Outcomes Test-22 (SNOT-22), 4-week postoperative (post-op) SNOT-22, propel stent use during ESS, and blood loss during ESS. The primary outcome measure was the revision rate of ESS. Secondary outcome measures were the change in SNOT-22 following ESS and factors impacting revision rate and change in SNOT-22 following ESS.

Results: Of 183 patients who underwent ESS, 10 (5.5%) required revision ESS. The greatest predictor of revision

surgery was pre-op SNOT-22 score (56.7 ± 26.6 vs 36.7 ± 22 ; $P = .022$). There was no association between age (41.2 ± 14.2 vs 46.8 ± 17.1 years), gender, polyposis (30.0% vs 26.6%), asthma (40.0% vs 22.0%), or AR (40.0% vs 39.9%) and revision ESS. Operative blood loss (282.0 ± 208.4 vs 186.7 ± 132.0 ; $P = .004$) was associated with revision ESS. Propel stent use (60.0% vs 52.5%) was not associated with revision ESS. Study participants had an average pre-op SNOT-22 of 37.8 ± 22.4 and post-op SNOT-22 of 16.2 ± 15.7 ($P < .001$). There was no association between change of SNOT-22 and polyposis (27.3 ± 25.3 vs 19.4 ± 20.1 , $P = .22$), asthma (23.7 ± 15.4 vs 20.9 ± 23.9 ; $P = .672$), AR (22.6 ± 20.9 vs 21.1 ± 22.6 ; $P = .813$), or propel stent use (22.7 ± 21.7 vs 20.7 ± 22.5 ; $P = .805$). All groups experienced a decline in SNOT-22 following ESS.

Conclusion: Most patients undergoing first-time ESS experience significant symptomatic relief and do not require revision surgery regardless of presence of polyposis, asthma, or allergic rhinitis. However, patients who are more symptomatic prior to ESS may be predisposed to requiring revision ESS.

Risk Stratification of Invasive Fungal Sinusitis in Hematologic Pathologies

Donald Vickers, MD (Presenter); Samantha Mohler; James R. Gardner, MD; Alissa Kanaan, MD

Introduction: The purpose of this study was to identify objective perioperative diagnostic factors for acute invasive fungal sinusitis (AIFS) with the goal to create a novel diagnostic scoring system using objective criteria.

Method: A retrospective review of biopsy-proven cases of AIFS identified from pathology records (2015–2019) were compared with patients the otolaryngology team was consulted to “rule out AIFS” in the year 2019 at an academic, tertiary care center. In total, 23 patients with AIFS and 26 patients without were included. A 2-tailed t test was run on the specific criteria, and receiver-operating characteristic curves were generated for the significant data. Youden’s J statistic was used to create the ideal cutoff values for determining ideal sensitivity and specificity for each criteria. Likelihood ratios were used to give a power for the scoring system.

Results: Compared with patients with nonhematologic malignancy-related AIFS, patients with hematologic malignancy-related AIFS have significantly elevated C-reactive protein (CRP) and blood glucose, while albumin, hematocrit, platelet count, and absolute neutrophil count (ANC) were found to be significantly lower. In addition, Lund-Mackay score asymmetry, extrasinus spread, aspergillus antigen, and preexisting diabetes mellitus were found to significantly correlate with disease.

Conclusion: Patients with hematologic malignancy-related AIFS have measurable differences in routine lab values and standard imaging that could be used in determining the diagnostic probability of AIFS including CRP, albumin, hematocrit, platelet count, ANC, blood glucose, aspergillus antigen, Lund-Mackay score asymmetry, extrasinus spread, and preexisting

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diabetes mellitus. A novel scoring system was proposed that will require prospective validation.

Role Factors for Recurrence in Cerebrospinal Fluid Leaks

Amanda S. Almeida, MD (Presenter); Eulalia Sakano, PhD; Marcelo Sampaio, PhD; Carlos T. Chone, MD, PhD

Introduction: Cerebrospinal fluid (CSF) leaks may present multiple locations and etiologies. Recurrence is not widely seen and implicates a challenging management. This study aims to investigate demographic and clinical aspects related to recurrent cerebrospinal fluid leaks in a long-term follow-up.

Method: A retrospective study including patients with CSF rhinorrhea between 2006 and 2011 was conducted. Demographic data, classifications of CSF leaks, and type of treatment were analyzed. In addition, a literature review was performed for articles addressing recurrent CSF leaks.

Results: Some 65 patients were included; 36 were female and 29 were male, with a mean age of 43 years. Most patients presented spontaneous fistulas (40%), followed by trauma (35%) and iatrogenic (24%). CSF fistulas were mainly located in the ethmoid (55%) and sphenoid (33%). Recurrent CSF leakages were observed in 3 patients; all were spontaneous fistulas and located in the sphenoid sinus ($P = .0527$).

Conclusion: Recurrence of CSF leaks may be correlated to the location in the sphenoid sinus due to technical difficulties to endoscopic transnasal access. Spontaneous fistulas, which were more common in woman, were also implicated with recurrence.

Surgical Margin Status and Survival Following Resection of Intestinal Adenocarcinoma

Dip J. Rana (Presenter); Samer T. Elsamna; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Intestinal-type adenocarcinoma (ITAC) is an aggressive sinonasal cancer that is usually treated with surgical resection. This study attempts to describe the impact that surgical margin status has on survival of patients with ITAC.

Method: The National Cancer Database was queried for cases of ITAC from 2004 to 2015. Data regarding patient demographics, tumor staging, treatment modality, and margin status were obtained. Survival rates were compared by margin status (positive [PSM], negative [NSM], and no operation [OSM]) using Kaplan-Meier analysis and log-rank test.

Results: Of the 105 patients who met inclusion criteria, most cases were younger (≤ 60 years; 56.2%), male (74.3%), and White (88.6%). Cases of ITAC almost equally involved the nasal cavity (50.5%) and the paranasal sinuses (49.5%). There was a bimodal T stage distribution: stage 1, 27.7%; stage 2, 23.4%; stage 3, 21.3%; stage 4, 27.7%. Patients predominantly underwent surgical resection at an academic center (84.2%). NSM and PSM were achieved in 58.1% and 20.0% of cases, respectively. There were 21.9% of cases categorized as OSM. The 3-year survival rates were 87.8%, 66.7%, and 21.7% for

NSM, PSM, and OSM, respectively. Survival was significantly different between cases of NSM and PSM (log-rank = 0.045) and between cases of PSM and OSM (log-rank = 0.005). No factors were independently associated with PSM.

Conclusion: ITAC is a variant of adenocarcinoma of the sinonasal tract with aggressive features. This study validates the importance of surgical intervention as survival was tiered by margin status. Careful preoperative planning and intraoperative technique should be used with the goal of achieving NSM.

Surgical Margin Status and Survival Following Resection of Non-intestinal Adenocarcinoma

Dip J. Rana (Presenter); Samer T. Elsamna; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Non-intestinal-type adenocarcinoma (N-ITAC) of the sinonasal tract is a nonsalivary type of adenocarcinoma that is classically treated with surgical resection. This study seeks to evaluate the impact of surgical margins on survival of patients with N-ITAC.

Method: The National Cancer Database was queried for cases of non-ITAC from 2004 to 2015. Data regarding patient demographics, tumor staging, treatment modality, and surgical margins were obtained. Survival rates were compared by margin status (positive [PSM], negative [NSM], and no operation [OSM]) using Kaplan-Meier and log-rank analyses. Factors associated with PSM were identified using multivariate logistic regression, and odds ratios (OR) were obtained.

Results: A total of 586 patients met inclusion criteria. Most cases were elderly (>60 years; 57.8%), male (58.4%), and White (81.7%). Cases of N-ITAC most commonly involved the paranasal sinuses (56.0%), were T stage 1 (35.0%), and underwent surgical resection at an academic center (67.7%). NSM and PSM were achieved in 52.0% and 18.4% of cases, respectively, while 29.5% of cases did not undergo surgical resection (OSM). When compared with NSM, factors predictive of a PSM included T stage 3 (odds ratio [OR] 5.34) and T stage 4 disease (OR 3.35). The 2-year survival rates were 91.2%, 72.7%, and 36.1% for NSM, PSM, and OSM, respectively. Survival was statistically significant between both NSM and PSM (log-rank $P < .001$) and between PSM and OSM (log-rank $P < .001$).

Conclusion: Our study demonstrates that surgical margin status is a strong predictor of survival of N-ITAC. Cases of N-ITAC with a higher T stage should be approached meticulously at the time of surgery, as they were associated with PSM.

Surgical Margin Status and Survival Following Resection of Sinonasal Esthesioneuroblastoma

Christian J. Fang (Presenter); Samer T. Elsamna; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Esthesioneuroblastoma (ENB) is a malignancy of the sinonasal tract that arises from neural cells of the olfactory mucosa and is commonly treated with surgical resection.

This study evaluates the impact of surgical margin status on survival following resection of ENB.

Method: The National Cancer Database was queried for cases of ENB that underwent surgical resection from 2004 to 2015. Data including patient demographics, tumor staging, treatment modality, and surgical margin status were obtained. Survival rates were compared by margin status (positive [PSM], negative [NSM], and no operation [OSM]) using Kaplan-Meier analysis and log-rank test.

Results: Overall, 1170 patients met inclusion criteria. Most cases were younger than 60 years ($n = 741$, 63.3%), male ($n = 692$, 59.1%), and White ($n = 999$, 86.6%). Cases most commonly involved the nasal cavity (83.1%), were T stage 4 (38.2%), and underwent treatment at an academic center (74.9%). A total of 51.1% underwent open resection. T stage 4 disease was the only variable found to be predictive of a PSM (odds ratio [OR], 5.90; 95% CI, 1.70–20.58; $P = .005$). The 3-year survival rates were 90.5%, 80.4%, and 51.7% for NSM, PSM, and OSM, respectively. Survival was significantly different between cases of PSM and NSM (log-rank <0.001) and between OSM and PSM (log-rank <0.001).

Conclusion: This study highlights the importance of attaining negative margins during surgical resection of ENB, as margin status is correlated with survival. T4 disease is associated with PSM and is likely secondary to the potential morbidity of surgery near vital anatomic structures, such as the orbit and brain.

Surgical Margin Status and Survival for Sinonasal Adenoid Cystic Carcinoma

Ghayoor Mir, DO (Presenter); Samer T. Elsamna; Omar Elkattawy; Christina H. Fang, MD; Soly Baredes, MD; Jean Anderson Eloy, MD

Introduction: Sinonasal adenoid cystic carcinoma (SNACC) is a rare malignant neoplasm. These tumors demonstrate perineural spread, often with prolonged clinical course. Classically, SNACC is treated with multimodal treatment. This study seeks to evaluate the impact of surgical margins on the survival of SNACC.

Method: The National Cancer Database was queried for cases of SNACC from 2004 to 2015. Data regarding patient demographics, tumor staging, treatment modality, surgical margins, and survival were obtained. Survival rates were compared by margin status: positive (PSM), negative (NSM), and no operation (OSM) using Kaplan-Meier analysis and log-rank test. Factors associated with PSM were identified using multivariate logistic regression; odds ratios (OR) were obtained.

Results: A total of 882 patients met inclusion criteria. Most cases were younger than 60 years (53.5%), female (54.0%), and White (80.5%). Cases of SNACC most commonly involved the paranasal sinuses (66.7%), were T stage 4 (46.9%), and underwent surgical resection at an academic center (73.7%). NSM and PSM were achieved in 34.5% and 39.6% of cases, respectively, while 26.0% of cases did not undergo surgical resection (OSM). Higher T stage was predictive of a PSM (T stage 2, OR 2.23; T stage 3, OR 7.20; T stage 4, OR 9.61). An endoscopic approach was negatively associated with a PSM (OR, 0.44).

Overall, 3-year survival rates were 87.6%, 72.0%, and 56.3% for NSM, PSM, and OSM, respectively. Survival was statistically significant between NSM and PSM (log-rank $P < .001$) and between PSM and OSM (log-rank $P < .001$).

Conclusion: Our study demonstrates that surgical margin status is a strong predictor of survival of SNACC. A higher T stage warrants more careful preoperative planning and intraoperative endeavor given its association with PSM.

Topical Anesthesia in Nasal Endoscopy: To Use or Not?

Prithwjit Roychowdhury (Presenter); George J. Han; Bruce Barton, PhD; Christopher J. Ito, MD

Introduction: Although topical anesthesia is often used to ease nasal endoscopy, there is a lack of high-quality evidence about whether anesthesia significantly reduces patient discomfort or improves surgeon satisfaction during the procedure. In addition, minimizing aerosolization of particles during the procedure is a priority due to concerns around transmission of respiratory viruses. However, there are few data about the ideal mode of anesthetizing the nose prior to nasal endoscopy to minimize respiratory droplet transmission. Herein, we conducted a double-blinded, placebo-controlled, randomized controlled trial of all consecutive patients who required nasal endoscopy at a large, urban, academic medical center.

Method: All adult patients requiring nasal endoscopy without a history of sinonasal surgery were recruited to participate directly from the clinic. All patients who consented to participate were randomized to receive either normal saline or lidocaine via a pledget or a spray. Following application of anesthesia, patient discomfort was assessed with a 1 to 10 visual analog scale prior to undergoing nasal endoscopy. During the procedure, the length of the endoscopy, as well as the number of aerosolizing events (sneezes and coughs), was recorded. Postendoscopy, the patient completed another 1 to 10 visual analog scale, as well as an adapted version of the Iowa Satisfaction with Anesthesia Scale, to assess their comfort with the procedure. The primary surgeon also assessed their satisfaction with the procedure on a 4-point scale.

Results: Of the 100 patients that we seek to enroll, we expect to recruit at least 50% of our total cohort by the time that we present our findings.

Conclusion: We hypothesize that the use of topical anesthesia via either pledget placement or spray will not reduce patient discomfort during endoscopy and may increase the number of aerosolizing events.

Treating Rhinosinusitis: An Evaluation of Systematic Reviews Underpinning Management Recommendations

Trevor Torgerson (Presenter); David Wenger; William Nowlin; Austin L. Johnson; Clay Farahani; Matt Vassar

Introduction: Rhinosinusitis is one of the most common otorhinolaryngologic conditions, affecting nearly 30 million patients

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in the United States a year. Given its high prevalence and harmful effects on quality of life, clinical practice guidelines (CPGs) were developed to help physicians manage the treatment of both acute and chronic rhinosinusitis. Here we evaluate the methodological and reporting quality of systematic reviews and meta-analyses (SRs/MAs) informing the current rhinosinusitis CPGs.

Method: We searched PubMed for CPGs related to rhinosinusitis and screened for inclusion. We then identified all SRs/MAs from the included CPGs and extracted study characteristics from each SR/MA. Each SR/MA was then evaluated for methodological quality using AMSTAR-2 and reporting quality using the Preferred Reporting Systems for Systematic Reviews and Meta-Analyses (PRISMA). Each checklist item was given 1 point for full criteria met, 0.5 points for partial criteria met, and 0 points for no criteria met.

Results: A total of 64 unique SRs/MAs from 7 CPGs were included in our study. SRs/MAs made up 9.6% of all references cited among the 7 CPGs. The Brazilian Academy of Rhinology and the American Academy of Otolaryngology rhinosinusitis CPGs were associated with the highest mean PRISMA evaluations at 0.68 and 0.67 and the highest mean AMSTAR-2 evaluations at 0.74 and 0.64, respectively.

Conclusion: The quality of SRs/MAs underpinning the management of rhinosinusitis CPGs is found to be moderate, with improvement still necessary in the areas of protocol registration, reporting of funding, and others. We also found SRs/MAs make up less than 10% of the references cited in rhinosinusitis CPGs. Increasing the production of high-quality systematic reviews through rigorous methodology and improved reporting is the first step in improving the overall quality of CPGs, which rely heavily on SRs/MAs as their highest quality of evidence.

Treatment of Chronic Rhinosinusitis With Nasal Polyps: A Population-Based Analysis

Nicholas Frisco (Presenter); Hui-Jie Lee; David Jang

Introduction: Chronic rhinosinusitis with nasal polyps (CRSwNP) is a chronic inflammatory disease of the upper airway with an overall health care burden estimated at \$5.7 billion annually in the United States. This population-level study analyzes health care resource utilization (HRCU) among CRSwNP patients to identify areas for quality improvement.

Method: This is a retrospective analysis of the IBM Health MarketScan Research Databases over a 5-year period (2013–2017). Adult and pediatric patients with newly diagnosed chronic rhinosinusitis without nasal polyps (CRSsNP) or CRSwNP between 2014 and 2015 and continuous 2-year follow-up enrollment data were included. HCRU was compared between the CRSsNP and CRSwNP groups and was analyzed in terms of medication prescriptions, sinus surgeries, outpatient visits, and overall costs.

Results: A total of 238,825 patients met criteria for CRS. Of them, 18,590 had CRSwNP. The mean age in the CRSwNP cohort was 47.9 years, and 56.2% were male. Compared with

the CRSsNP group, there was a higher prevalence of asthma (21.2% vs 13.6%) and allergies (41.5% vs 31.2%). During the 2-year follow-up period, 92.1% of patients with CRSwNP and 95.7% of patients with CRSsNP received antibiotics, with a median of 5.0 and 4.0 prescriptions, respectively. In contrast, only 73.4% of patients with CRSsNP and 74.9% of patients with CRSwNP received prescriptions for topical or oral steroids. CRSwNP had a higher surgery rate (41.6% vs 7.9%) contributing to higher mean overall costs (\$6,144.1 vs \$2,027.9).

Conclusion: The overall cost associated with CRSwNP was high likely due to the high rate of sinus surgery in addition to outpatient medical therapy. Potential areas of quality improvement are educating clinicians on reducing the inappropriate use of antibiotics and increasing the use of steroids for CRSwNP.

Treatment of Refractory Anosmia With Topical Platelet Rich Plasma

Theodore Klug, MD (Presenter); David Rosen, MD; Mark Chaskes, MD; Glen D. Souza, MD; Edmund Pribitkin, MD

Introduction: We assess the role of topical platelet-rich plasma (PRP) in the management of anosmic patients; aim to understand the mechanism of action of topical PRP in the olfactory groove; and differentiate and analyze objective vs subjective improvement in patients receiving topical PRP for anosmia. Anosmia affects up to 20% of the general population, has significant negative impact on quality of life, and has been associated with increased mortality. Further, an estimated 30% to 75% of patients who contract COVID-19 develop anosmia or hyposmia. Despite the commonality and adverse impact of this disorder, there are very few effective treatment options. This abstract/manuscript presents encouraging, late-breaking data showing that topical PRP placed in the olfactory groove may show some efficacy in managing persistent, long-standing anosmia.

Methods: Ten patients with persistent anosmia for at least 6 months were included in this pilot study. All 10 patients had failed previous medical management and olfactory training. An absorbable sponge was soaked in PRP and placed in the patient's olfactory groove on one side in a single-blinded and randomized fashion. The other side received an absorbable sponge soaked in saline. The patient was subsequently seen at 4-week intervals for an additional 2 months, with this procedure repeated at each interval. The same side of the nose was treated with PRP at each encounter and was randomized only at the beginning of the trial. At each interval, a Brief Smell Identification Test (B-SIT) was performed on each nostril independently.

Results: Nine patients completed 3 treatment sessions, and 1 patient was lost to follow-up after two treatments. The average overall presenting B-SIT score was 3.5 ± 1.76 (scores <4 are considered anosmic); 3.9 ± 2.02 in the treatment nostril and 3.1 ± 1.37 in the control nostril. B-SIT scores improved after each subsequent visit, regardless of the nostril side treated. After completion of the 3 treatments, or at the time of exiting

the study, the average overall B-SIT score improved to 4.5 ± 1.92 ; 4.6 ± 1.81 in the treatment nostril and 4.4 ± 2.12 in the control nostril. All patients reported subjective improvement in their sense of smell.

Conclusion: Topical PRP placed in the olfactory groove appears to show some efficacy in managing persistent, long-standing anosmia.

Trends in Nasal Steroid Prescriptions for Medicare Beneficiaries From 2013 to 2017

Franklin M. Wu, (Presenter); Ido Badash, MD; Ruben Ulloa; Kevin Hur, MD

Introduction: This study aims to describe the patterns of nasal steroid prescriptions for Medicare beneficiaries in the United States between 2013 and 2017.

Method: Data on nasal steroid prescriptions for Medicare beneficiaries were obtained from the 2013–2017 Medicare Provider Utilization and Payment Data: Physician and Other Supplier Public Use File, and the Part D Prescriber Public Use Files from the Centers for Medicare & Medicaid Services. Microsoft Excel was used to organize the data and create heat-maps and scatterplots. State temperature data were collected through the National Centers for Environmental Information.

Results: From 2013 to 2017, the total claims for fluticasone, mometasone, and triamcinolone increased from 684,442 to 823,883. During this time, the beneficiary count also increased from 295,834 to 345,397. However, the total drug cost decreased from 19,332,736 to 16,166,694. The correlation coefficient between total providers to total claims was 0.87 in 2013 and 0.83 in 2017. Florida and California were outliers in both years. The correlation coefficient for the average temperature from 2013 to 2017 to the sum of the claims/beneficiaries from 2013 to 2017 was a modest 0.19. When comparing the correlations for just the temperature averages between the winter months of December through February, there was an increase in the coefficient to 0.23.

Conclusion: Nasal steroid prescription cost and beneficiaries have increased. The cost of fluticasone is decreasing while the cost of mometasone is increasing. Total providers by state correlated strongly with the claims per state. When comparing the correlation between temperature to claims/beneficiaries, there was a modest relationship. However, this correlation became stronger when only looking at winter temperature averages.

Use of Polycaprolactone for Correction of Caudal Septal Deviation

Jin-Young Min, MD (Presenter); Hee Jin Kang, MD; Sung-Wan Kim, MD, PhD

Introduction: Surgical management of caudal septal deviation can be a challenging problem. Osteomesh is a bioresorbable implant made of a US Food and Drug Administration-approved polymer called polycaprolactone (PCL); it is commonly used in craniofacial surgery to repair various types of fractures and to fill surgical defects, and in rhinoplasty. In this study, we analyzed our experience using Osteomesh for correction of caudal septal deviation in septoplasty.

Method: Medical records from 14 patients who underwent septoplasty using Osteomesh for correction of caudal septal deviation were analyzed. Briefly, batten graft using Osteomesh was placed on septal cartilage (usually on the concave side) and fixed with 4-0 polydioxanone sutures. Subjective patient satisfaction regarding nasal obstruction were evaluated using the visual analog scale (VAS) score. Objective pre- and post-operative endoscopic findings were evaluated.

Results: All patients showed significant improvement in mean VAS scores after surgery compared with 6.81 ± 2.11 preoperatively vs 2.13 ± 1.90 postoperatively ($P < .001$). On endoscopic evaluation for surgical outcome, 12 patients (75.0%) showed favorable outcomes, and 4 (25.0%) had improved but had residual caudal deviation. A postoperative complication included extrusion of Osteomesh in 2 patients without any infection and subjective discomfort.

Conclusion: Correction of caudal septal deviation using Osteomesh in septoplasty is a relatively safe surgical option with favorable surgical outcomes.

Use of Tranexamic Acid in Rhinoplasty Operations

Mustafa M. Basaran, MD (Presenter); Sinan Kocaturk

Introduction: Bleeding is one of the most common obstacles in rhinoplasty operations. Excessive hemorrhage can be seen, especially during bony cap removal. We compared topical use of adrenaline with tranexamic acid.

Method: A total of 100 patients who underwent open rhinoplasty operations between 2020 and 2021 were included in our study. Patients aged between 18 and 65 years with nasal obstruction symptoms were included in our study. Patients with chronic diseases, chronic drug use, and sinonasal diseases were excluded in our study. Operations of female patients during the menstrual period were postponed. Bleeding during operation was measured, and tension of the patients during operation was noted. All operations were performed by the same surgeon and anesthesiologist. Classic anesthesia was given to patients. In the control group, no additional topical applications were used other than sponges and saline. The study group was divided into 2 groups according to topical use of adrenaline or tranexamic acid.

Results: Both adrenaline-soaked cotton buds and tranexamic acid soaked cotton buds were better in stopping bleeding than the control group (saline; $P = .78$). However, when compared with each other, no significant difference was seen.

Conclusion: When comparing the cost and accessibility of the drugs, adrenaline still remains the best hemostatic in patients without chronic diseases such as hypertension.

Using Subjective Measures to Predict Objective Olfactory Dysfunction in COVID-19

Megan V. Morisada, MD (Presenter); Angela H. Nguyen; Angela M. Beliveau, MPH, CCRP; Mabelle D. Wilson; E Bradley Strong, MD; Toby O. Steele

Introduction: According to prior literature based on patient self-reporting, olfactory dysfunction (OD) is a specific and

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prominent symptom in patients with coronavirus-19 (COVID-19) infection. Here we describe olfactory-specific quality of life and objective smell testing in patients with COVID-19, determine if objective measures of OD correlate with a patient's subjective experience, and determine OD recovery rates based on the severity of perceived and tested olfactory loss.

Method: The University of Pennsylvania Smell Identification Test (UPSIT), a validated 40-item odorant test instrument, Questionnaire of Olfactory Disorders–Negative Statements (QOD-NS), and Sino-Nasal Outcomes Test (SNOT-22) instruments were administered to 25 polymerase chain reaction-confirmed COVID-19 outpatient subjects to measure the prevalence and severity of OD at diagnosis, and 6 weeks and 6 months postdiagnosis. An analysis of variance, *t* test, and Pearson correlations were examined.

Results: In total, 18 (72%) of 25 patients with positive COVID-19 testing showed some degree of OD (UPSIT score mean: 29.1; standard deviation [SD]: 4.7). Ten patients (40%) had mild microsmia, 6 patients (24%) had moderate microsmia, and 2 patients had severe microsmia (8%) on initial testing. Nine of 25 patients enrolled with OD that reached the 6-week follow-up, and most patients showed objective improvement in OD. There was a difference in QOD-NS scores between patients with normal or mild olfactory OD (mean: 10.2, SD: 7.4) compared with moderate or severe OD (mean: 22.4, SD: 11.6) patients ($P = .041$) but no trends in mean SNOT scores between groups. There was a significant correlation between QOD-NS score and UPSIT score ($Rho = -0.45$, $P = .027$) indicating patients with higher objective measures of OD experienced lower quality of life.

Conclusion: There was significant correlation between subjective quality-of-life scores and objective measurements of OD. Most patients improved their OD several weeks after initial diagnosis. The QOD-NS may be an alternative and valuable method to screen for OD in COVID-19 patients.

Sleep Medicine

A 10-Year Experience Utilizing Lingual Tonsillectomy in Treating OSA

Randall S. Ruffner, MD (Presenter); Ethan Moritz; Bethzaida Suarez Gonzalez; Steven Parnes

Introduction: Uvulopalatopharyngoplasty (UPPP) is the most common procedure performed for the treatment of obstructive sleep apnea (OSA), but its success is limited. Studies have suggested a multilevel anatomic approach for improved outcomes. Adult studies of lingual tonsillectomy (LT) with palatal surgery to date are limited. We aim to determine the effect of multilevel airway surgery including lingual tonsillectomy on sleep-related outcomes in OSA.

Method: This was a 10-year, retrospective chart review of 117 patients who underwent LT in combination with tonsillectomy and UPPP from a single surgeon in a tertiary referral center from 2009 to 2018. Preoperative and 3-month postoperative

apnea-hypopnea index (AHI) were compared. Postoperative complications are reviewed.

Results: There was a significant improvement in respiratory events postoperatively, with an average AHI reduction of 14.86 (10.52–19.18, $P < .0001$). Average AHI reduction was significantly different based on OSA severity but not preoperative body mass index (BMI) severity. The cure rate (postoperative AHI <5) was 23.1%. Surgical success rate (50% reduction in AHI with postoperative AHI <20) was 41.9%. Of the patients, 58.1% achieved a postoperative AHI reduction of $\geq 50\%$. Surgical success was inversely proportional to increasing BMI and preoperative AHI severity. Complications were uncommon (13.0%). Uvular dehiscence and dehydration were the most common complications. Revision LT for regrowth was 1.2%.

Conclusion: The combined approach of LT coblation, UPPP, and palatine tonsillectomy is quite efficacious in the surgical management of OSA. Patients with lower preoperative body mass index and mild to moderate OSA were most likely to achieve a surgical cure or have a successful outcome. The addition of LT via coblation technique is both safe and successful with a low rate of complications. Multilevel upper airway surgery based on a specific anatomic approach to airway obstruction leads to improved outcomes in the surgical management of OSA.

Analysis of DISE Findings and Sleep Parameters in OSA Subjects With Lateral Pharyngeal Wall Collapse

Sun A. Han, MD (Presenter); Chae-Seo Rhee, MD; Doo Hee Han, MD; Hyun Jik Kim, MD; Dong-Young Kim, MD

Introduction: We recognize the significance of lateral pharyngeal wall collapse in obstructive sleep apnea (OSA) patients; interpret the drug-induced sleep endoscopy (DISE) findings that are indicative of lateral pharyngeal wall collapse; and explain which polysomnography (PSG) parameters and clinical factors are related to lateral pharyngeal wall collapse in OSA patients. The importance of lateral pharyngeal wall collapse in OSA patients has been discussed in many studies. In our study, we found that lateral pharyngeal collapse is correlated with PSG parameters and clinical factors of patients.

Methods: This cross-sectional study analyzed 106 OSA subjects who underwent DISE and PSG at Seoul National University Hospital from March 2019 to August 2020. The degree of collapse and pattern of collapse were analyzed to identify patients with lateral pharyngeal wall (LPW) narrowing or with anteroposterior (AP) narrowing. The clinical factors and PSG parameters such as apnea-hypopnea index (AHI), apnea duration, and pulse oximetry data were compared between the 2 groups, and a further subgroup analysis was done in the LPW narrowing group on the effect of degree of narrowing.

Results: In total, 59 (55.7%) of the OSA subjects were confirmed to have LPW collapse, and 47 patients (44.3%) were diagnosed with AP narrowing based on DISE findings. OSA

subjects with LPW narrowing at the level of palate had significantly higher mean weight (82.2 ± 11.1 kg vs 75.1 ± 14.2 kg, $P = .001$) and body mass index (28.2 ± 3.4 kg/m² vs 26.2 ± 3.7 kg/m², $P = .002$) compared with the AP narrowing group. The mean AHI of the LPW narrowing group was 43.1 ± 27.5 events/h, while that of the AP narrowing group was 30.5 ± 20.6 events/h ($P = .018$). In the subgroup analysis of the LPW group, 30 patients had grade 2 collapse (>50% collapse) while 29 patients had grade 3 collapse (total collapse). The mean AHI of patients with grade 3 collapse had significantly higher AHI compared with grade 2 collapse patients (53.3 ± 25.4 events/h vs 33.2 ± 26.1 events/h, $P = .003$) and also showed significantly lower average ($89.4\% \pm 4.9\%$ vs $93.6\% \pm 2.3\%$, $P < .001$) and minimum SpO₂ ($71.7\% \pm 10.5\%$ vs $80.6\% \pm 8.1\%$, $P = .001$).

Conclusion: Lateral pharyngeal wall collapse in OSA is not uncommon. This study revealed that lateral pharyngeal wall collapse is related to increased OSA severity. Furthermore, total collapse (grade 3 collapse) in these patients was correlated with higher AHI and lower oxygen parameters. Lateral pharyngeal wall collapse patients may warrant more aggressive treatment due to complications that may arise from severity of OSA.

Analysis of OSA Using a Smartwatch and Sleep Study

Masa Petrovic (Presenter); Michela R. Borrelli; Arthur Wu, MD; Daryoush Saadat, MD; Arash Shamsian, MD, MHA; Martin L. Hopp, MD, PhD

Introduction: The Withings sleep watch built-in program records the same parameters as routine home studies. Our study compared the values recorded during a certified at-home sleep study vs the Withings sleep watch to determine if the watch can aid with the diagnosis of sleep apnea with similar accuracy.

Method: Our study included 5 subjects who had an at-home sleep study and a sleep test using the Withings sleep watch. Values from both tests were recorded and analyzed to compare the accuracy of the sleep watch vs the at-home study.

Results: Both the home sleep study and the Withings watch recorded parameters including the apnea hypopnea index, respiratory rate, oxygen saturation, and heart rate. When comparing raw data from both the home sleep study and watch for our subjects, these parameters were comparable and had no statistical difference.

Conclusion: The study outcomes demonstrate that Withings smartwatches may aid in patient engagement and the diagnosis of sleep apnea. Both tests had similar laboratory values for both subjects.

Assessing GERD Severity in OSA Patients Undergoing Upper Airway Surgery

Leonard E. Estephan (Presenter); Angela Alnemri; Matthew Stewart; Ashwin Ananth, MD; Maurits Boon, MD; Colin T. Huntley, MD

Introduction: Gastroesophageal reflux disease (GERD) and obstructive sleep apnea (OSA) are often recognized as comorbid conditions. Continuous positive airway pressure (CPAP) therapy has been shown to decrease GERD symptom severity in patients being treated for comorbid OSA. We aim to evaluate quality of life pertaining to GERD symptoms in patients undergoing upper airway surgery (UAS), as data are sparse in this context.

Method: A single-center, prospective survey-based study was conducted on patients with GERD and comorbid OSA receiving UAS beginning in July 2020. Patients were to complete the GERD-Health Related Quality of Life Questionnaire (GERD-HRQL) at 3 time points: 1 week before surgery and at 2 and 6 months after surgery. GERD-related symptoms were rated from 0 (no symptoms) to 5 (incapacitating symptoms). Statistical analyses included unpaired nonparametric Mann-Whitney tests with a P value $< .05$ indicating significance.

Results: Fourteen patients (4 male, 10 female) with an average age of 55.8 years (range, 25–83 years) completed both the preoperative and 2-month postoperative surveys. The mean 2-month severity scores vs baseline, respectively, were collected for symptoms including pyrosis (3.00 vs 3.35, $P = .369$), pyrosis while supine (3.00 vs 3.43, $P = .373$), pyrosis while standing (2.14 vs 2.43, $P = .494$), postprandial pyrosis (2.93 vs 2.79, $P = .828$), pyrosis altering diet (3.00 vs 2.85, $P = .707$), pyrosis altering sleep (2.50 vs 3.14, $P = .409$), dysphagia (1.77 vs 1.53, $P = .638$), odynophagia (1.29 vs 1.43, $P = .851$), and life interruption of medications (1.29 vs 2.14, $P = .295$).

Conclusion: In this preliminary analysis, UAS did not appear to positively affect GERD symptoms. Addition to our small cohort and analysis of the 6-month postoperative questionnaires are necessary to determine the effect of upper airway surgery on GERD symptom severity.

Assessing OSA Patients' AHI After Hypoglossal Nerve Stimulator Surgery

Ariel M. Azhdam (Presenter); Michela R. Borrelli; Jonathan Raskin; Arthur Wu, MD; Daryoush Saadat, MD; Martin L. Hopp, MD, PhD

Introduction: We evaluated the effect of inexperience on the efficacy of a hypoglossal nerve stimulator on obstructive sleep apnea (OSA) patients' apnea-hypopnea index (AHI).

Method: The initial 17 consecutive OSA patients undergoing hypoglossal nerve stimulator placement from July 2017 to November 2020 in a single surgeon group were assessed. Patients' AHI was recorded preoperatively and postoperatively. The AHI is a quantitative measure of sleep-related obstructive events and is used in the diagnosis of OSA.

Results: When comparing preoperative vs postoperative AHI scores for the 17 patients undergoing hypoglossal nerve stimulator placement, the paired t test P value was $< .01$. The preoperative mean AHI \pm SD was 34.9 ± 17.3 , with an AHI range of 15.7 to 69.1, whereas the postoperative mean AHI \pm SD was 7.5 ± 6.6 , with an AHI range of 1 to 29, where the patient with an AHI of 29 suffered from insomnia. The 95%

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confidence interval of the difference had a lower bound of 19.8 and upper bound of 35.1, with a mean difference of 27.4 ± 14.9 .

Conclusion: The study outcomes demonstrate that initial inexperience does not have an effect and there was a significant effect of hypoglossal nerve stimulator placement on severity as measured by the AHI. Placement of a hypoglossal nerve stimulator greatly relieves patients' obstructive sleep apnea, as seen by dramatic reduction in the AHI. This significant improvement favors the continued use of the hypoglossal nerve stimulator and warrants further research into which types of OSA patients may be fitting candidates for this therapy.

Base of Tongue Surgery and Pediatric Obstructive Sleep Apnea

Adrian Williamson, MD (Presenter); Erica Haught; Vincent R. Morrow; Habib Zalzal, MD; Michele M. Carr, MD, DDS, MEd, PhD; Steven W. Coutras, MD, FRACS

Introduction: Obstructive sleep apnea (OSA) in children is treated primarily with adenotonsillectomy (AT). The purpose of this study is to evaluate changes in apnea-hypopnea index (AHI) in children undergoing lingual tonsillectomy (LT), midline posterior glossectomy (MPG), or combined procedures (LT+MPG) for obstructive sleep apnea (OSA).

Method: A retrospective review of pediatric patients with OSA who underwent base of tongue surgery as indicated by drug-induced sleep endoscopy (DISE) was performed. Patients with lingual tonsil hypertrophy, macroglossia, or both were selected. Pre- and postoperative obstructive apnea hypopnea index (oAHI) were compared. Age, sex, and body mass index (BMI) z-score were also evaluated.

Results: A total of 168 children were included with a mean age of 8.3 years (range 23 months to 17 years). Mean preoperative AHI was 6.93 (95% CI; 5.07–8.80) and mean oxygen saturation nadir was 87.44% (95% CI, 86.56%–88.32). A total of 101 patients underwent LT alone, 25 patients underwent MPG alone, and 42 underwent LT+MPG. Each surgical group experienced significant improvement in sleep apnea when comparing preoperative and postoperative oAHI ($P < .01$ for all groups). Mean improvement in oAHI was 3.52 (95% CI, 5.86–1.86) for the LT group, 2.70 (95% CI, 0.36–5.00) for the MPG group, and 3.70 (95% CI, 1.81–5.59) for the LT+MPG group. There was no significant difference in the severity of sleep apnea in each group measured by oAHI ($P = .591$), nor was there a difference in oAHI improvement for each group ($P = .941$). There was no significant difference in Z scores among the groups ($P = .174$).

Conclusion: Pediatric tongue base reduction by LT, MPG, or LT+MPG can significantly improve oAHI when performed as directed by DISE.

Comparing Mean Disease Alleviation of Upper Airway Stimulation to CPAP

Julianna Rodin, MD (Presenter); Emily Sagalow; Karl Doghramji, MD; Colin T. Huntley, MD; Maurits Boon, MD

Introduction: Continuous positive airway pressure (CPAP) is the typical first treatment modality used for obstructive sleep apnea (OSA); however, many patients fail therapy due to intolerance. Upper airway stimulation (UAS) is a treatment option for select patients with OSA who have failed CPAP. It has been shown to provide effective disease control and symptom relief with high patient compliance. We hypothesize that patients treated with UAS have comparable disease control using the mean disease alleviation concept.

Method: A retrospective chart review of OSA patients treated with CPAP and UAS at our tertiary care academic center was conducted. Demographic, pre- and posttreatment sleep study data, and therapy compliance were reviewed. We assessed patients at 1 year after institution of therapy. We used the mean disease alleviation concept and calculations to assess overall treatment efficacy and disease control.

Results: At 1 year, data on 35 of the CPAP patients were available. The remainder were lost to follow-up. In total, 56 UAS patients had full-night sleep study data. The mean age, body mass index, and pretreatment AHI of the CPAP and UAS groups were 59.2 and 61.1 years ($P = .541$), 35.1 and 27.9 kg/m² ($P < 0.001$), and 29.3 and 32.7 ($P = .320$), respectively. The mean nightly usage and treatment AHI in the CPAP and UAS groups were 5.0 and 5.6 h/night ($P = .262$) and 6.4 and 11.0 ($P < .001$). The treatment efficacy, adjusted compliance, mean disease alleviation, and remaining AHI in the CPAP and UAS cohorts were 72.2% and 62.7% ($P = .103$), 72.3% and 80.0% ($P = .262$), 51.0% and 50.5% ($P = .931$), and 12.7 and 16 ($P = .147$), respectively.

Conclusion: UAS is an effective treatment option in patients intolerant of CPAP with similar disease alleviation.

Comprehensive Strategy for Improving Nasal Outcomes After Maxillomandibular Advancement (OSA)

Mohamed Abdelwahab (Presenter); Robson Capasso, MD; Robert Riley; Courtney Chou; Ssam Most; Stanley Liu

Introduction: Our objective is to describe a comprehensive strategy to optimize nasal outcomes and to minimize corrective nasal surgery for patients with obstructive sleep apnea (OSA) after undergoing maxillomandibular advancement (MMA). Former rates were reported to be 18.7%.

Method: We performed a retrospective review of patients undergoing MMA surgery for OSA, with a comprehensive perioperative intervention to optimize nasal outcomes between January 2014 and February 2018. The main outcomes were the apnea hypopnea index (AHI), the oxygen saturation nadir (SpO₂), the incidence of corrective nasal surgery needed after MMA, and the Nasal Obstruction Symptom Evaluation (NOSE) scores.

Results: AHI after MMA showed significant reduction (-34.65 , $P < .001$). The SpO₂ nadir increased significantly ($+6.08$, $P < .001$). NOSE scores decreased significantly (-5.96 , $P < .001$). Corrective nasal surgery needed after MMA was reported in 6.5% (8 of 122) subjects at a mean of 8.5 months, ranging from 1 to 24.7 months. Six subjects

underwent either septoplasty and/or valve stenosis repair, and 2 subjects underwent functional and cosmetic rhinoplasty (mean follow-up of 34.2 months, ranging from 11 to 77 months).

Conclusion: While MMA remains one of the most effective procedures for the treatment of OSA, we previously published the rate of postoperative corrective nasal surgery to be 18.7%. A comprehensive perioperative strategy was applied since 2014. Efficacy of the strategy was reflected by the reduction of post-MMA corrective nasal surgery to 6.5% (relative risk reduction of 65%).

DISE-Guided Treatment for OSA: A Sleep Medicine Team Experience

Ana Campos, MD (Presenter); José Pais, MD;
Pedro Cebola, DDS; André Mariz, DDS;
Cristina Carocha, PhD; João Paço, PhD

Introduction: Obstructive sleep apnea (OSA) is a common sleep disorder with multiple management options. In our center, we perform drug-induced sleep endoscopy (DISE) with dental registry in patients with OSA, and the best treatment option is then evaluated with the patient and the team elements. This study aims to show different treatment options based on patients' individual characteristics, including DISE findings.

Method: In January 2021, we performed a retrospective cohort study of adult patients who underwent DISE between March 2019 and December 2020, in a total of 54 patients. We consulted clinical files to access clinical history, polysomnography (PSN) results, DISE findings, and recommended treatment. After excluding those with incomplete data, a total of 46 patients who underwent DISE in our center were included.

Results: Of a total of 46 patients, 14 (30%) were female and 32 (70%) were male, the mean age was 45.84 (23–68) years, and the mean body mass index was 25.67 kg/m² (24.4–35.2). Eleven (24%) patients were already under treatment: 5 (11%) had previous surgery and 9 (19%) were under continuous positive airway pressure (CPAP) therapy, with 6 (13%) reporting device maladaptation. Regarding PSN, 24 (52%) had mild OSA, 15 (33%) had moderate OSA, and 7 (15%) had severe OSA. DISE revealed complete or partial obstruction of the velum in 28 (61%) cases, of the oropharynx lateral wall in 15 (33%), of the tongue base in 20 (43%), and of the epiglottis in 19 (41%). Some 27 (59%) patients revealed multilevel obstruction, 18 (39%) in 2 levels, 3 (6%) in 3 levels, and 6 (13%) showed some degree of obstruction in all 4 levels. Patients were offered 1 or several combined treatment options: 23 (50%) were offered mandibular advancement device, 20 (43%) nasal surgery, 18 (39%) palatal surgery, 13 (28%) CPAP therapy, 11 (24%) pharynx surgery, 2 (4%) maxillomandibular advancement surgery, and 2 (4%) positional therapy.

Conclusion: OSA affects people of very different conditions. Ear, nose, and throat doctors are pivotal members of multidisciplinary teams, and DISE is a helpful tool to achieve an individually tailored treatment.

Does Insomnia Affect Outcomes in Patients Undergoing Upper Airway Stimulation?

Julianna Rodin, MD (Presenter); Emily Sagalow;
Garrett Largoza; Maurits Boon, MD; Colin T. Huntley, MD

Introduction: Insomnia is often comorbid with obstructive sleep apnea (OSA) and may impair compliance with continuous positive airway pressure and other OSA therapies. This study aims to compare outcomes and compliance with upper airway stimulation (UAS) therapy in OSA patients with and without comorbid insomnia.

Method: A single-center, retrospective review of patients undergoing upper airway stimulation surgery from June 2018 to June 2020 at a tertiary care academic center was conducted. Baseline demographic data, preoperative and postoperative sleep study data, insomnia history, and compliance (usage in hours/week) data were reviewed.

Results: From June 2018 to June 2020, 137 patients underwent UAS surgery, with 64 (46.7%) of them having comorbid insomnia and 73 (53.3%) with OSA alone. Patients in the comorbid insomnia group all previously carried a diagnosis of insomnia in their chart, and 26 of them were prescribed sleeping medications. In the comorbid insomnia group, average age and body mass index (BMI) were 62 years and 28.6 kg/m², respectively. In the OSA alone group, the average age and BMI were 60 years and 28.7 kg/m², respectively. In the comorbid insomnia group, there were 31 patients with severe OSA and 33 with moderate OSA, with an average apnea hypopnea index (AHI)/respiratory event index (REI) of 33.2 and O₂ nadir of 81.3. In the OSA-alone group, there were 42 patients with severe OSA and 31 with moderate OSA, with an average AHI/REI of 34.3 and O₂ nadir of 79.6. In the insomnia group, 58 patients (90.8%) underwent either UAS titration study or home sleep test (HST) at 2 to 6 months postoperative, yielding an average REI of 14.2. Of these, 57 patients had compliance recorded at an average use of 39 hours per week. In the OSA-alone group, 60 patients (82.2%) underwent either UAS titration or HST with an average postoperative REI of 14.9. Of these patients, 54 of had compliance recorded, with an average use of 39.4 hours per week. There was no statistically significant difference between the 2 groups in efficacy measured by REI ($P = .1847$) and compliance ($P = .9272$).

Conclusion: Patients with OSA and comorbid insomnia undergoing UAS have similar reduction in REI and compliance rates to those with OSA alone.

Effect of Adenotonsillectomy on Polysomnographic Data on Children With OSAS

Joselina Antunes (Presenter); Nuno Mendes;
Liliana Carvalho; Cristina Adonis; Filipe Freire

Introduction: The aim of this study is to investigate the effect of adenotonsillectomy on polysomnographic data, in children with severe obstructive sleep apnea syndrome (OSAS).

Method: Retrospective analysis of polysomnographic data in children diagnosed with severe OSAS and without comorbidity, submitted to adenotonsillectomy. Children were

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submitted to 2 polysomnographies, between 2010 and 2020. Severe OSAS is diagnosed as an apnea hypopnea index (AHI) $>10/h$, and central apnea syndrome (CSAS) is diagnosed as a central apnea index (CAI) $>5/h$. CAI $>1/h$ is considered abnormal. Cure of OSAS is considered when AHI is $<5/h$ after surgery. Data are presented as median (25–75th percentile). Data were available for 67 children, 45 boys and 22 girls, with a median age of 3.9 (2.7–5.3) years. We found a CAI $>1/h$ in 34 children (52.3%) and CSAS in 3 children (4.5%).

Results: AHI decreased from 14.2 (11.0–18.5) to 2.8 (2.0–3.8) ($P < .001$), due to a reduction in obstructive AHI from 13.1 (10.2–15.9) to 2.3 (1.6–3.3) ($P < .001$) but also due to a decrease in IAC from 1.0 (0.5–1.9) to 0.3 (0.1–0.9) ($P < .001$). We found cure of OSAS in 85.1% of children. Any children had CSAS after surgery, and we found a normalization of CAI in 28 children, 80.0% of those with an abnormal CAI before surgery. We also observed significant improvements in sleep architecture, with sleep efficiency increasing from 86.7 (80.1–90.5) to 90.5 (85.5–93.6) ($P = .004$), as awakenings decreasing from 11.7 (9.3–17.2) to 8.7 (7.1–10.7) ($P < .001$), along with a decrease in N1 sleep phase from 1.3 (0.3–2.3) to 0.5 (0.2–1.3) ($P = .003$) and an increase in rapid eye movement sleep from 14.4 (10.4–16.6) to 16.4 (12.9–18.2) ($P = .034$). No correlation was found between sleep architecture and AHI.

Conclusion: We observed high cure rates in children with severe OSAS treated with adenotonsillectomy. This treatment led to resolution of a significant number of obstructive events but also central ones, with resolution of CSAS in this population. We also found improvement in sleep architecture after surgery, with a tendency to decrease superficial sleep and increase deep sleep phases.

Effect of Cooling Irrigating Saline in Tongue Base Ablation Surgery

Ahmed Y. Bahgat, MD, EBE-ORL (Presenter)

Introduction: Plasma is formed by creating a high-density energy field within an electrically conductive fluid, such as saline. Sometimes ablated bits of tissue get stuck between the electrodes of the wand, obstructing the suction channel. The purpose of this study is to investigate the effect of cooling the irrigating saline when ablating hypertrophied tongue base in obstructive sleep apnea (OSA) patients.

Method: Study design: Prospective, randomized, controlled trial. Setting: Single setting at the ENT department, main university hospitals. Methods: Sixty adult OSA patients with tongue base hypertrophy underwent tongue base ablation surgery. Patients were randomly divided into 2 groups (30 patients each): group 1 received cooled saline and group 2 received room-temperature saline. The coblation wand used was the EVac 70 Xtra HP.

Results: A significant difference in operative time was seen between groups ($P = .001$), with a mean of 21.2 ± 5.5 minutes in the cold group and 47 ± 9.5 minutes in the control group. The wands in the cold group were not obstructed, whereas all the wands in the control group were obstructed by tissue clogs to variable degrees, hence wasting more time by cleaning the wands' tips.

Conclusion: Cooling the irrigating saline overcame the problem of wand clogs, and the wand tip did not occlude at all

during the procedures, thus saving time lost in wand cleaning and demonstrating faster and safer surgery. Further studies are also needed to identify the hemostatic effect of the cooled saline over the regular one.

Interobserver Agreement Among Otolaryngologists on Drug Induced Sleep Endoscopy

Nuno O'Neill Mendes (Presenter); João Rito; Diogo Raposo; Cristina Adonis; Ana Guimarães; Filipe Freire

Introduction: Drug-induced sleep endoscopy (DISE) allows for the identification of different levels of obstruction in the upper respiratory tract, and if obstruction is detected, it enables the observer to describe its conformation and severity according to one of the existing classifications. This work aims to evaluate (1) the interobserver agreement among otolaryngologists in the classification of DISE findings and (2) the agreement regarding therapeutic decision.

Method: This cross-sectional study was conducted during October 2020. A total of 40 DISE videos (performed in adults with obstructive sleep apnea [OSA] who refused continuous positive airway pressure therapy) were randomly selected from our archives. Previously operated patients or those with severe OSA were not included. Videos were reviewed by 6 observers (3 senior otolaryngologists [S group] and 3 residents [R group]). The observers rated the exam findings according to the modified velum, oropharynx, tongue base, epiglottis classification and suggested the best treatment for each case. Cohen's kappa coefficient (K) was used to evaluate interobserver agreement. Independent t test was used to analyze surgical decisions.

Results: Airway obstruction was assessed by seniors and residents, and with this parameter, there was 100% agreement between groups at the level of soft palate ($K = 1$), 77.8% at the oropharynx ($K = 0.679$), 83% at the tongue base ($K = 0.667$), and 88.9% at the epiglottis ($K = 0.455$). Concerning the severity and conformation of the obstruction, interobserver agreement was moderate to high at every level except at the tongue base ($K = 0.379$). With regard to the treatment, we found a higher rate of indication for tongue base surgery in the R group (55.0%) as compared with the S group (10.0%; $P = .04$; confidence level: 95%).

Conclusion: Although DISE is a reproducible exam, rating the severity of obstruction at the tongue base level is associated with disagreement between the most trained and less trained observers. Residents overrated the obstruction at that anatomical level and consequently showed a greater tendency toward tongue base surgery

Laryngeal Surgery in Obstructive Sleep Apnea: NSQIP-P Analysis of Complications

Michele M. Carr, MD, DDS, MEd, PhD (Presenter); Cathleen C. Kuo; Mohamed Elrakhawy, MD

Introduction: No national study has evaluated the predictors associated with extended hospitalization and other postop complications following laryngeal surgery in children with obstructive sleep apnea (OSA). The goals of this study were to

identify perioperative risk factors and describe general complications in these children using the National Surgical Quality Improvement Program–Pediatrics (NSQIP-P) database.

Method: Patients with OSA aged 0 to 18 years who underwent laryngeal surgery with a postop diagnosis of OSA were queried via the 2014 to 2018 NSQIP-P database using Current Procedural Terminology code 31541. Variables included age, sex, ethnicity, body mass index (BMI), medical comorbidities, American Society of Anesthesiologists (ASA) physical classification, operative time, and concurrent procedures. Endpoints of interest in this study were length of stay (LOS), unplanned reoperation, readmission, reintubation, and postoperative complications. Extended LOS (ExtLOS) was defined as the 75th percentile of the cohort. Univariate analysis and multivariate logistic regression were used to identify predictors for ExtLOS, 30-day readmission, and reoperation.

Results: A total of 181 children with a mean age of 4.36 years (95% CI, 3.74–4.99) and a male-to-female ratio of 1.35:1 were included. There were relatively few unplanned readmissions (5.0%), reoperations (1.7%), or reintubations (1.1%). Univariate analysis showed the following were associated with extLOS: lower body mass index ($P = .023$), structural central nervous system (CNS) abnormalities ($P = .022$), cardiac risk factors ($P = .035$), preoperative oxygen use ($P = .043$), worse ASA class ($P = .019$), longer operative times ($P < .001$), and concurrent procedures ($P < .001$). On multivariate analysis, structural CNS abnormality ($P = .032$), cardiac risk factor ($P = .045$), ASA class ≥ 3 ($P < .001$), longer operative time ($P = .002$), and concurrent procedures ($P < .001$) were positive predictors for extLOS.

Conclusion: This analysis confirms laryngeal surgery is a safe procedure for children with OSA. Further research into how to use these predictors in preoperative risk stratification is necessary.

Morphological Integration Between the Bony Nasopharynx and the Cervical Vertebrae

Alejandro Santiago Nazario (Presenter); Catalina Villamil

Introduction: The nasopharynx is a vital region for functions such as respiration, and maintaining these functions serves as an important constraint on the development of its surrounding structures, but the relationship of these functional constraints to the cervical vertebrae, which form its posterior border, are not well known. Previous clinical research has shown significant negative consequences when the bony nasopharyngeal boundaries become altered, such as the development of obstructive sleep apnea, as a result of cranial base and cervical vertebral morphological changes that may influence multiple cranial dimensions.

Method: We used a comparative approach to test whether the atlas, axis, face, and the cranial boundaries of the nasopharynx form an integrated module using 3-dimensional shape data from human ($n = 80$) and pan ($n = 44$) crania. We used 2-block partial least squares to obtain RV values (multivariate generalization of the squared Pearson correlation coefficient), covariance ratios (CRs), and z-scores for each potential pair of structures.

Results: Our results confirm that the nasopharynx and face form an integrated module (effect size = 14.0185, CR = 1.0296, $P = .001$) and that the atlas and axis are integrated with the face and nasopharynx (CR = 1.0206–1.058) to a greater extent than they are to each other (CR = 0.7797, $P = .001$). Finally, covariation tends to be stronger between the axis and nasopharynx (effect size = 9.4830) and between the axis and face (effect size = 9.0196) than between the atlas and any structure (effect size = 8.4396–8.7139).

Conclusion: These findings point to the important relationship between the upper cervical vertebrae and the maintenance of nasopharyngeal shape and function. By recognizing that the nasopharynx and the upper cervical vertebrae, particularly the axis, are morphologically integrated, clinicians can be on the lookout for potential upper respiratory pathologies arising from cervical anomalies early on. The early recognition and treatment of insidious sleep pathologies, such as obstructive sleep apnea, arising secondary to cervical anomalies can lead to improved diagnostic and therapeutic approaches in this patient population.

Multilevel Coblation Surgery in Obese Obstructive Sleep Apnea Patients

Ahmed Y. Bahgat, MD, EBE-ORL (Presenter);
Yassin Bahgat; Rajab Alzahrani; Abdulmohsen Alterki

Introduction: Obstructive sleep apnea (OSA) is a widespread and severe health problem. The gold standard for treatment remains continuous positive airway pressure (CPAP). However, many published research studies have shown that patient compliance with CPAP therapy can be as low as 50%. For those patients who are not compliant or cannot tolerate CPAP, surgical treatment may be an essential alternative option to be considered. Understanding the sites of upper airways collapse and their patterns are mandatory for surgical treatment decision making and efficiency. This study is to assess the feasibility, efficacy, and safety of using coblation technology with barbed sutures to perform multi-level sleep surgery in obese (body mass index [BMI] 30–35) patients with moderate to severe OSA (apnea hypopnea index [AHI] >15).

Method: A prospective study was conducted on 40 obese adult patients with OSA with a mean age of 42.8 ± 8.5 years and a mean BMI of 32.88 ± 1.69 kg/m². Coblation was used in tonsillectomy, palatopharyngeal muscle sectioning at its lower part with instant hemostasis, and ablation of supratonsillar fat in the lateral palatal space until the level of the contact point, and then the V-Loc wound closure device was inserted in the soft palate, similar to original barbed reposition pharyngoplasty. was used to resect or ablate tongue base with a similar technique as described in transoral robotic surgery. In the end, nasal surgery was done without putting in nasal packs.

Results: Coblation multilevel surgery is proved to be fast (mean operative time 95.8 ± 10.27 minutes) and minimally invasive (<100 mL blood loss and visual analog scale for pain 4 ± 1.22). Objective clinical improvement was confirmed by polygraphy 3 months postoperatively, with a significant

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decrease in mean AHI from 34.24 ± 10.26 to 14.12 ± 7.56 ($P < .005$). No significant complications were reported. No tracheostomy was carried out in any patient.

Conclusion: The use of coblation in a multilevel surgery setting in obese patients with moderate to severe OSA is proved to be feasible, effective in lowering AHI, and safe without major complications rather than non-obese patients.

OSA Characteristics and DISE Patterns in Males and Females

Lee Porterfield (Presenter);

Bartholomew J. Bacak, MD, PhD; Sveta Karelsky, MD

Introduction: Airway phenotypes on drug-induced sleep endoscopy (DISE) in adult men and women with obstructive sleep apnea (OSA) have not been compared. We aim to evaluate obstruction patterns, neck circumference, and OSA severity among men and women undergoing DISE.

Method: A retrospective chart review was conducted of adult patients undergoing DISE with dexmedetomidine from 2016 to 2020. Video recordings were retrospectively scored by an attending otolaryngologist. The standard velum, oropharynx, tongue base, epiglottis classification with modifiers to describe the pattern of collapse was used. Demographics, comorbidities, surgical history, and polysomnogram results were collected. Data were further stratified into body mass index (BMI) categories of under/normal weight (NW; BMI = 30 kg/m²).

Results: There were no significant differences in patient age, BMI, or AHI between men and women. Across all BMI categories, men ($n = 180$) had larger neck circumferences than women ($n = 82$; 14.6 ± 1.7 vs 16.7 ± 1.1 inches, $P < .001$) and smaller Epworth Sleepiness Scale (ESS) scores (9.4 ± 5.5 vs 11.2 ± 5.7 , $P < .029$). Comparison of NW and overweight (OW) women and men revealed no significant differences in AHI: NW 27.0 ± 20.6 vs 22.0 ± 18.7 , $P = .372$; OW 25.7 ± 25.4 vs 24.5 ± 17.9 , $P = .85$; and ESS: NW 9.10 ± 6.54 vs 7.9 ± 5.5 , $P = .602$; OW 10.6 ± 5.0 vs 8.9 ± 5.0 , $P = .178$. In obese subjects, women had lower AHI: 24.4 ± 18.7 vs 36.6 ± 22.1 , $P < .014$ and higher ESS 13.5 ± 4.8 vs 10.2 ± 6.5 , $P < .03$. There was no significant difference in the prevalence of preidentified DISE phenotypes (complete circumferential collapse at the velum, complete lateral oropharyngeal wall collapse, and complete tongue base collapse) between men and women within BMI categories.

Conclusion: Men had significantly larger neck circumferences than women did in every BMI category. Despite this, men and women had similar DISE findings at all anatomic levels. Comparable OSA severity was seen in men and women, except for those in the obese category, with obese men having greater severity than women.

Outcomes of 2-Incision Placement of Hypoglossal Nerve Stimulator for Obstructive Sleep Apnea

Michael Dougherty, MD (Presenter);

Derek Lam, MD, MPH; Prashant James, MD, MPH

Introduction: We compare the risks and benefits of a 2-incision vs 3-incision approach for hypoglossal nerve stimulator placement; counsel patients on the 2-incision approach; and implement a surgical protocol and workflow involving this new approach. The change to a 2-incision approach occurred in the second half of 2020. Follow-up data for patients implanted with this new approach have only recently begun to accrue.

Methods: This retrospective cohort study compared hypoglossal nerve stimulator (HNS) placement using a traditional 3-incision approach with a newer 2-incision approach. Subjects included adult patients who underwent HNS placement at Oregon Health and Science University from December 2017 to January 2021. Data included demographics, pre- and postoperative apnea hypopnea index (AHI), operating time, and complications.

Results: In total, 30 patients were included: 17 implanted using 3 incisions and 13 using 2 incisions. Demographic data were similar in both groups. Patients in the 3-incision group had slightly worse baseline obstructive sleep apnea compared with the 2-incision group (AHI 39.3 [95% CI, 28.1, 50.4] vs 27.4 [95% CI, 17.8, 37.0] events/h, respectively; $P = .11$). Operating time was reduced by a mean of 51 minutes (29%; 175 [95% CI, 152, 198] vs 124 [95% CI, 102, 145] minutes, respectively; $P = .002$). The results were similar when excluding the first 3 implanted patients in each group to account for a surgical learning curve (168 [95% CI, 146, 190] vs 116 [95% CI, 105, 127] minutes, respectively; $P = .0005$). Complications were uncommon in both groups with no significant difference in incidence.

Conclusion: Our results show a substantially shorter operating time with a 2-incision approach to HNS implantation with similar treatment efficacy and risk of complications.

Perception of Nasal Function and Cosmesis After Skeletal Sleep Surgery

Mohamed Abdelwahab, CA (Presenter); Courtney Chou; Audrey Yoon; Yeon Joo Hong; Stanley Liu

Introduction: Contemporary sleep surgery seeks to optimize both form and function. For procedures that require skeletal movement of the midface, nasal form and function are important considerations for both surgeons and patients with obstructive sleep apnea (OSA).

Method: This is an ongoing retrospective study evaluating subjects undergoing skeletal sleep surgery: (1) endoscopic distraction osteogenesis maxillary expansion (DOME) or (2) maxillomandibular advancement (MMA) for obstructive sleep apnea (OSA) from September 2020 to 2021 at the Stanford Sleep Surgery Division. The outcome measure used to assess nasal function and cosmesis was the validated Standardized Cosmesis and Health Nasal Outcomes Survey (SCHNOS).

Results: Only subjects with completed SCHNOS scores were included in the study. Four subjects completed DOME and 10 completed MMA. The SCHNOS-O (nasal obstruction

domain) did not show changes after either procedures ($P = .139$ and $P = .342$, respectively). The SCHNOS-C (nasal cosmesis domain) did not change significantly ($P = .932$ and $P = .499$, respectively).

Conclusion: We have previously published methods that optimize nasal function and cosmesis for patients undergoing MMA. MMA is known to have potentially deleterious effects on the nose. Our study shows that patients do not report negative postsurgical nasal function and cosmesis from either DOME or MMA.

Postoperative Amyloidosis of Tongue Base After Multilevel Sleep Surgery

Ahmed Y. Bahgat, MD, EBE-ORL (Presenter);
Claudio Vicini

Introduction: Amyloidosis is to be considered in the differential diagnosis of postoperative edema of tongue base after its ablation. It might be triggered by surgical trauma. After establishment of diagnosis, the cause of secondary amyloidosis should be excluded.

Method: This is a case report.

Results: When amyloidosis is suspected, it requires tissue biopsy under local anesthesia, and microscopic examination (using hematoxylin and eosin and Congo red stains) is usually sufficient to establish a diagnosis. The next step is to exclude other organ involvements in systemic amyloidosis, then exclude underlying systemic disease (eg, chronic inflammatory arthritis, tuberculosis, familial Mediterranean fever, and Crohn disease). Finally, it is important to establish the subtype of amyloidosis. This is usually tested using serum or urine immunofixation electrophoresis to search for a clonal disorder.

Conclusion: Recommendations regarding amyloidosis diagnosis are as follows: (1) Congo red stain is currently the gold standard for amyloid detection and (2) the type of amyloid must be identified microscopically or immunohistochemically, not solely on clinical or DNA studies. Cooperation with other medical specialties is crucial for correct and early diagnosis.

Referral Trends for an Otolaryngology Sleep Surgery Practice

Amiel Mercado, MS (Presenter);
Claudia I. Cabrera, MD, MS; Amy Schell, MD

Introduction: Consideration for surgical therapy for obstructive sleep apnea (OSA) often requires extensive workup of the patient's disease severity, comorbidities, past treatment, airway anatomy, and body mass index (BMI). The aim of this study is to analyze referral trends for otolaryngology sleep surgery candidates and additional workup considerations within each referral group.

Method: A retrospective chart review was performed examining adult sleep surgery candidates who underwent drug-induced sleep endoscopy (DISE) at a tertiary-care academic medical center between 2018 and 2020. Demographic, disease, and referral data were recorded. A BMI of 32 kg/m^2 and

diagnostic sleep study within the preceding 2 years were used as a corollary for sleep surgery readiness. Insomnia Severity Index (ISI) was used as a measure of this common sleep comorbidity

Results: A total of 116 patients (mean age 53 ± 16 years) were analyzed. Patient's referral sources were 22.5%, 19.1%, 18.3%, 33.9%, and 6.2% for self, primary care, otolaryngology, sleep medicine, and other physician specialist, respectively. The percentage of patients that needed additional workup for diagnostic testing or weight loss counseling was 70.4% for self-referred patients, 57.1% for primary care referred, 35.0% for otolaryngology referred, and 43.6% for sleep medicine referred. Self-referred patients had the lowest mean ISI (14.0; SD = 0.55), whereas otolaryngology-referred patients had the highest (15.3).

Conclusion: There is a diverse network of professionals that refer OSA patients for sleep surgery. Although sleep medicine is the most prominent source of referrals, many patients are referred by primary care or other otolaryngology providers. Almost a quarter of the patients were self-referred, suggesting a bevy of self-motivated patients interested in exploring OSA treatment alternatives. In this cohort, otolaryngology-referred patients required less workup but also had the highest mean ISI.

Representation of Gender and Race in Sleep Surgery

Peter M. Debbaneh, MD (Presenter); Megan Durr, MD;
Kimberly Ramirez, MD; Nikolas Block, MD

Introduction: We aim to understand gender and racial demographics described in sleep surgery studies; consider external validity and generalizability of current evidence in sleep surgery; and implement gender and racial representation in future research studies. Our abstract highlights the timely topic of gender and race representation in medicine, looking specifically at sleep surgery studies over the past 5 years. We have included studies up to 2021, reflecting the most updated data on the subject.

Methods: A systematic review was performed to identify studies of that evaluated sleep surgery in adults with reported obstructive sleep apnea (OSA) outcomes published between 2016 and 2020. PubMed, MEDLINE, and Ovid databases were searched. Studies evaluating bariatric surgery, tracheotomy, maxillomandibular advancement, or nasal septal surgery alone were excluded. Pooled gender, racial, and ethnicity data of the enrolled subjects in each study were tabulated.

Results: The 152 included studies comprised 13,078 patients. Of the 143 studies that reported gender, 80.5% of patients were male. These gender differences exceed the expected differences based on known prevalence of OSA in men and women. Only 14 studies reported racial/ethnic demographic data. Of these studies, 89.4% of patients were White. Of 30 studies of primarily American patients, only 5 reported race demographic data.

Conclusion: There is gender and racial/ethnic bias in the demographic composition of participants in sleep surgery studies from 2016 to 2020. Future research should strive to

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document demographics of enrolled patients as well as recruit patients representative of the epidemiological demographics of disease prevalence of obstructive sleep apnea.

Sleep Endoscopy and Cine MRI Directed Surgery for Pediatric OSA

Carol Li, MD (Presenter); Yann-Fuu Kou; Michael DeMarcantonio; Christine Heubi; David Smith, MD, PhD; Stacey Ishman, MD, MPH

Introduction: Cine magnetic resonance imaging (MRI) and drug-induced sleep endoscopy (DISE) are performed to evaluate sites of obstruction in children with persistent obstructive sleep apnea (OSA) after adenotonsillectomy. This study reports outcomes of DISE and cine-MRI guided surgery for persistent OSA.

Method: A retrospective chart review was performed for patients who underwent cine MRI- and DISE-guided surgery between 2015 and 2020. Chi-square analysis was used to investigate the association between diagnostic findings and surgeries. Wilcoxon signed-rank tests were used to compare pre- and postoperative polysomnography (PSG) measures.

Results: We studied 126 patients, mean age 10.5 ± 4.3 years, 36% female, 55% with Down syndrome. The most common surgeries were inferior turbinate reduction (35.7%), revision adenoidectomy (25.4%), and lingual tonsillectomy (24.6%). There was a significant association between DISE-identified inferior turbinate hypertrophy and turbinate reduction ($P = .001$). Adenoid hypertrophy identified on DISE or cine MRI was associated with revision adenoidectomy ($P < .001$). Lingual tonsil hypertrophy identified on DISE was associated with lingual tonsillectomy ($P = .03$), while hypertrophy on cine MRI was not ($P = .235$). There was no association between tongue base obstruction on DISE or cine MRI and tongue base surgery ($P = .55$ and $.58$, respectively). Overall, DISE- and cine MRI-directed surgery resulted in a decrease in the apnea-hypopnea index from 11.5 to 4.5 events/h ($P = .001$). For patients who underwent lingual tonsillectomy alone ($n = 15$), the median apnea hypopnea index decreased from 14.4 to 2.5 events/h ($P = .01$).

Conclusion: Children evaluated with same-day DISE and cine MRI who underwent directed surgery for persistent OSA following adenotonsillectomy exhibited an improvement in PSG outcomes.

Unilateral Hypoglossal Nerve Stimulation in Moderate and Severe OSA Patients

Clemens Heiser, MD, PhD (Presenter); Ulrich Sommer, MD; Benedikt Hofauer, MD; Amelie Birk, MD

Introduction: Unilateral selective hypoglossal nerve stimulation (uniHNS) is an efficient therapy in patients with obstructive sleep apnea (OSA). The aim of this study was to examine potential differences in the clinical outcome between patients with moderate OSA (mOSA) or severe OSA (sOSA).

Method: A consecutive cohort of 128 patients with moderate-to-severe sleep apnea were included and underwent uniHNS (Inspire Medical Systems) between 2014 and 2020. Patients were divided into 2 groups: group 1 patients ($n = 48$) suffered from mOSA (15/h AHI ≥ 30 /h), and group 2 patients suffered from sOSA. We provide data for body mass index, age, and sex for all patients. All patients underwent baseline polysomnography (PSG) prior to surgery and were controlled by a PSG 2 months and a home sleep study on month 6 and 12 after implantation. Apnea-hypopnea index (AHI) reduction, Epworth Sleepiness Scale (ESS), and therapy adherence have been examined as therapy endpoints.

Results: All participants showed a significant reduction of daytime sleepiness in both groups with no difference (mOSA 11 ± 4.6 [baseline], 6 ± 3.8 [12 months] and sOSA 10.0 ± 5.5 [baseline], 7 ± 4.4 [12 months]; $P = .6$). Adherence time did not differ between both groups at month 12 (mOSA: 6.1 ± -2.5 h/night; sOSA 5.0 ± 2.5 h/night; $P = .34$). The AHI reduction was in mOSA from 24.3 ± 4.4 to 6.9 ± 6.1 and in sOSA from 41.6 ± 12.1 to 11.6 ± 12.7 at month 12 ($P = .001$), which showed a statistical significance between both groups.

Conclusion: uniHNS is an effective therapeutic approach for mOSA and sOSA. In our patient cohort, we showed that uniHNS has a slightly better outcome in subjects suffering from moderate than in patients with severe sleep apnea.



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