

## Message from the President, Charles W. Beatty, MD FACS



Welcome to the 120th Annual Meeting of the Triological Society! It has been a sincere honor and distinct privilege to serve the membership as President this year. This venerable Society has become increasingly robust and stimulating since its inception over 120 years ago! We can be particularly proud of the outstanding 2017 program that has been assembled by our Program Chair, Brian Nussenbaum, MD, with the assistance of an exceptional Program Committee. I strongly urge you to closely review the topics to be discussed in over 50 podium presentations and nearly 150 posters in addition to several stimulating panels. My heartfelt gratitude to the committee and participants for making this a tremendous educational forum!

I would especially recommend that you attend the Ogura Lecture where Eric J. Moore, MD, will address the evolving presentation, treatment and possible prevention options related to oropharyngeal cancer. You will note in the condensed program below the panels that will highlight a wide variety of topics. There is something for everyone.

Additionally, I hope you have the opportunity to renew old friendships, meet new colleagues, and share the camaraderie of the Society in this wonderful San Diego venue! Enjoy!

## FRIDAY AT A GLANCE

7:00 - 7:50 Business Meeting (Triological Fellows Only) followed by  
New Fellow Ceremony and Reception - Seaport F-G-H

### General Session - Seaport F-G-H

8:05 Welcome and Introduction of Special Guests  
8:25 Presidential Address  
8:40 - 8:55 Harris P. Mosher and Edmund Prince Fowler Thesis Presentations  
8:55 Ogura Lecture  
9:20 - 9:45 Break with Exhibitors/View Posters

### Concurrent Session 1 - Seaport F-G-H

9:45 - 12:00 Head and Neck/Laryngology Panels and Papers  
PANEL: Updates in Head and Neck Cancer Management  
PANEL: Dysphonia in Patients without Lesions or Motion Abnormalities  
12:05 Adjourn/Lunch in Exhibit Hall/View Posters  
5:30 - 7:00 TRIO, ANS, AOS, AAFPRS Meet the Authors Poster Reception

# FRIDAY AT A GLANCE (cont'd)

## Concurrent Session 2 - Seaport D-E

- 9:45 - 12:00 Otolaryngology/Neurotology and Pediatric Otolaryngology Panel and Papers  
PANEL: Evaluation and Management of a Child with Sensorineural Hearing Loss - What's New?
- 12:05 Adjourn/Lunch in Exhibit Hall/View Posters
- 5:30 - 7:00 TRIO, ANS, AOS, AAFPRS Meet the Authors Poster Reception

# SATURDAY AT A GLANCE

- 7:00 - 7:50 Annual Business Meeting (Triological Fellows Only) - Seaport F-G-H
- 7:55 Welcome by President

## Morning Scientific Session - Seaport F-G-H

- 8:00 - 9:48 Facial Plastic/Reconstructive Surgery and Sleep Medicine Panel and Papers  
PANEL: The Aging Face - What's Real and What's Hype?
- 9:48 - 10:20 Break with Exhibitors/View Posters
- 10:20 - Allergy/Rhinology Panel and Papers  
PANEL: Sinusitis Management of Atypical Rhinosinusitis
- 12:00 - 1:00 Lunch in Exhibit Hall

## Afternoon Scientific Session - Seaport F-G-H

- 1:00 - 5:00 Clinical Fundamentals and General Otolaryngology Panels and Papers  
PANEL: Optimizing Outcomes after Tonsillectomy  
PANEL: Teaching Millennials: What Works and What Does Not
- 2:45 - 3:15 Break with Exhibitors/View Posters
- 5:00 Introduction of President-Elect and Adjourn

# 120TH ANNUAL MEETING AT COSM

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## Triological Society's Mission Statement and Goals

The American Laryngological, Rhinological and Otological Society, Inc., aka The Triological Society, was founded in 1895 in New York, New York. In the more than 120 years since its founding, the Triological Society has attracted the best and brightest in academic and clinical otolaryngology. Membership in the Triological Society brings the distinction of being elected to the most prestigious society in otolaryngology. Active Fellowship is achieved by presenting a thesis in the field of otolaryngology considered acceptable to a panel of peers. For those entering the field of otolaryngology, the Society provides role models. For those who are committed to research and related scholarly activity, the Society offers fellowship with like-minded peers who share common values, interests, and concerns.

The Society disseminates scientific information by presenting the latest basic science and clinical information at scientific meetings and through publication of its scientific journals, ***The Laryngoscope*** and ***Laryngoscope Investigative Otolaryngology***. The Society promotes research into the causes of and treatments for otolaryngic diseases by attracting promising physicians to scholarly otolaryngology research and supporting their development, providing financial support for the research efforts of young scientists, and promoting the highest standards in the field of otolaryngology-head and neck surgery.

## Mission

The mission of the Triological Society is to encourage and assist otolaryngologist-head and neck surgeons and other health care professionals to develop, maintain, and enhance their knowledge and skills in their pursuit of improved patient care through education, research, and fellowship.

## Goals

- To continue the noble legacy of the Triological Society, which is to attract, develop and mentor the best otolaryngologists to become scholars and leaders.
- To encourage, support, and disseminate through meetings, print and electronic mediums the latest basic and clinical research findings and reports on evidence-based medicine pertaining to the diagnosis, treatment and prevention of the full spectrum of disorders of the head and neck and related structures.
- To seek out and encourage scientific and technical advances in otolaryngology-head and neck surgery.
- To provide a forum through meetings, print and electronic mediums for the international exchange of ideas and knowledge in otolaryngology-head and neck surgery and related fields of medicine and science.
- To provide for physician professional development through support of teaching and peer reviewed research.
- To encourage the highest ethical and professional standards in the delivery of patient care by otolaryngologist-head and neck surgeons.
- To promote academic excellence by requiring peer recommendations and an acceptable mentored thesis for admission to membership.
- To ensure that all educational activities comply with ACCME directives, and develop vehicles for otolaryngologist-head and neck surgeons to meet their Maintenance of Certification requirements.
- To enhance fellowship amongst members by creating social forums for interface and conversation.
- To maintain ***The Laryngoscope*** and ***Laryngoscope Investigative Otolaryngology*** as primary journals at the forefront of excellence as a resource and venue for scientific advancement of the profession.
- To advance the Society's standing outside the field of otolaryngology-head and neck surgery and promote across all types of practice environments.

To facilitate the above goals, the Society sponsors educational meetings. The Society's journals, ***The Laryngoscope*** and ***Laryngoscope Investigative Otolaryngology*** serve as a means of disseminating the latest basic and clinical research results. The Society encourages research in otolaryngology-head and neck surgery by providing research grants and awards on a competitive basis.

In 2016, the Triological Society awarded:

- \$400,000 in grant funds to otolaryngologist-head and neck surgeons to 1) help facilitate research career development in young otolaryngologists; and 2) further support otolaryngology clinical scientists with new or existing K08/K23 awards;
- \$192,000 in travel awards to Fellow, resident and medical student presenters who gave podium and poster presentations at the Society's meetings;
- Nearly \$20,000 to Fellows, residents, and medical students who received top honors in presenting resident research award winning papers and award winning posters at the Society's meetings;

#### Learning Objectives for This Activity

This activity is designed for otolaryngologists-head and neck surgeons and other health professionals. Upon completion of this course, participants will be able to:

- Describe how to properly stage head and neck cancers, recognize how accurate staging directly impacts patient counseling of prognosis, and discuss how new advances in immunotherapy and robotics are having an impact on patient outcomes.
- Recognize how to properly diagnose and treat patients with hoarseness without lesions or motion abnormalities.
- Describe contemporary evaluation and management of children with sensorineural hearing loss.
- Distinguish the most effective techniques for treatment of the aging face from the hype of others that are less effective.
- Describe most effective methods of diagnosis and treatment strategies for patients with atypical forms of rhinosinusitis, such as caused by immunodeficiency, rheumatologic disorders, and cystic fibrosis.
- Implement best practices in perioperative management of patients undergoing tonsillectomy to maximize patient outcomes.
- Describe the most effective teaching techniques for millennials, and recognize which techniques are less effective for this generational group.

#### Disclosure Information

In compliance with the ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.

#### Program Evaluation and CME Certificates

Participant comments on program evaluation forms assist Program Advisory Committees in determining the direction of future educational activities. We appreciate your input and request that you complete a program evaluation in exchange for a CME certificate of attendance. Records are maintained in the Administrative Office of the Society and maintained by the American College of Surgeons for Fellows of the College. Requests may be made by sending a self-addressed envelope to: Triological Society • 13930 Gold Circle, Suite 103 • Omaha, NE 68144 • 531-355-8900.

#### Exhibits

Exhibitors will include representatives of pharmaceutical companies, instrument companies, diagnostic equipment companies, publishers, and others. We encourage attendees to visit the exhibit hall for information that may assist in their pursuit of improved patient care. Exhibitor arrangements are in compliance with the Accreditation Council for Continuing Medical Education (ACCME) Standards for Commercial Support.

*Information presented by exhibitors and oral and poster presenters does not represent an endorsement by the Triological Society.*

## **CONTINUING MEDICAL EDUCATION CREDIT INFORMATION**

### **Accreditation**

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American College of Surgeons and Triological Society. The American College of Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

### **AMA PRA Category 1 Credits™**

The American College of Surgeons designates this live activity for a maximum of **9.75 AMA PRA Category 1 Credits™**. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the *AMA PRA Category 1 Credits™* listed above, a maximum of **0.00** credits meet the requirements for Self-Assessment.



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**GUEST OF HONOR**  
**H. Bryan Neel, III, MD PhD FACS**



The career of Honorable H. Bryan Neel III, MD PhD is characterized by dedication to excellence, basic and clinical research, enlightened leadership, and unique administrative and policy making skills. A masterful surgeon and clinician, he is among the pioneers in head and neck cancer classification and immunology research with a broad portfolio of grant funded research beginning with his work at the NIH/NCI prior to joining the Mayo Clinic. As Professor and Chairman at Mayo, he guided the department to national prominence while publishing more than 230 original scientific papers and book chapters. He developed the Clinician-Investigator Program for Mayo residents in Otolaryngology-Head and Neck Surgery and is honored with a Mayo Foundation Visiting Professorship in his name in Otolaryngology-Head and Neck Surgery.

Having made many academic contributions to otolaryngology-head and neck surgery, he has also served in numerous leadership roles nationally and internationally including Treasurer of the American College of Surgeons, examiner and Treasurer for ABOto for many years, and Board member and Chair of the Investment Committee for AAO-HNS.

His record of accomplishments in and contributions to numerous civic activities and public service is remarkable. One of the most notable is his service as a Regent at the University of Minnesota, considered to be one of the highest levels of public service in the state. Community members and peers endowed a scholarship in his name for students in the health sciences at University of Minnesota, Rochester.

Dr. Neel is the recipient of innumerable awards for research, leadership, and service and recently received the Alumni Achievement Medallion from SUNY which is the highest award given by the Alumni Association, which recognizes distinguished service to American medicine and the community through significant contributions to the welfare of mankind. Additionally, the Neel Distinguished Research Lecture was established by the AAO-HNSF and takes place each year at the AAO annual meeting.

Dr. Neel's service to the Triological Society has been extraordinary. He has given generously of his time and talents continuously since 1992 when he became a member of the Council. He was President of the Society in 1997, playing an integral part in celebrating the Society's Centennial. He has served as the Historian since 2001. He was chosen to receive the Patrick E. Brookhouser, MD Award for Excellence in 2014 for his service and scientific contributions to the Society and otolaryngology as leader, mentor, scholar and clinician.

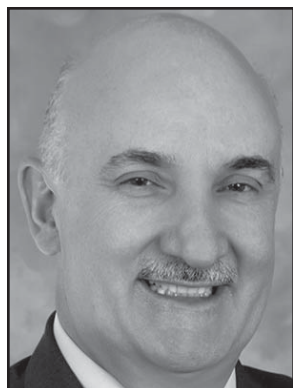
Dr. Neel received his BS from Cornell, MD from SUNY Downstate, and PhD from the Mayo Graduate School of Medicine/University of Minnesota. His postgraduate work and residency training included University of Minnesota, Mayo School of Medicine, and the NCI at NIH.

He is married to Ingrid Neel, MD and has three children and seven grandchildren.



## **PRESIDENTIAL CITATION AWARDEE**

### **Juan Manuel Garcia, MD**



Dr. Juan Manuel Garcia received his medical degree from the University of Rosario in Bogota, Colombia and was a Visiting Research Associate at the University of Illinois Eye and Ear Infirmary where he actively participated in the Neurotology Section from 1984 to 1985. Dr. Garcia completed his Otolaryngology/Neurotology Fellowship at the Fundación Universitaria de Ciencias de la Salud (Health Sciences University) in Bogotá. He was a Visiting Fellow at the Silverstein Ear Institute, the University of Illinois Eye and Ear Infirmary, and the University of Miami Ear Institute.

Dr. Garcia was the President of the 34th Pan-American Congress in 2014 and Chair of the Pan-American Committee of the American Academy of Otolaryngology from 2014-2016. Currently, he is head of the Otolaryngology Section at Fundación Santa Fé de Bogotá, a Clinical Professor at University of Los Andes, as well as the Director of the Otolaryngology fellowship program at the Fundación Universitaria de Ciencias de la Salud in Bogotá. Dr. Garcia is a corresponding member of the American Academy of Otolaryngology, a Fellow of the American Neurotology Society, and is Vice President of the Panamerican Association of Otolaryngology.

In 1992, Dr. Garcia performed the first cochlear implant in Colombia. With his team, he has visited many Latin American countries and several hospitals and clinics around Colombia to train and assist in organizing their cochlear implant and implantable hearing devices programs. He has been invited to share his scientific experience as a guest speaker at numerous national and international meetings. His main research interest and publications are in cochlear implants and implantable hearing devices. His publications include more than 50 scientific articles and book chapters, and he is a co-author of a book on Otorhinolaryngology, which is vastly read and studied throughout Latin America and Colombia.

## **PRESIDENTIAL CITATION AWARDEE**

### **John T. McElveen Jr., MD**



John T. McElveen Jr., MD had originally planned to pursue a career in cardiothoracic surgery. However, during his mandatory rotation in Otolaryngology during medical school at UNC Chapel Hill, the chairman of the department, Dr. Newton Fisher, suggested that he consider becoming a “fine cabinet maker” and not a “lumberjack”. Taking Dr. Fisher’s advice to heart, Dr. McElveen completed an ENT residency at Stanford. During his residency he benefited from the otologic expertise of Drs. Blair Simmons, Richard Goode, Mansfield Smith and Rodney Perkins. Following his residency, he completed a research and clinical fellowship at the House Ear Clinic/Institute. During his fellowship, he developed a particularly close working relationship with Drs. William F. House and William E. Hitselbeger. He stayed on as an associate of the House Ear Clinic for three years until recruited by Duke to head up their neurotology program. After six years at Duke, he moved to Raleigh and established the Carolina Ear & Hearing Clinic, the nonprofit Carolina Ear Research Institute and a camp for deaf children, Camp Woodbine. The camp was named in honor of his father, a decorated P-51 fighter pilot, whose “call sign”

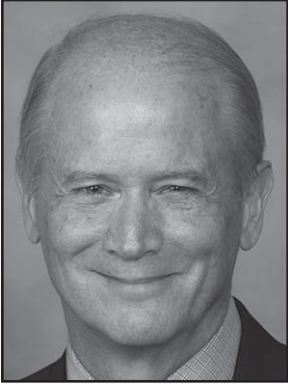
during the war was “Woodbine 80.”

Dr. McElveen is a member of the Triological Society, the American Otological Society, the American Neurotology Society and the Otosclerosis Study Group. He recently served as President of the ANS and is currently the secretary-treasurer of the Otosclerosis Study Group. He has published 60 articles and shares Dr. Howard House’s belief, “With knowledge comes a responsibility, that is to share it.” Dr. McElveen is actively involved in clinical research [much of it done in collaboration with members of the Clinical Otologic Research Team (C.O.R.T.)] and each year teaches temporal bone dissection courses in both Raleigh, NC and Vienna, Austria.

He is married to Christa McElveen and they have 18 year old twins, John Thomas and Madeline, who are currently enrolled at Davidson College. His hobbies include fly fishing, rowing and studying foreign languages.

## **PRESIDENTIAL CITATION AWARDEE**

### **Kerry D. Olsen, MD FACS**



Kerry D. Olsen, MD, Joseph I. and Barbara Ashkins Professorship in Surgery, is chair of the Division of Head and Neck Surgery in the Department of Otolaryngology and medical director of the Dan Abraham Healthy Living Center at Mayo Clinic. He is an emeritus member of Mayo Clinic Board of Governors and Board of Trustees.

Dr. Olsen received a BA degree in economics from Northwestern University and his MD from the first graduating class of Mayo Medical School. His internship in general surgery and residency in otolaryngology were completed at Mayo Graduate School of Medicine, and facial plastic surgery training at the Massachusetts Eye and Ear Infirmary. His academic rank is professor of Otolaryngology and Head and Neck Surgery in the Mayo College of Medicine.

He has over 200 publications, has championed surgical approaches for the removal of head and neck tumors that are commonly used today, and has one of the largest head and neck surgical practices in the country.

His greatest source of satisfaction is his family, a wonderful wife, four children, and a growing number of grandchildren. Dr. Olsen enjoys exercising regularly and adventurous outdoor trips around the globe.

## **JOSEPH H. OGURA, MD, LECTURER**

### **Eric J. Moore, MD FACS**



Eric J. Moore, M.D. is a Consultant and a Professor in the Department of Otolaryngology - Head and Neck Surgery at the Mayo Clinic, Rochester. He attended Princeton University where he received his BA in Chemistry. Dr. Moore received his MD in 1992 from Jefferson Medical College at Thomas Jefferson University in Philadelphia. He completed residency training at Mayo Graduate School. Dr. Moore served in the United States Air Force for four years and then completed a Mayo Clinical Fellowship in skull base surgery in Graz, Austria.

Dr. Moore is the Clinical Practice Chair for the Department of Otorhinolaryngology and is the Director of its Fellowship Program. He has been named Teacher of the Year five times and was named Mayo Clinic Distinguished Clinician in 2012. He was awarded the 2010 Chris O'Brien Traveling Fellowship Award by the American Head and Neck Society and the Australia/New Zealand Head and Neck Society. Dr. Moore's clinical interests are in robotic head and neck cancer surgery and head and neck microvascular reconstruction.

**Harris P. Mosher Award for Clinical Research**

**Jonathan M. Bock, MD, Medical College of Wisconsin**  
*Evaluation of the Natural History of Patients Who Aspirate*

**Edmund Prince Fowler Award for Basic Research**

**Syed F. Ahsan, MD FACS, Kaiser Permanente**  
*An Animal Model of Deep Brain Stimulation (DBS) for Treating Tinnitus - A Proof of Concept Study*

**Maureen Hannley Award for Alternative Science Research**

**Kofi Derek Boahene, MD FACS, Johns Hopkins Medical Institute**  
*Free Functional Transfer of the Omohyoid Muscle Tendon Unit: Flap Dissection, Biomechanical Modeling, Excursion and Potential Application in Facial Paralysis*

**Honorable Mention for Basic Science Award**

**Devraj Basu, MD PhD FACS, University of Pennsylvania**  
*Factors Impacting Generation of PDX Models of HPV Related Head and Neck Cancer*

**Honorable Mention for Clinical Research Award**

**Daniel Henriques Coelho, MD FACS, Virginia Commonwealth University School of Medicine**  
*MRI Surveillance of Vestibular Schwannomas without Contrast Enhancement: Clinical and Economic Evaluation*

**With Distinction Awards**

**Matthew L. Bush, MD FACS, University of Kentucky**  
*Promotion of Early Pediatric Hearing Detection through Patient Navigation: A Randomized Controlled Clinical Trial*

**David Goldenberg, MD FACS, Penn State College of Medicine/Penn State Hershey Medical Center**

*Altered Molecular Profile in Thyroid Cancers from Patients Affected by the Three Mile Island Nuclear Accident*

New Fellow Ceremonies followed by the reception with Triological Fellows is scheduled on Friday, April 28th from 7:00 am to 7:50 am.

- Yuri Agrawal, MD** .....Baltimore, MD
- Syed F. Ahsan, MD FACS** ..... Irvine, CA
- Lee Michael Akst, MD** .....Baltimore, MD
- Seilesh Chodavarapu Babu, MD** ..... Farmington Hills, MI
- Devraj Basu, MD PhD FACS** ..... Philadelphia, PA
- Kofi Derek Boahene, MD FACS** .....Baltimore, MD
- Jonathan M. Bock, MD** ..... Milwaukee, WI
- Matthew L. Bush, MD FACS** .....Lexington, KY
- Patrick Joseph Byrne, MD FACS** .....Baltimore, MD
- Thomas Leigh Carroll, MD** .....Boston, MA
- Daniel Henriques Coelho, MD FACS** .....Richmond, VA
- Benjamin T. Crane, MD PhD FACS**..... Rochester, NY
- Carole Fakhry, MD MPH (Fellow 2016)** .....Baltimore, MD
- Tamer AbdelHalim Ghanem, MD PhD FACS** .....Detroit, MI
- David Goldenberg, MD FACS** ..... Hershey, PA
- Julie L. Goldman, MD BS FACS** ..... Louisville, KY
- Gregory A. Grillone, MD FACS (Fellow 2016)** .....Boston, MA
- Romaine Fitzgerald Johnson, MD MPH**.....Dallas, TX
- Katherine Ann Kendall, MD FACS** .....Salt Lake City, UT
- Miriam Lango, MD FACS** ..... Philadelphia, PA
- Vincent YuWen Lin, MD**.....Toronto, ON Canada
- Jennifer Lynn Long, MD PhD** .....Los Angeles, CA
- Benjamin Daniel Malkin, MD FACS** ..... Elmhurst, NY
- Barry M. Rasgon, MD** ..... Oakland, CA
- Evan R. Reiter, MD FACS** .....Richmond, VA
- Joseph Scharpf, MD FACS** ..... Cleveland, OH
- Juan Manuel Garcia, MD (Associate)** .....Bogota, Colombia



## Harris P. Mosher Award

Given in recognition of the excellence of the Candidate's Thesis in Clinical Research. This honor was created to perpetuate the ideals of the great teacher for whom it was named and to bestow upon a worthy recipient the responsibility of furthering the highest standards of perfection in the study, teaching and practice of Otolaryngology.

## Harris P. Mosher • 1867-1954

Highly respected, feared, and revered by his students, Dr. Mosher attended Harvard College and the Harvard Medical School, receiving his MD degree in 1896. There were no formal residency training programs then, so he sought training at the best ear, nose and throat centers in Germany, namely, with Jansen in Berlin and Grunert in Halle. After returning home, Mosher became an instructor in the department of anatomy at the Massachusetts Eye and Ear Infirmary and the Harvard Medical School.

He started the first course in sinus anatomy in the United States. This course was to become famous for its content and its progenitor and was appropriately named "Mosher's course". It endured for 35 years.

In 1919 he was appointed Professor of Laryngology at the Harvard Medical School and Chief of Laryngology at the Massachusetts General Hospital. In 1932 he was appointed to the Walter Augustus LaCompte Chair of Otology at Harvard and at age 66 became the second individual to hold two chairs at Harvard. Dr. Mosher was a member and became the president of all of our prominent national otolaryngology societies. When the American Board of Otolaryngology was formed in 1924 (the second certification board after ophthalmology in 1917\*) he was chosen as its president and served in that capacity for 25 years. He was the recipient of the Semon Medal from the Royal Society of Medicine of London, the Gold Medal from the American Laryngological Association, and a service medal from the American Academy of Ophthalmology and Otolaryngology. He is known for his intranasal ethmoidectomy technique and his method for the removal of safety pins swallowed by babies, for which he was given a citation by the American College of Surgeons in 1934.

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\*Deliberations and progress in our specialty were interrupted by World War I. Also, there was growing resistance to authority to regulate specialty education and training--in essence, the transition from apprenticeships to formal training programs as we know them today. The need was urgent because some form of evaluation of physicians was needed to supplement the general licensing regulations of the various states' Boards of Public Health.

## Mosher Award Recipients

1957	Harold G. Tabb, MD	1987	James N. Thompson, MD
1958	Jack V.D. Hough, MD John A. Kirchner, MD	1988	Thomas V. McCaffrey, MD
1959	Maurice Schiff, MD	1989	Arnold Komisar, MD Bernard R. Marsh, MD
1960	Walter A. Petryshyn, MD Alex Weisskopf, MD	1990	Patrick J. Gullane, MD
1961	Godfrey E. Arnold, MD	1991	Robin T. Cotton, MD
1962	Wesley E. Compere, MD	1992	Myles L. Pensak, MD
1963	Edward G. McCoy, MD William W. Montgomery, MD Henry J. Rubin, MD	1993	Ronald A. Hoffman, MD
1964	Hugh O. Barber, MD	1994	Robert Sofferman, MD
1965	Brian F. McCabe, MD	1995	Fred Herzon, MD
1966	No award	1996	Stimson P. Schantz, MD
1967	Frank N. Ritter, MD George T. Singleton, MD	1997	Scott C. Manning, MD
1968	Leslie Bernstein, MD	1998	No award
1969	David A. Hilding, MD Lindsay Lee Pratt, MD	1999	Dennis S. Poe, MD
1970	Herbert H. Dedo, MD	2000	Lyon L. Gleich, MD David J. Terris, MD
1971	Byron J. Bailey, MD	2001	Joseph G. Feghali, MD
1972	Hugh F. Biller, MD	2002	Wendell G. Yarbrough, MD
1973	Mark May, MD Andrew W. Miglets, MD	2003	Edwin M. Monsell, MD PhD
1974	Robert W. Cantrell, MD	2004	Craig A. Buchman, MD
1975	Donald G. Sessions, MD	2005	Francisco J. Civantos, MD
1976	No award	2006	Henry T. Hoffman, MD Dana M. Thompson, MD
1977	Donald B. Hawkins, MD	2007	Erin D. Wright, MD
1978	Robert A. Jahrsdoerfer, MD	2008	Robert C. O'Reilly, MD
1979	Arnold M. Noyek, MD	2009	Steven J. Wang, MD
1980	H. Bryan Neel III, MD PhD	2010	Adrian L. James, MD
1981	Bruce A. Feldman, MD	2011	Robert L. Ferris, MD PhD
1982	Roger L. Crumley, MD	2012	Nira A. Goldstein, MD MPH Judith E.C. Lieu, MD MSPH
1983	S. George Lesinski, MD	2013	Joseph M. Chen, MD Adam Mikial Zanation, MD
1984	Irwin F. Stewart, MD	2014	George B. Wanna, MD FACS
1985	Frank E. Lucente, MD	2015	Lisa E. Ishii, MD MHS
1986	Harold C. Pillsbury, MD	2016	Giovana R. Thomas, MD FACS
		2017	Jonathan M. Bock, MD



## Edmund Price Fowler Award

Given in recognition of the excellence of the Candidate's Thesis in Basic Research. This honor was created to perpetuate the ideals of the great teacher for whom it was named and to bestow upon a worthy recipient the responsibility of furthering the highest standards of perfection in the study, teaching and practice of Otolaryngology.

## Edmund Prince Fowler • 1872-1966

It says something about the intellectual wealth of the Triological Society that Edmund Prince Fowler Sr., MD, succeeded Max Goldstein, MD, as president in 1932. Both were giants in otology, prolific authors and advocates for the hard of hearing. In honor of Dr. Fowler's contributions to otolaryngology, the Society established The Edmund Prince Fowler Award in 1971, given each year for the best thesis in basic research.

After earning his MD from Columbia University, Dr. Fowler joined the Manhattan Eye and Ear Hospital and became a clinical professor at Columbia University in 1933. He was a decorated colonel of World War I. He was president of the American Otological Society in 1937, recipient of the first Award of Merit from that society in 1952 and founder of the first hearing center in the United States (in New York City). To the legacy of the prodigious researcher and "Dean of Audiology", as he was called, we attribute the invention of the modern clinical audiometer. He tested many patients and soon became aware of the fact that some patients with severe or unilateral losses had suprathreshold hearing values, a condition he coined as "recruitment". This clinical finding resulted in the Alternate Binaural Loudness Balance test, the first to separate cochlear from retrocochlear losses.

In his address to the sections in January 1932, Dr. Fowler described specific recommendations for hearing tests on schoolchildren. He also asked his colleagues to be thoughtful: "Let us not forget to treat the patient as a sensitive human being," he said, "and aid him in surmounting the drawbacks and psychological reactions to his disability."

At the 38th Annual Meeting in Atlantic City, NJ, in 1932, Dr. Fowler shared the spotlight with Edward B. Dench, MD, first president of the Triological, then 72 years old. (Dr. Dench had been named Honorary President of the Society in 1931 until his death in 1936.) At the meeting, George Richards, MD, editor of the Transactions, outlined a list of guidelines for submissions. During the same meeting the council approved a resolution supporting the ABO and its work in raising educational standards in the specialty as part of an effort to stem the tide of proposals for examinations for specialists by each of the 48 states.

Dr. Fowler died in 1966, six months after the last of his 113 papers was presented (at 94 years of age!) at a meeting of the American Otological Society.

## Fowler Award Recipients

1971	Richard R. Gacek, MD	1994	Paul Lambert, MD
1972	Duane W. Nagle, MD	1995	Michael Pratt, MD
	Raimund G. Rueger, MD	1996	P. Ashley Wackym, MD
1973	Robert J. Ruben, MD	1997	Allen Hillel, MD
1974	Robert I. Kohut, MD		D. Bradley Welling, MD
	Willard B. Moran, Jr., MD	1998	No award
	Gershon J. Spector, MD	1999	Debra L. Tucci, MD
1975	Gregory J. Matz, MD	2000	Rick A. Friedman, MD
	Richard L. Vorhees, MD		Michael D. Seidman, MD
1976	Shokri Radpour, MD	2001	J. Christopher Post, MD
1977	LaVonne Bergstrom, MD	2002	Richard D. Kopke, MD
1978	Diran O. Mikaelian, MD	2003	Chung-Ku Rhee, MD PhD
1979	William L. Meyerhoff, MD	2004	Shawn D. Newlands, MD
	Clarence T. Sasaki, MD	2005	Steven W. Cheung, MD
1980	Robert A. Schindler, MD	2006	Alan G. Micco, MD
1981	Don E. Gebhart, MD	2007	Bradley W. Kesser, MD
1982	Michael E. Johns, MD	2008	Eric M. Genden, MD
1983	Bruce W. Jafek, MD		Marlan R. Hansen, MD
1984	David E. Schuller, MD	2009	Ravindhra G. Elluru, MD PhD
1985	Marvin P. Fried, MD		Andrew P. Lane, MD
1986	Michael Friedman, MD	2010	Philip D. Littlefield, MD
1987	Stanley M. Shapshay, MD	2011	Stacey L. Halum, MD
1988	Timothy T.K. Jung, MD	2012	Quyen T. Nguyen, MD PhD
1989	Robert T. Sataloff, MD	2013	Subinoy Das, MD FACS
1990	Soly Baredes, MD	2014	Hinrich Staecker, MD PhD
1991	Douglas E. Mattox, MD	2015	Bradford A. Woodworth, MD
1992	Vanessa G. Schweitzer, MD	2016	Gregory A. Grillone, MD FACS
1993	Ralph F. Wetmore, MD	2017	Syed F. Ahsan, MD FACS

## Maureen Hannley Award

Given in recognition of the excellence of the Candidate's Thesis in an Alternative Science category. This honor was created in 2016 to honor Dr. Hannley's contributions and legacy to the Triological Society. She was the Society's Thesis and Research Grants consultant from 2006 to 2015. Dr. Hannley assisted young researchers and mentored candidates for Triological Fellowship, assisting them with preparation of their theses.

Maureen Hannley, PhD, was a dedicated advisor and respected for her commitment to advance the mission of the Society to attract the best minds in otolaryngology. Her tireless work assured that the quality of the contributions of the candidates reflected the honor and prestige of membership. As the diversity of the academic and scientific work of the otolaryngology community evolved, Dr. Hannley acknowledged the importance of alternative scholastic contributions to our Society that fall outside the traditional basic and clinical research paradigms. This award is annually bestowed upon the candidate whose thesis represents an outstanding contribution in the alternative science category of Technology/ Procedure Development, Otolaryngology Status and Trends, Health Services Research, or Historical Perspectives.

Maureen Hannley, PhD received her M.A. from the University of Arizona and a Ph.D. in Hearing Science and Biocommunication from Baylor College of Medicine. Throughout her academic and research career, she held appointments at Louisiana State University, Kresge Hearing Research Laboratory, Stanford University School of Medicine, Duke University, Medical College of Wisconsin and, most recently, was a Professor in the Department of Otolaryngology at University of Arizona. Dr. Hannley held many administrative appointments, including that of Chief Research Officer at the AAO-HNSF and Health Services Administrator and Director of the Hearing Research Program at NIDCD. She lent her expertise to numerous advisory boards including NIH, ARO, SUO, and Boys Town National Research Hospital, to name a few.

## Hannley Award Recipients

2016 Paul Hong, MD FRCSC  
2017 Kofi Derek Boahene, MD FACS

## Honorable Mention for Basic Science Award

Given in recognition of the excellence of the Candidate's Thesis in Basic Science.

## Honorable Mention for Basic Science Recipients

1998	Perry M. Santos, MD, MS	2008	No Award
1999	Saumil N. Merchant, MD	2009	No Award
2000	Jennifer R. Grandis, MD	2010	Seth H. Dailey, MD
2001	William H. Lindsey, MD	2011	Norman D. Hogikyan, MD FACS Maie A. St. John, MD
2002	No Award	2012	Adrien Eshraghi, MD, MSC
2003	Sujana S. Chandrasekhar, MD	2013	John D. Macias, MD FACS
2004	Joseph Sniezek, MD	2014	Kenneth H. Lee, MD PhD
2005	Cliff A. Megerian, MD Brian Nussenbaum, MD	2015	Eunice Yuzu Chen, MD PhD Ian Neal Jacobs, MD FACS
2006	Eben Rosenthal, MD Richard L. Scher, MD	2016	Lamont RandallDesean Jones, MD
2007	Joseph E. Kerschner, MD J. Paul Moxham, MD	2017	Devraj Basu, MD PhD FACS

## Honorable Mention for Clinical Research Award

Given in recognition of the excellence of the Candidate's Thesis in Clinical Research.

## Honorable Mention for Clinical Research Recipients

1998	Kenneth M. Grundfast, MD	2010	Peter C. Belafsky, MD PhD Seth M. Cohen, MD MPH Jeffrey H. Spiegel, MD
1999	Randal Paniello, MD	2011	Carol R. Bradford, MD FACS Gregory J. Wiet, MD FACS
2000	Seth I. Rosenberg, MD	2012	Bruce H. Haughey, MBChB FACS
2001	Mark S. Courey, MD	2013	Amy Y. Chen, MD FACS Sam Joseph Daniel, MD MSC Tanya Kim Meyer, MD BS
2002	Christopher J. Linstrom, MD	2014	Andrew Richardson Scott, MD FACS
2003	Phillip K. Pellitteri, DO James C. Alex, MD	2015	Oliver F. Adunka, MD Hamid R. Djalilian, MD Brett A. Miles, MD DDS FACS
2004	Donald T. Weed, MD	2016	No Award
2005	George T. Hashisaki, MD Judith Czaja McCaffrey, MD	2017	Daniel Henriques Coelho, MD FACS
2006	Neil Bhattacharyya, MD		
2007	Joel A. Ernster, MD Natasha Mirza, MD		
2008	Marshall E. Smith, MD		
2009	Stephen F. Conley, MD FACS David R. Friedland, MD PhD		

## Honorable Mention Award

Given in recognition of the excellence of the Candidate's Thesis.

## Honorable Mention Recipients

1982	Joseph B. Nadol Jr., MD	1991	Gary L. Schechter, MD
1983	No award	1992	Lawrence P.A. Burgess, MD
1984	No award		William W. Shockley, MD
1985	George Paul Burns, MD Wayne F. Larrabee Jr., MD Richard T. Miyamoto, MD Leonard P. Rybak, MD	1993	C. Ron Canon, MD Gerald E. Merwin, MD (posthumous) James L. Netterville, MD K. Thomas Robbins, MD
1986	Paul J. Donald, MD Jack L. Gluckman, MD Jeffery P. Harris, MD	1994	Arthur S. Hengerer, MD Larry A. Hoover, MD Richard W. Waguespack, MD Steven M. Zeitels, MD
1987	Frederick M.S. McConnell, MD	1995	Kevin A. Shumrick, MD Robert C. Wang, MD
1988	C. Gary Jackson, MD	1996	Author Unknown
1989	Samuel R. Fisher, MD Joan T. Zajtchuk, MD	1997	George S. Goding Jr., MD Joseph Haddad Jr., MD Sigsbee W. Duck, MD
1990	David M. Barrs, MD James A. Koufman, MD		

## With Distinction Award

Given in recognition of the excellence of the Candidate's Thesis.

## With Distinction Recipients

2011	Julie L. Wei, MD	2015	Wade Wei-De Chien, MD
2012	Daniel D. Lydiatt, DDS MD FACS		Noam Aryeh Cohen, MD PhD
2013	Joseph A. Brennan, MD FACS	2016	No Award
2014	Howard W. Francis, MD	2017	Matthew L. Bush, MD FACS David Goldenberg, MD FACS

TRIOLOGICAL SOCIETY 120TH ANNUAL MEETING  
GRAND HYATT, SAN DIEGO, CALIFORNIA  
APRIL 28 - 29, 2017

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FRIDAY, APRIL 28, 2017  
SEAPORT F-G-H

7:00 - 7:50 **Business Meeting (Triological Fellows only)**  
**New Fellow Ceremony and Reception**

8:00 - 9:20 SCIENTIFIC GENERAL SESSION  
SEAPORT F-G-H

8:05 **Welcome and Introductions by President**  
Charles W. Beatty, MD FACS, Rochester, MN

**Presidential Citations**

Kerry D. Olsen, MD FACS, Rochester, MN  
John T. McElveen Jr., MD, Raleigh, NC  
Juan Manuel Garcia, MD, Bogota, Colombia, SA

**Introduction of Guest of Honor and Remarks**

H. Bryan Neel, III, MD PhD FACS, Rochester, MN

8:25 **Presidential Address**  
**Just Say "Yes"!**  
Charles W. Beatty, MD FACS, Rochester, MN

8:40 **Introduction of 2017 Thesis Awardees**  
*By Dana M. Thompson, MD FACS, Chicago, IL*

8:41 **2017 Harris P. Mosher Thesis Award Presentation**  
**Evaluation of the Natural History of Patients Who Aspirate**  
Jonathan M. Bock, MD, Milwaukee, WI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better predict overall mortality and risk of pneumonia from demonstrated aspiration on swallowing studies, and understand which dysphagia related diagnoses lead to higher rates of pneumonia and death.

**Objectives:** The natural clinical progression of aspiration to eventual pulmonary compromise is not well understood. We hypothesized that dietary modification recommendations, penetration-aspiration scale (PAS) score, and dysphagia etiology would be associated with changes in time to first pulmonary event and overall survival for patients with documented aspiration on radiologic testing. This study identified a cohort of patients with detectable aspiration on videofluoroscopic swallowing study (VFSS) and followed this cohort over time for development of pulmonary events and death. We then evaluated the correlation of aspiration severity and dietary modification recommendations on incidence of these endpoints. **Study Design:** Individual cohort study. Retrospective chart review. **Methods:** A total of 2616 VFSS exam reports were reviewed from our institution performed between January 1, 2009, and December 31, 2010. Aspiration (PAS of 5 or greater) was detected in 564 (21.5%) of these patients, who were then included in the study cohort. Medical records were reviewed retrospectively for development of pulmonary events (pneumonia, pneumonitis, or other life threatening pulmonary illness) and all cause mortality for up to 54 months after initial VFSS. Univariate Kaplan-Meier analysis and multivariate Cox regression were performed for time to first pulmonary event and survival predicted by recommended diet, PAS score, and dysphagia etiology. **Results:** Dysphagia etiology was highly associated with increased development of pulmonary events for some patients, especially those with generalized nonspecific dysphagia due to deconditioning or frailty (hazard ratio [HR] versus stroke 2.95, 95% CI: 1.53-5.69, p=0.001) and esopha-

geal dysphagia (HR 2.66, 95% CI: 1.17-6.02, p=0.019). Dysphagia etiology was also associated with increased mortality for patients with generalized nonspecific dysphagia due to deconditioning or frailty (HR 3.32, 95% CI: 2.0-5.52, p<0.001), post-surgical patients (HR 1.73, 95% CI: 1.05-2.86, p=0.032) and chronic neurologic disease (HR 1.87, 95% CI: 1.12-3.13, p=0.017). Dietary modification recommendations at the time of VFSS (prohibition of oral intake or modification of food consistency) had no significant impact on time to first pulmonary event (p=0.37) or survival (p=0.17), while PAS score was associated with decreased time to first pulmonary event on univariate but not multivariate analysis (hazard ratio for 1 point increase 1.6, 95% CI: 0.99-1.36, p=0.067). Kaplan-Meier estimate of overall 3 year mortality for this patient cohort was 39%. **Conclusions:** Etiology of dysphagia is associated with a higher mortality rate and development of pulmonary events in patients who aspirate on VFSS, especially for those patients with generalized deconditioning and frailty or esophageal dysphagia. Severity of aspiration as defined by PAS may predict shorter time to first pulmonary event but is not associated with altered overall survival. Dietary modification to an NPO status or modified food consistency had no statistically significant effect on development of pulmonary events or survival in patients with detectable aspiration on VFSS compared to full diet recommendation.

**8:48**            **2017 Edmund Prince Fowler Thesis Award Presentation**  
**An Animal Model of Deep Brain Stimulation (DBS) for Treating Tinnitus--A Proof of Concept Study**  
Syed F. Ahsan, MD FACS, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participant will be able to 1) an animal model of tinnitus is helpful in elucidating the mechanisms in development of chronic tinnitus and to study treatment options; 2) understand that DBS holds promise as a treatment option for patients with debilitating tinnitus; and 3) understand that nonauditory central nervous system pathway or structures are able to modulate neural activity in the auditory pathway.

**Objectives:** This proof of concept study aimed to demonstrate therapeutic effects of deep brain stimulation (DBS) on noise induced tinnitus. **Study Design:** An experimental animal study. **Methods:** Adult Sprague-Dawley rats were implanted in the caudate nucleus with custom made DBS electrode array. The rats were exposed to noise to induce tinnitus. Auditory brainstem response (ABR) was performed to evaluate hearing changes. Noise induced tinnitus and its suppression by DBS were evaluated using gap detection acoustic startle reflex paradigm and by evaluating effects on neural correlates of tinnitus. Various DBS parameters were used to determine which were most effective in affecting behavioral changes along with corresponding neural activity in the caudate nucleus. Correlation between the caudate and auditory cortex was also determined. Analysis of variance with Bonferroni correction was performed to examine DBS effects on behavioral evidence of tinnitus. **Results:** Bursting activity (BA), a neural marker of tinnitus, was noted to decrease compared to baseline in tinnitus positive (Tinn+) animals. The Tinn+ animals had an increase and the tinnitus negative (Tinn-) animals had a decrease in the spontaneous activity (SA) and BA after DBS. Behavioral evidence analysis using gap testing suggested suppression of tinnitus after DBS by electrical stimulation. These effects lasted up to 5 days after stimulation. To our knowledge, this is the first development of an animal model to test DBS of the caudate region for the treatment of tinnitus. **Conclusions:** DBS of the caudate nucleus can modulate tinnitus in a rat model of tinnitus.

**8:55**            **Joseph H. Ogura Annual Lecture**  
**Lessons Learned While Following the Metamorphosis of Oropharyngeal Cancer**  
Eric J. Moore, MD FACS, Rochester, MN  
*Introduction by Charles W. Beatty, MD FACS, President*

**9:20 - 9:45**    **Break with Exhibitors/View Posters**

9:45 - 12:00 CONCURRENT SCIENTIFIC SESSIONS

CONCURRENT SESSION 1 - HEAD AND NECK/LARYNGOLOGY  
SEAPORT F-G-H

**9:45 - 10:25**    **UPDATES IN HEAD AND NECK CANCER MANAGEMENT**  
**Moderator:** Carol R. Bradford, MD FACS, Ann Arbor, MI  
**Panelists:** **AJCC Staging System Changes: What and Why?**  
Dennis H. Kraus, MD FACS, New York, NY  
**Robotics: Advances and Applications**  
J. Scott Magnuson, MD, Celebration, FL  
**Immunotherapy-Emerging Roles in Head and Neck Cancer Therapy**  
Ravindra Uppaluri, MD FACS, St. Louis, MO



**Moderators: Albert L. Merati, MD FACS, Seattle, WA  
Brett A. Miles, MD DDS FACS, New York, NY**

**10:25 Thyroid Cancer Clinical Trials in the United States: Are We Maximizing Impact?**  
Alan Hsieh, BSc, Boston, MA; Charles Murchison, MD, Boston, MA; Anand Devaiah, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the pattern of clinical trials for thyroid cancer to characterize past emphasis and seek future directions.

**Objectives:** Thyroid cancer is the fastest increasing cancer in the United States, representing a 3 fold increase since the 1970s. This rapidly changing epidemiology warrants the strategic use of clinical trial data to better understand this phenomenon. By identifying trends in treatment regimens and results reporting in our research project, we aim to provide recommendations for future research directions that will contribute to ongoing clinical efforts towards improving patient survival. **Study Design:** Retrospective analysis. **Methods:** We gathered thyroid cancer clinical trials, based in the United States, from ClinicalTrials.gov. The study title, study design, treatment, results reporting, and cancer types were compiled and analyzed. PubMed.gov was used to verify publication rates. **Results:** Out of 200 000 studies, 73 investigated thyroid cancer trials, with trial start dates from 1998 to 2015. Drug studies were the overwhelming majority, composing 97% of all trials. The most common drugs, sorafenib and vandetanib, were studied in 20% of trials, and all other drugs were represented in 3 or fewer trials. Among treatment types, 14% included radiation therapy and 4% included surgery. We found that just 38% had their results reported on Clinicaltrials.gov, 13% had their results published in a medical journal, and 60% of these publications reported positive results. **Conclusions:** Our investigation of thyroid cancer clinical trials revealed primarily drug trials paired with standard treatments, with radiation and surgery underrepresented. Despite FDA requirements, we found that publication rates were low. We recommend more balanced studies of therapeutics and peer reviewed reporting of positive and negative trial results.

**10:32 Morbidity and Mortality of Oncologic Resections in Octogenarian and Older Head and Neck Cancer Patients**  
Heidi E. L'Esperance, MD, St. Louis, MO; Jay F. Piccirillo, MD FACS, St. Louis, MO; Dorina Kallogjeri, MD MPH, St. Louis, MO; Shahnawaz Yousef, BS, Kansas City, MO; Jason T. Rich, MD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss risk factors for perioperative complications and mortality in elderly head and neck cancer patients undergoing ablative surgical procedures.

**Objectives:** To ascertain the postoperative severe complication and mortality rates in octogenarians and older head and neck cancer patients undergoing ablative surgical resections, and to identify patient factors associated with increased postoperative morbidity and mortality in order to better counsel patients on their surgical risk. **Study Design:** Retrospective cohort study. **Methods:** Chart review, multivariate analysis, conjunctive consolidation. **Results:** In our retrospective cohort study of 219 eligible patients, 31% patients experienced a serious complication within 30 days of surgery, and 11% of patients died within 90 days of surgery. Multivariate analysis found several patient factors that were independently associated with morbidity and mortality and were both clinically relevant and statistically significant. ASA score of 4 or more and OR time >6 hours were patient factors associated with increased risk of serious complications; similarly age 90+ years, overall severe medical comorbidity, presence of dysphagia, and large extent of resection were patient factors associated with increased risk of death in 90 days. Conjunctive consolidation was utilized to create a 4-c category staging system to discriminate patients at high and low risk of mortality in 90 days (c-statistic 0.842). **Conclusions:** As population ages, otolaryngologists will be increasingly faced with dilemma of how to counsel elderly patients on operative risk. The 4 tiered staging system for postop mortality can help physicians discuss surgical risk with this patient population. Data suggests that performing shorter procedures with less extent of resection, when oncologically feasible, may reduce post-operative morbidity and mortality in this population. However, our study design prevents causal inference.

**10:39 EGFR Detection in Saliva as an Easy Diagnostic and Prognostic Tool in Oral Squamous Cell Cancer**  
Cesare Piazza, MD, Brescia, Italy; Alberto Paderno, MD, Brescia, Italy; Laura Zanotti, MD, Brescia, Italy; Elisabetta Bandiera, MD, Brescia, Italy; Francesca Del Bon, MD, Brescia, Italy; Antonella Ravaggi, MD, Brescia, Italy

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the role of serum and salivary EGFR as a diagnostic and prognostic marker in oral squamous cell carcinoma.

**Objectives:** The epidermal growth factor receptor (EGFR) is frequently overexpressed in a wide variety of malignancies, including oral squamous cell carcinoma (OSCC). Our objective was to assess the EGFR diagnostic and prognostic values

in OSCC, investigating its expression in serum and saliva. **Study Design:** Prospective case control study. **Methods:** Serum and saliva samples were collected from a cohort of OSCC patients before surgery and a matched group of healthy subjects. Serum EGFR concentration was determined by an enzyme linked immunosorbent assay (ELISA), according to manufacturer's instructions. Saliva EGFR concentration was determined with a modified protocol of the same immunoassay. Sixty-three naive patients affected by OSCC (cases) and 60 healthy individuals (controls) were included. **Results:** Regarding serum EGFR levels, OSCC patients (mean, 47.6 ng/ml) evidenced lower values ( $p < 0.001$ ) when compared with controls (mean, 53.7 ng/ml). Conversely, salivary EGFR concentrations were higher ( $p = 0.001$ ) in OSCC patients (mean, 8.2 ng/ml) than in controls (mean, 4.4 ng/ml). Salivary EGFR levels were also related with tumor pT classification ( $p = 0.02$ ). Considering 9.0 ng/ml (75<sup>o</sup> percentile) as the cut-off, patients with higher values of salivary EGFR had a worse prognosis in terms of disease specific survival ( $p = 0.017$ ), even when limiting the evaluation to pT4 tumors only ( $p = 0.05$ ). **Conclusions:** Salivary EGFR is a potential tumor marker for OSCC detection, with both diagnostic and prognostic values. Conversely, serum EGFR was significantly lower in patients but did not show any prognostic impact. Determination of these markers requires a noninvasive and low cost technique.

## 10:46 Clinical Characteristics and Outcomes for Salivary Gland Malignancies in Children: An Update from the SEER Database

Shannon N. Radomski, BA, Washington, DC; Sarah M. Dermody, BS, Washington, DC; Earl H. Harley, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the clinical characteristics and survival outcomes of children diagnosed with salivary gland neoplasms.

**Objectives:** Determine demographics, clinical characteristics, and survival rates for children with primary salivary gland neoplasms. **Study Design:** Retrospective analysis of a national population based tumor registry. **Methods:** All cases of primary salivary gland malignancies diagnosed between the years of 2002-2013 in patients ages zero to 19 years were extracted from the National Cancer Institute's Surveillance, Epidemiology, and End Results database (SEER). Additional variables collected included age, gender, ethnicity, tumor histological subtype, tumor size, treatment modality, vitality status, and followup time. Kaplan-Meier survival curves were generated to elucidate survival differences. **Results:** 245 patients with primary salivary gland malignancies were identified (220 parotid, 25 submandibular). Median age at diagnosis was fifteen. Most patients were female (59%), white (74%), and non-Spanish/Hispanic/Latino (81%). Among patients with parotid tumors, mean tumor size was 2.3 cm and there were 109 (50%) mucoepidermoid carcinomas and 86 (39%) acinar cell carcinomas. Most patients underwent surgery ( $n = 212$ , 96%) and 64 (29%) received adjuvant radiation. At a mean followup of 62.4 months, 10 patients (5%) were deceased. Kaplan-Meier survival curves illustrated that black children exhibited significantly higher mortality rates than white children (15.8% vs. 4.6%, log rank = 0.0260) as did those who underwent adjuvant radiation (15.73% vs. 3.2%, log rank = 0.0209). Among submandibular tumors, mean tumor size was 3.1 cm and there were 11 (44%) mucoepidermoid carcinomas. All patients underwent surgery and most received adjuvant radiation ( $n = 15$ , 60%). At a mean followup of 51.25 months 1 patient was deceased. **Conclusions:** Salivary gland malignancies in children and adolescents are rare. Overall survival for both parotid and submandibular tumors in children is good.

## 10:53 Health Disparities among Adults with Voice Problems in the United States

Kevin Hur, MD, Los Angeles, CA; Sheng Zhou, BS, Los Angeles, CA; Michael M. Johns, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the differences in access to care and healthcare utilization among adults with voice problems in the United States.

**Objectives:** To assess differences in access to care and healthcare utilization among adults who reported voice problems in 2012. **Study Design:** Cross-sectional study. **Methods:** The 2012 National Health Interview Survey was utilized to evaluate adults who had a voice problem in the past 12 months. Multivariate analyses determined the influence of sociodemographic variables on the prevalence of voice problems in adults and access to care. **Results:** Among 234 million adults in the United States,  $17.9 \pm 0.05$  million adults (7.63%  $\pm$  0.21%) experienced voice problems. After controlling for age, education, income level, geographic region, and health insurance status, Asians (OR: 0.43,  $P < 0.001$ ), African Americans (OR: 0.85,  $P < 0.05$ ), and Hispanics (OR: 0.62,  $P < 0.001$ ) had a lower odds ratio for voice problems relative to white adults. Among adults with voice problems, Hispanics and Asians were more likely to delay care because they could not reach a medical office by telephone (OR: 0.19 and 1.81,  $P = 0.023$  and 0.023) compared to white adults. Both black and Hispanic adults with voice problems were more likely to delay care because of long wait times at the clinic ( $P < 0.05$ ) compared to white adults. Adults with voice problems that were low income or had public insurance were more likely to postpone care because they did not have transportation. **Conclusions:** Targeted programs are necessary to address the health disparities and barriers to care among those who suffer from voice problems.

**11:00**            **Repairing the Vibratory Vocal Fold**  
Jennifer L. Long, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a tissue engineering approach to vocal fold replacement, compare this approach to vocal fold grafting, and consider factors for successful graft healing and function.

**Objectives:** An implantable vibratory vocal fold replacement would introduce a new treatment for structural disorders such as vocal fold scarring and lamina propria loss. The objectives of this work were to 1) demonstrate a tissue engineered replacement for the vocal fold lamina propria and epithelium in a rabbit model; and 2) compare implant histology and function relative to injured controls and orthotopic vocal fold mucosal transplants. **Study Design:** In vivo animal studies. **Methods:** Cell based outer vocal fold replacement (COVR) was formed from rabbit adipose derived stem cells and fibrin. 16 rabbits underwent laryngofissure and resection of unilateral vocal fold epithelium and lamina propria. The vocal fold was immediately reconstructed with one of three treatments: fibrin glue, autologous vocal fold cover replantation, or COVR implantation. After four weeks larynges were vibrated and examined histologically. **Results:** After one month both vocal fold graft types improved histology and vibration relative to injured controls. Extracellular matrix of the replanted mucosa was disrupted and ECM of the COVR implants remained immature. Immune reaction was evident in sex mismatched implants. Best histologic and short term vibratory outcomes were achieved with sex matched COVR implants. **Conclusions:** Stem cell based vibratory vocal fold replacement is feasible and beneficial in an acute rabbit implantation model. After one month all grafted vocal folds showed improved wound healing over injury alone. Compared to replanted native vocal fold tissue, COVR reduced fibrosis and improved vibration. Wound modifying behavior of the implant is therefore considered to be important in preventing fibrosis. Short term vibratory function is excellent, but further ECM maturation may be required for long term function.

**11:07**            **Early Injection Laryngoplasty for Unilateral Vocal Fold Paralysis Decreases the Risk of Thyroplasty: A Systematic Review and Meta-Analysis**  
Peter M. Vila, MD MSPH, St. Louis, MO; Neel K. Bhatt, MD, St. Louis, MO;  
Randall C. Paniello, MD PhD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the effect of an early injection laryngoplasty on patients with unilateral vocal fold paralysis, specifically how it relates to the risk of subsequent thyroplasty.

**Objectives:** To determine whether injection laryngoplasty during the first six months following onset of unilateral vocal fold paralysis (UVFP) decreases the rate of permanent thyroplasty in adults. **Study Design:** Systematic review and meta-analysis. **Methods:** Search strategies created by a medical librarian were implemented in Ovid Medline, Embase, Scopus, Cochrane Central Register of Controlled Trials, Database of Abstracts of Reviews of Effects, Cochrane Database of Systematic Reviews, and Clinicaltrials.gov. Inclusion and exclusion criteria were designed to capture randomized clinical trials and cohort studies examining adults with UVFP, who either received injection laryngoplasty early (< 6 months from diagnosis), or were observed. The primary outcome was the rate of thyroplasty. The Newcastle-Ottawa scale was used to assess quality of included cohort studies. Random effects meta-analysis was used to calculate an overall relative risk. Heterogeneity was evaluated with the i squared statistic. The number needed to treat (NNT) was calculated from the pooled studies. **Results:** The search strategy resulted in 1,177 studies, and 6 cohort studies met all inclusion and exclusion criteria. All studies were rated 9 of 9 on the Newcastle-Ottawa scale. Meta-analysis of 357 patients with UVFP revealed that those managed conservatively (late or no injection) were 3.7 times more likely (95% CI 2.6 - 5.3) than patients receiving an early injection to undergo thyroplasty. The i squared overall was 35.7% (low, meaning favorable for meta-analysis). The number needed to treat to prevent one thyroplasty was 1.9. **Conclusions:** Otolaryngologists should offer injection laryngoplasty to patients with a diagnosis of UVFP within six months of diagnosis.

**11:14**            **Q&A**

**11:20 - 12:00**    **DYSPHONIA IN PATIENTS WITHOUT LESIONS OR MOTION ABNORMALITIES**  
**Moderator:** Clark A. Rosen, MD FACS, Pittsburgh, PA  
**Panelists:** Mark S. Courey, MD, New York, NY  
Norman D. Hogikyan, MD FACS, Ann Arbor, MI  
Michael M. Johns III, MD, Los Angeles, CA

**12:00**            **Adjourn**

**5:30 - 7:00**     **Triological (with ANS, AOS and AAFPRS) Meet the Authors Poster Reception**

## CONCURRENT SESSION 2 OTOLOGY/NEUROTOLOGY AND PEDIATRIC OTOLARYNGOLOGY SEAPORT D-E

**Moderators: Karen J. Enright, MD PhD, Detroit, MI  
Howard W. Francis, MD, Baltimore, MD**

**9:45 Classification of Endoscopic Ear Surgery**  
Razan A. Basonbul, MBBS MPH, Boston, MA; Elliott D. Kozin, MD, Boston, MA; Samuel R. Barber, MS, Boston, MA; Alejandro C. Rivas, MD, Nashville, TN; Daniel J. Lee, MD FACS, Boston, MA; Michael S. Cohen, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss and classify the degrees endoscopic use in ear surgery, compare the use of endoscopes in previous published studies and future publications, and discuss outcomes based on the different classifications of endoscopic ear surgery.

**Objectives:** To propose and validate a classification system for use in endoscopic ear surgery. **Study Design:** Development and validation study. **Methods:** A classification system previously developed at our institution was utilized by three attendings, an otolaryngology resident, and a medical student. 50 ear surgery operative reports were reviewed by the attending surgeons for each case, and by an otologist from another institution, a resident and a medical student. Each case was classified according to a scale where class 0 represents use of microscope only, class 1 describes use of the endoscope for inspection only, class 2 is mixed dissection with both microscope and endoscope, and class 3 describes use of endoscope for the entire surgery. Class 2 is divided into subclasses, where 2a involves endoscope use for less than 50% of dissection and class 2b for more than 50%. **Results:** Weighted Cohen's kappa for inter-rater agreement between the 2 institutional surgeons was 0.81 (95% CI, 0.63-0.91) and similar measurement between institutional surgeon and the surgeon from outside 0.81 (95% CI, 0.52-0.82). Weighted kappa between attending surgeon and resident was 0.79 (95% CI, 0.55-0.84) and between surgeon and medical student was 0.78 (95% CI, 0.54-0.84). **Conclusions:** There was a moderate to strong inter-rater agreement suggesting that this endoscopic ear surgery classification system can be used as a simple and reliable tool by experts and trainees to describe the extent to which an endoscope was used during ear surgery. This system can be used for both retrospective review of operative reports and for prospective study.

**9:52 Eustachian Tube Reconstruction for the Treatment of Patulous Eustachian Tube**  
Elias M. Michaelides, MD, New Haven, CT; Madeline A. Coulter, BA, Farmington, CT (Presenter)

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate understanding of eustachian tube reconstruction with different implantation techniques and compare rates of improvement of patulous symptoms in patients with patulous eustachian tube (PET).

**Objectives:** In patients with patulous eustachian tube (PET), to determine the rate of improvement of patulous symptoms and overall satisfaction after reconstruction of the eustachian tube, using different implantation techniques. **Study Design:** Retrospective analysis of patients who previously failed medical treatment for PET and underwent eustachian tuboplasty. The use of different surgical materials and site insertion into the nasopharyngeal orifice of the ET is assessed to indicate treatment specific outcome on the basis of patient reported autophony and aural fullness in followup. **Methods:** Surgically, autologous cartilage was placed into a pocket on the anterior edge of the torus tubarius. In addition, some patients had implantation of acellular dermal matrix into the inferomedial eustachian tube. Postoperative interviews were conducted and patients were asked to rate their symptoms as: resolved, significantly improved/satisfied, significantly improved/dissatisfied, unchanged or worse. **Results:** 21 patients with 30 patulous ETs underwent surgical implantation. Improvement of autophony and aural fullness is reported as 72.73% and 76.92% in the cartilage only group and 84.62% and 91.67% in cartilage with acellular dermal matrix group respectively. Regarding the improvement of autophony, aural fullness and overall satisfaction, patient data is trending towards a greater benefit with the use of a combined AlloDerm and cartilage technique as compared to that of only cartilage graft. **Conclusions:** PET is often associated with bothersome auditory symptoms, for which there are a multitude of different medical treatments. Cartilage implantation in conjunction with AlloDerm implant shows promise to provide functional restoration to patients with PET.



**9:59 The Impact of Obesity in Vestibular Schwannoma Surgery: A Parallel Analysis of the NIS and NSQIP Databases**

Jacob S. Brady, BA, Newark, NJ; Shreya Patel, BS, Newark, NJ; Omar M. Mohamed, BA, Newark, NJ; Soly Baredes, MD, Newark, NJ; Evelyne Kalyoussef, MD, Newark, NJ; Yu-Lan Mary Ying, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand and discuss the nature of the relationship between obesity and complications of vestibular schwannoma surgery.

**Objectives:** Analyze the comorbidities and complications in obese patients undergoing vestibular schwannoma (VS) surgery. **Study Design:** Retrospective cohort study of cases from the National Inpatient Sample (NIS) and National Surgical and Quality Improvement Program (NSQIP) databases. **Methods:** Patients undergoing surgery for VS were extracted from the NIS and NSQIP databases from 2002-2013 and 2005-2013, respectively. Obese (BMI>29.9) and non-obese cohorts from the two datasets were examined independently for differences in demographics, comorbidities, and postoperative complications. **Results:** The NIS analysis included 5133 patients (6.2% obese) and the NSQIP analysis included 572 patients (39.3% obese). On bivariate analysis, the NIS showed increased rates of heart failure, depression, hypothyroidism, and chronic pulmonary disease in obese patients. NSQIP showed more obese patients with an ASA class of 3 or 4. Both datasets showed increased rates of hypertension and diabetes. Postoperatively, the NIS data displayed increased incidence of acute cardiac events ( $p=0.007$ ). The NSQIP data showed a greater incidence of DVTs ( $p=0.045$ ) and reoperation ( $p=0.044$ ). Multivariate regression of each dataset found no significant correlation of obesity with acute cardiac events ( $p=0.379$ ), DVTs ( $p=0.117$ ) or reoperation ( $p=0.145$ ). Additionally, both datasets showed no increase in postoperative infections, wound dehiscence, length of stay, or mortality. **Conclusions:** Independent analyses of the NIS and NSQIP databases found significant postoperative associations between obesity and acute cardiac events, DVTs, and reoperation. However, further analysis accounting for confounding factors did not find obesity to be an independent risk factor for the development of postoperative complications in obese patients undergoing VS surgery in both databases.

**10:06 A Systematic Review of Temporal Bone Trauma Causing Facial Nerve Injury: A Suggestion for Minimum Reporting Guidelines**

Prasanth Pattisapu, MD MPH, Houston, TX; Matthew L. Carlson, MD, Rochester, MN; Malia S. Gresham, BA, Houston, TX; Tyler J. McElwee, BS, Houston, TX; Jeffrey T. Vrabec, MD, Houston, TX; Alex D. Sweeney, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the current literature on complete traumatic facial nerve paralysis and to discuss what kind of data are still needed to fill gaps in the literature.

**Objectives:** To improve understanding regarding the management and prognosis of facial nerve injury after temporal bone trauma. **Study Design:** Systematic review. **Methods:** Medline and EmBase were searched for English language articles involving complete weakness of facial nerve following primary temporal bone trauma, used the House-Brackmann (HB) grading scale for outcomes, and explicitly reported a primary management strategy for all subjects. Individual case reports and series reporting temporal bone injuries in which facial paralysis cases could not be separately analyzed were excluded. Studies were assessed by 2 independent investigators for inclusion/exclusion criteria, and differences were resolved by an independent reviewer. Selected studies were evaluated for risk of bias and consistency of findings. Where available, trauma mechanism, radiographic findings, timing of injury and intervention, surgical strategy, surgical findings, complications, hearing outcomes, and HB level at followup were analyzed. **Results:** Of 611 candidate publications, 18 met inclusion criteria, all of which classified as level 4 evidence. Few studies had control groups, and selection bias limited comparison between surgical and nonsurgical management. Of the 252 patients meeting criteria, 225 (89%) underwent surgical intervention. Nerve edema (54%) and bony spicules/compression (21%) were the most commonly reported intraoperative findings. Injury occurred in the geniculate ganglion and labyrinthine segment in 62% of cases. **Conclusions:** Literature on traumatic facial nerve injury is plentiful, though variability in reporting methodology limits robust outcome comparisons. Standardization of reporting utilizing minimum reporting standards will optimize outcome analysis and further understanding of prognosis and optimal management. Minimum reporting guidelines for facial nerve injury in temporal bone trauma are proposed.

**10:13 Otologic Biomarkers: Early Detection of Hearing Loss in a Cisplatin Ototoxicity Model**

James G. Naples, MD, Farmington, CT; Robert Cox, BS, Farmington, CT; Gregory S. Bonaiuto, MD, Farmington, CT; Kourosh Parham, MD PhD, Farmington, CT

**Educational Objective:** At the conclusion of this presentation, the participants should have a more complete understanding of the mechanism by which cisplatin causes hearing loss and the clinical utility of specific inner ear biomarkers as early indicators of hearing loss. They should recognize the potential of otologic biomarkers as a more sensitive measure of hearing loss that occurs prior to significant ABR threshold shift. The participants should also have an improved understanding of newer potential therapeutic agents against cisplatin induced hearing loss such as diltiazem.

**Objectives:** To evaluate whether serum levels of the inner ear specific protein, prestin, are sensitive to hearing loss and effects of an otoprotectant agent, diltiazem, in an animal model of cisplatin ototoxicity. **Study Design:** Single institution, animal model. **Methods:** Two groups of 10 guinea pigs were used to evaluate serum levels of prestin after cisplatin administration. The relationship between prestin levels and auditory brainstem response (ABR) thresholds were compared in both groups. All animals had baseline blood draws and ABR thresholds recorded prior to cisplatin administration. A cisplatin bolus (8mg/kg) was given followed by 5 consecutive days of intratympanic saline or diltiazem (2mg/kg). Prestin levels and ABR thresholds were obtained at 1, 2, 3, 7 and 14 days post-cisplatin. **Results:** Mean serum levels of prestin were elevated above baseline on days 1-7 reaching a peak on day 2 post-cisplatin in the group receiving intratympanic saline. Prestin levels post-cisplatin were statistically significantly elevated from baseline on days 1-3 ( $p < 0.001$ ,  $p < 0.001$ , and  $p = 0.022$ , respectively), while ABR thresholds were significantly elevated on days 2-14. Serum prestin levels and ABR thresholds in diltiazem treated animals remained near baseline on days 1-14. **Conclusions:** Significant changes in serum prestin levels were detected prior to significant changes in ABR thresholds post-cisplatin. These changes were not seen in animals treated with the otoprotectant, diltiazem. Prestin may serve as a serological biomarker for early detection of cisplatin induced hearing loss. Future work will broaden the potential applications of prestin as a biomarker and early indicator of cochlear injury.

10:18 Q&A

## 10:25 - 11:05 EVALUATION AND MANAGEMENT OF A CHILD WITH SENSORINEURAL HEARING LOSS - WHAT'S NEW?

**Moderator:** Bradley W. Kesser, MD, Charlottesville, VA

**Panelists:** John H. Greinwald Jr., MD, Cincinnati, OH  
Margaret A. Kenna, MD FACS, Boston, MA  
Robert C. O'Reilly, MD FACS, Philadelphia, PA  
Harold C. Pillsbury, MD, FACS, Chapel Hill, NC

**Moderators:** Daniel I. Choo, MD FACS, Cincinnati, OH  
Kristina W. Rosbe, MD FACS, San Francisco, CA

## 11:05 Management Considerations for Octo- and Nonagenarian Cochlear Implant Recipients

Harold C. Pillsbury, MD, Chapel Hill, NC; English R. King, AuD, Chapel Hill, NC; Ellen J. Deres, AuD, Chapel Hill, NC; Andrea L. Bucker, AuD, Chapel Hill, NC; Sarah A. McCarthy, AuD, Chapel Hill, NC; Margaret T. Dillon, AuD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain medical considerations for geriatric cochlear implant recipients and discuss management plans to improve long term outcomes.

**Objectives:** It is well known that advanced age is not a contraindication to cochlear implantation, and geriatric cochlear implant recipients experience an improvement in speech perception and quality of life postoperatively. The management of octo- and nonagenarian recipients evolves as they advance in age, including new medical considerations and difficulties managing the external device due to physical and cognitive changes. This is further complicated if patients are lost to followup. **Study Design:** The present report examines potential complications in this patient population and proposes alternative management methods. **Methods:** A retrospective review of cochlear implant recipients greater than 80 years of age was conducted to assess management considerations in geriatric patients. **Results:** The most common issue was loss to followup (23%). This was typically associated with transportation challenges. Issues that presented in patients who returned for followup included breakdown of the skin between coil and receiver, confusion regarding manipulation of the external device, and damage to equipment and/or internal device due to falls. **Conclusions:** Cases that return to the cochlear implant center for followup are treated with appropriate medical management, device assessment and programming, and/or counseling. A concern is the prevalence of cases not returning for followup, coupled with new management considerations in this age group. Medical centers may prevent complications in patients with travel limitations through telemedicine and by training staff at satellite locations to recognize medical considerations of octo- and nonagenarian cochlear implant recipients. Providing routine care locally, while referring to the primary center when warranted, may improve the long term management of this population.

### 11:12 Trends in Socioeconomic, Race, and Insurance Disparities of Pediatric Cochlear Implantation over a 15 Year Period

Alex J.F. Tampo, MD, Syracuse, NY; Ronald J. Schroeder, MD, Syracuse, NY; John Boyle, BS, Syracuse, NY; Brian D. Nicholas, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the trends of socioeconomic, racial, and insurance disparities in pediatric cochlear implantation (CI) over a span of 15 years (1997-2012).

**Objectives:** To compare the trends of socioeconomic, racial, and insurance disparities in pediatric cochlear implantation (CI) over a span of 15 years (1997-2012). **Study Design:** Retrospective analysis. **Methods:** Analyses of pediatric cochlear implantation were made using the Kids' Inpatient Database (KID) from the Health Care and Utilization Project (HCUP). We selected for children 18 years or younger who underwent cochlear implantation based on CPT codes from 1997-2012. Demographic data extracted for analysis included race, primary payer, and income quartile. The Cochran-Armitage test for trend was used to determine if trends over this fifteen year period were significant. **Results:** The proportion of children receiving CIs with private insurance decreased from 79.3% to 42.6% ( $p < .0001$ ), whereas children with Medicaid increased from 17.4% to 35.2% ( $p < .0001$ ). Children in the lowest income quartiles one and two increased from 15.5% to 24.4% ( $p < .0001$ ) and 10.3% to 21.8% ( $p < .0035$ ), respectively. Children from the highest income quartile decreased from 50.9% to 35.3% ( $p < .0001$ ). There was a decrease in white children who received CI from 73.4% to 35.5% ( $p < .0001$ ), whereas Hispanic children increased 10.1% to 23.6% ( $p < .0234$ ). There were no significant changes in the percentages of black, Asian/Pacific islander, or native American children from 1997 to 2012. **Conclusions:** This study suggests that the socioeconomic, racial, and insurance disparities of children receiving CIs have narrowed since 1997.

### 11:19 Predictive Factors for Short and Long Term Functional Hearing Preservation in Cochlear Implantation

George B. Wanna, MD, Nashville, TN; Brendan P. O'Connell, MD, Nashville, TN (Presenter); David O. Francis, MD, Nashville, TN; Rene H. Gifford, PhD, Nashville, TN; Jacob B. Hunter, MD, Nashville, TN; David S. Haynes, MD, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) identify factors that influence short term hearing preservation in CI patients; 2) identify factors that influence long term hearing preservation in CI patients; and 3) understand the impact of electrodes type on hearing preservation in CI patients.

**Objectives:** Identify factors that are predictive of short and long term hearing preservation. **Study Design:** Retrospective review of patients undergoing cochlear implantation with air conduction thresholds  $\leq 80$  dB at 250 Hz preoperatively. Short term outcomes were assessed at the time of activation, while long term outcomes were assessed at the last followup beyond 1 year. **Methods:** Two hundred and twenty-five patients met inclusion criteria. Multivariate analysis was performed to identify predictors of hearing preservation. Logistic regression was performed, controlling for the presence of diabetes, perioperative steroid use, preoperative hearing status, electrode design, and surgical approach. **Results:** The short term rate of functional hearing preservation was 38% (84/225). A lower air conduction threshold at 250 Hz preoperatively was independently predictive of higher rates of functional hearing preservation postoperatively (OR 0.93, 95% CI 0.91-0.95,  $p < 0.001$ ). Lateral wall and mid-scala electrodes were associated with a 3.4 and 5.6 times higher likelihood of preserving hearing when compared to perimodiolar arrays, respectively (OR 3.4, 95% CI 1.4-8.6,  $p = 0.009$  and OR 5.6, 95% CI 1.8 and 17.3,  $p = 0.003$ ). Long term achievement of  $\leq 80$  dB at 250 Hz was 18%. Preoperative hearing thresholds at 250 Hz and lateral wall electrode design were again independently predictive of higher rates of long term hearing preservation (OR 0.95, 95% CI 0.92-0.97,  $p < 0.001$  and OR 5.8, 95% CI 1.3-26.6,  $p = 0.02$ ). Interestingly, both oral steroids and surgical approach portended better hearing preservation at long term followup ( $p = 0.01$  and  $0.004$ ). **Conclusions:** An air conduction threshold of  $\leq 80$  dB at 250 Hz was achieved in 38% of patients at activation and 18% of patients beyond 1 year postoperatively. Preoperative hearing status and lateral wall electrode design were predictive of higher rates of hearing preservation at both short and long term followup. While the use of perioperative steroids and round window approaches did not impact short term outcomes, these variables were associated with better hearing preservation long term.

### 11:26 Linguistic and Behavioral Outcomes of Bilingual Children with Hearing Loss

Neelaysh Vukkadala, BS, San Francisco, CA; Cimeran Kapur, BA, San Francisco, CA; Danielle Perez, BS, San Francisco, CA; Dylan Chan, MD PhD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the impact of hearing loss in bilingual children on oral language performance and the rates of behavioral problems.

**Objectives:** To characterize the linguistic and behavioral outcomes of hard of hearing bilingual children. **Study Design:** This is a prospective, cross-sectional study of children (6-17 years) with permanent, non-profound hearing loss (HL). **Methods:** HL subjects were recruited from a pediatric otolaryngology and audiology practice. Typically hearing (TH) sib-



lings and patients from general pediatrics clinic were controls. All children were raised in a household where the primary language was not English. English language proficiency was assessed by a licensed speech language pathologist using the Oral and Written Language Scales (OWLS-II); behavioral problems were assessed with the validated Child Behavior Checklist (CBCL); and native language proficiency was assessed with the SOLOM (Student Oral Language Observation Matrix). **Results:** Age, sex, socioeconomic status, and years of English exposure were comparable between the HL (n=32) and TH (n=15) groups. Oral expression and listening comprehension were both worse in the HL cohort; children with unilateral HL performed significantly better than those with bilateral HL. HL children scored worse in native language proficiency than their TH counterparts. HL children had a higher incidence of clinically significant problem scores in social and school domains, with 25% of HL children having clinically significant behavioral problems. **Conclusions:** Children raised in a non-English speaking household are at particular risk for language delay in both English and their native language, as well as behavioral challenges, compared to their typically hearing peers. These disparities in speech, language, and behavioral outcomes in this at risk group demonstrate need for additional investigation and support.

## 11:33 Blood Transfusion in Children with Sickle Cell Disease Undergoing Tonsillectomy

Carlyn M. Atwood, MD, Charleston, SC; Sharon H. Gnagi, MD, Charleston, SC;  
Shayla M. Bergmann, MD, Charleston, SC; Ronald J. Teufel, MD, Charleston, SC;  
Shaun A. Nguyen, MD, Charleston, SC; David R. White, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the changes in management and outcomes of children with sickle cell disease undergoing tonsillectomy.

**Objectives:** To analyze trends in the use of blood transfusion for management of children with sickle cell disease (SCD) undergoing tonsillectomy. **Study Design:** Review of the 1997-2012 Kids' Inpatients Database (KID). **Methods:** Patients in the 1997-2012 KID with a primary procedure matching the ICD-9 procedure code for tonsillectomy (28.2-28.3) and diagnosis code for SCD (282.60-282.69) were examined. Patients were split into groups by blood transfusion status and compared across variables including complication rate, length of stay (LOS), and hospital charges. Statistical analysis included chi-square test for trend, Spearman's correlation, Fisher's exact test, and independent t-test. **Results:** 1,133 patients with SCD underwent tonsillectomy. There was a strong positive correlation between increasing chronologic year and the proportion of patients receiving blood transfusions, 47 (30.1%) in 1997 to 78 (42.5%) in 2012 ( $r=0.94$ ,  $p=0.005$ ). During this period, there was no significant change in the rate of complications ( $r=-0.1$ ,  $p=0.87$ ). Overall, patients receiving blood transfusion had a longer mean LOS ( $3.1\pm 2.4$  days vs.  $2.5\pm 2.2$  days,  $p<0.005$ ) and higher mean charge ( $\$17,318\pm 13,191$  vs.  $\$13,532\pm 12,124$ ,  $p<0.005$ ) compared to patients who did not receive blood transfusion. The rate of complications in the transfusion group, 18 of 352 (5.1%), was not significantly different ( $p=0.48$ ) from the group without transfusion, 40 of 626 (6.4%). **Conclusions:** From 1997 to 2012, there was a significant increase in the proportion of patients with SCD receiving perioperative blood transfusions for tonsillectomy. While the frequency of transfusion rose, those who received a transfusion had similar complication rates with increased charges and length of hospital stays compared to those who did not receive a transfusion.

## 11:40 Diagnosis and Treatment of Paradoxical Vocal Fold Motion in Infants

Ashley P. O'Connell Ferster, MD, Hershey, PA; Tom Shokri, MD, Hershey, PA; Michele M. Carr, MD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better recognize and treat infants with paradoxical vocal fold motion.

**Objectives:** To investigate the clinical course of paradoxical vocal fold motion (PVFM) in infants. **Study Design:** Retrospective review at a tertiary academic medical center. **Methods:** Patients less than 2 years of age diagnosed with PVFM were identified. History, physical exam findings, and clinical course of treatment were reviewed. Findings including those on flexible fiberoptic laryngoscopy (FFL) and subjective assessment by parents and clinicians were compiled for review. **Results:** Seven infants were diagnosed with PVFM. All patients were full term at birth and average age at diagnosis was 7 months. All patients initially presented with inspiratory stridor and two patients had stertor. Five of seven patients also had a history of reactive airway disease and one with laryngomalacia. Two had a history of reflux. Two of seven patients had weight percentiles at diagnosis lower than the 25th percentile, while the remainder was between 37th and 75th percentiles. Initial voice evaluation revealed stridor in all patients as well as finding of PVFM on FFL. All patients were started on antireflux medication. Average time to resolution of PVFM was 5.9 months after treatment. **Conclusions:** PVFM can be challenging to diagnose in the infant population. PVFM resolves uneventfully with reflux treatment, however, it is unknown whether reflux treatment is essential or if PVFM would spontaneously resolve. The rarity of infantile PVFM mandates formal evaluation and monitoring by a pediatric otolaryngologist.

**11:47 National Admission Patterns and Complication Rates for Thyroglossal Duct Cyst Surgery**  
 Sharon H. Gnagi, MD, Charleston, SC; Darrell T. Wright, MD, Charleston, SC;  
 Clarice S. Clemmens, MD, Charleston, SC; David R. White, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe national admission patterns and complication rates for thyroglossal duct cyst surgery.

**Objectives:** To identify admission patterns and complication rates after thyroglossal duct cyst (TGDC) excision using the American College of Surgeon's National Surgery Quality Improvement Program-Pediatric (ACS-NSQIP-P) platform.

**Study Design:** Retrospective analysis of patients undergoing TGDC excision reported in a national database. **Methods:** Current procedural terminology (CPT) codes were used to identify children who underwent included procedures in the 2014 ACS-NSQIP-P database. Targeted variables included patient demographics, operative details, admission trends, and complications. Data was compared between subgroups. Statistical analysis was performed with a combination of chi square analysis and Kruskal-Wallis tests. **Results:** 360 TGDC excisions were identified using CPT code 60280. Recurrent TGDC excisions (CPT 60281) were not recorded in this database. 236 (65.56%) patients were treated by pediatric otolaryngologists, 42 (11.67%) by otolaryngologists, and 82 (22.78%) by pediatric surgeons. There were no significant differences in age, weight, American Society of Anesthesiologist (ASA) physical status classification, or comorbidities between groups ( $p < 0.05$ ). The complication rate was similar between specialists with an overall complication rate of 3.9%, the most common being a superficial incisional surgical site infection (2.8%). Most patients were discharged on the day of surgery with pediatric surgeons being more likely to perform the procedure as an outpatient (87.8%) than pediatric otolaryngologists (80.5%) or otolaryngologists (73.8%) ( $p < 0.05$ ). **Conclusions:** TGDC excisions are most commonly performed by pediatric otolaryngologists. Most children undergoing TGDC excision are managed as outpatients. Regardless of the surgeon's subspecialty complication rates are low.

**11:54 Changes in Management Trends for Lymphatic Malformations in the United States from 1997-2012**  
 Carlyn M. Atwood, MD, Charleston, SC; Sharon H. Gnagi, MD, Charleston, SC; Ronald J. Teufel, MD, Charleston, SC; Shaun A. Nguyen, MD, Charleston, SC; David R. White, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, participants should be able to identify changes in the management of lymphatic malformations between 1997 and 2012 in the United States.

**Objectives:** To examine changes in the management of lymphatic malformations (LMs) in the US. **Study Design:** Review of the 1997-2012 Kids' Inpatients Database (KID). **Methods:** This study examined all admissions with the ICD-9 diagnosis of LM (228.1) using the 1997-2012 Kids' Inpatient Database (KID). The most commonly performed procedures for the treatment of LM were identified as surgical excision (ICD-9 codes 40.0-40.9), airway endoscopy (ICD-9 codes 31.41, 31.42, 33.21-33.23), tongue procedures (ICD-9 code 25.1), salivary gland procedures (ICD-9 code 26.31-26.32), and sclerotherapy (ICD-9 codes 39.92, 99.25, 99.29). The frequency of each procedure group was tracked across each edition of the KID; the complication rates were compared between groups. Statistical analyses were performed using chi-square test for trend. **Results:** A total of 9,575 admissions included the diagnosis of LM. From 1997 to 2012, there was a significant overall change in management of patients with LM. This was primarily attributed to a significant decrease in surgical excisions with 507 (30.4%) patients undergoing surgery in 1997 and only 193 (13.5%) in 2012 ( $p < 0.001$ ). Simultaneously, there was a significant increase in the number of sclerotherapy procedures performed, rising from 19 (1.1%) to 117 (8.2%) patients ( $p < 0.001$ ). Patients undergoing sclerotherapy were roughly half as likely to experience a complication during admission compared to those undergoing surgical excision (OR= 0.53, 95% CI 0.29-0.95,  $p < 0.05$ ). **Conclusions:** The management of lymphatic malformations has undergone a significant shift in 15 years. While surgical excision of the malformation was the predominant treatment in 1997, a gradual shift has occurred toward sclerotherapy, which has a lower complication rate.

**12:01 Q&A**

**12:05 Adjourn**

**5:30 - 7:00 Triological (with ANS, AOS and AAFPRS) Meet the Authors Poster Reception**



# SATURDAY, APRIL 29, 2017

7:00 - 7:50 **Annual Business Meeting (Triological Fellows only) - Seaport F-G-H**

7:55 **Welcome by President**  
Charles W. Beatty, MD FACS, Rochester, MN

8:00 - 5:00 SCIENTIFIC SESSIONS  
SEAPORT F-G-H

8:00 - 9:50 FACIAL PLASTIC/RECONSTRUCTIVE SURGERY  
AND SLEEP MEDICINE

8:00 - 8:35 **THE AGING FACE - WHAT'S REAL AND WHAT'S HYPE?**  
**Moderator:** Lisa E. Ishii, MD MHS, Baltimore, MD  
**Panelists:** J. Madison Clark II, MD FACS, Chapel Hill, NC  
Stephen S. Park, MD, Charlottesville, VA  
Travis T. Tollefson, MD MPH FACS, Sacramento, CA

**Moderators: David B. Hom, MD FACS, Cincinnati, OH**  
**Erica R. Thaler, MD FACS, Philadelphia, PA**

8:35 **Tobacco Exposure and Biomarkers of Wound Healing in Head and Neck Surgical Wounds**  
Amy Anne D. Lassig, MD, Minneapolis, MN; Anne M. Joseph, MD MPH,  
Minneapolis, MN; Bevan Yueh, MD MPH, Minneapolis, MN; Bruce R. Lindgren, MS,  
Minneapolis, MN; Joan E. Bechtold, PhD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss postulated mechanisms by which tobacco exposure alters wound healing in head and neck surgical wounds.

**Objectives:** Smoking impairs wound healing, yet the underlying pathophysiological mechanisms are unclear. We evaluated tobacco altered healing by studying the association between biomarkers in head and neck surgical wounds and tobacco exposure. **Study Design:** Prospective cohort study, tertiary/academic care center, 2011 - present. **Methods:** Patients who required head and neck surgery with drain placement were enrolled prospectively. Drain fluid was collected 24 hours postoperatively. Biomarkers associated with postulated mechanisms of smoking impaired healing were assayed. These included cytokines of inflammation and angiogenesis: interleukins (IL)1, 6, and 8, tumor necrosis factor (TNF) alpha, transforming growth factor (TGF) beta, epidermal and fibroblast growth factor (EGF, FGF), C-reactive protein, vascular endothelial growth factor (VEGF); soluble fms-like tyrosine kinase-1 (sFLT-1); and placental growth factor (PIGF). Cytokines were measured using ELISA and multiplex technology (Luminex). Tobacco exposure and clinical outcomes were recorded. Two sample, two sided t-tests evaluated differences in cytokine levels by tobacco exposure. **Results:** Twenty-eight patients were enrolled with complete specimen collection. Twenty-one subjects were current/former smokers while 7 were never smokers. EGF was higher in never smokers than current/former smokers in a statistically significant manner ( $p=0.030$ ). Likewise, sFLT-1 was significantly higher in never smokers ( $p=0.011$ ). **Conclusions:** In this head and neck surgical cohort, significantly higher EGF and sFlt-1 levels in wound fluid were associated with never smoking. This suggests that smoking has a long term effect on both the inflammatory and angiogenic phases of wound healing, and supports further study as well as therapeutic targets for smokers undergoing surgery.

8:42 **Facial Fractures in Helmeted and Non-Helmeted Bicycle Trauma**  
Tania Benjamin, BS, San Francisco, CA; P. Daniel Knott, MD, San Francisco, CA;  
Nancy K. Hills, PhD, San Francisco, CA; Rahul Seth, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe and characterize facial fractures amongst bicycle trauma patients and assess effectiveness of the bicycle

helmet in protecting from facial fractures.

**Objectives:** Bicycle riding is commonly associated with falls and corporal and facial trauma. While bicycle helmets shield the head from potential trauma, their role in preventing facial injuries is less clear. We used a large national database to characterize and compare the prevalence of fractures to the lower, mid, and upper face and head among helmeted and non-helmeted bicycle trauma victims. **Study Design:** This 5 year retrospective cohort study used records from the National Trauma Data Bank, a registry that collects data from U.S. emergency departments. **Methods:** Our study examined incidence records related to bicycling accidents from 2010 to 2014. We included patients aged 18 to 65 for whom data on helmet use and injury characteristics were available. **Results:** A total 85,187 bicycle trauma incidences met inclusion. The overall facial fracture prevalence of helmeted and non-helmeted patients was 13.6% and 18.7%, respectively ( $p$ -value  $<0.001$ ). Facial fractures accounted for 65.2% and 57.2% of all face and head fractures among helmeted and non-helmeted traumas, respectively. Compared to non-helmeted traumas, wearing a helmet reduced head fractures by half (OR 0.48; 95% CI 0.45-0.51), but provided less protection against fractures of the upper face (OR 0.65; 95% CI 0.61-0.69), mid face (OR 0.72; 95% CI 0.68-0.77), and lower face (OR 0.79; 95% CI 0.74-0.85). **Conclusions:** While helmet use effectively lowers the risk of head fractures during bicycle trauma by 52%, it only lowers the risk of facial fractures by 21-35%. Facial fractures account for a significant proportion of bicycle related injury and helmet redesign may be indicated.

**8:49**      **Is There a Good Side? The Role of Laterality in Facial Paralysis Severity Perceptions**  
Jason C. Nellis, MD, Baltimore, MD; Masaru Ishii, MD PhD, Baltimore, MD; Patrick J. Byrne, MD MBA, Baltimore, MD; Kofi D.O. Boahene, MD, Baltimore, MD; Jacob K. Dey, MD, Rochester, MN; Lisa E. Ishii, MD MHS, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the effect of facial paralysis on society's perceptions of affect, attractiveness, impairment, and overall severity compared to normal faces. In the context of prior studies suggesting a left hemiface preference and facial laterality differences in emotional expression, this presentation will compare the differences of left sided and right sided facial paralysis on naive observer perceptions of affect, attractiveness, impairment, and overall paralysis severity.

**Objectives:** To determine if the side of facial paralysis results in significantly different observer graded perceptions of facial paralysis. **Study Design:** Randomized controlled experiment. **Methods:** Naive observers completed an online survey including independent standardized photographs of left or right sided completely paralyzed faces as well as normal faces. For each image, a horizontal mirror image was created and included in the survey to control for factors outside of facial paralysis laterality. Observers rated the affect, attractiveness, perceived impairment, and facial paralysis severity for each face on a visual analog scale from 0-100. Planned hypothesis testing was performed to compare mean scores for each domain between paralyzed and normal faces. Next, mean scores for each domain were compared between left and right paralyzed faces. **Results:** A total of 164 observers (mean age 30 years, 61% female) successfully completed the survey. Planned hypothesis testing comparing paralyzed faces and normal faces revealed that observers rated paralyzed faces as significantly less attractive, having a more negative affect, more impaired, and higher severity compared to normal faces ( $p < 0.001$ ). However, comparing observer graded ratings of left and right sided paralysis demonstrated no significant differences in attractiveness ( $t(828) = 0.19, p = 0.85$ ), affect ( $t(828) = 0.88, p = 0.38$ ), perceived impairment ( $t(828) = 0.06, p = 0.95$ ), and severity ( $t(828) = 0.30, p = 0.77$ ). **Conclusions:** In this study, facial paralysis results in decreased attractiveness, more negative perceived affect, and increased perceived impairment and severity compared to normal faces. While prior studies suggest facial laterality in emotional expression and a left hemiface preference, this study showed no difference between left and right sided facial paralysis in observer ratings across all domains demonstrating the dominance of the paralysis effect on observer perceptions. Consequently, the side of facial paralysis should not significantly impact clinicians' treatment decision making.

**8:56**      **Workplace Facial Trauma 2004-2014 - Progress Made, Progress Pending**  
Joshua E. Romero, MD, Syracuse, NY; Amar C. Suryadevara, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the epidemiological data on workplace facial trauma and its public health significance.

**Objectives:** To familiarize otolaryngologists with the epidemiological data on workplace facial trauma and its public health significance. **Study Design:** Database review. **Methods:** The US Bureau of Labor Statistics Occupational Injuries and Illnesses Database was queried for data on facial trauma resulting in days missed from work from 2004-2014. Resulting figures were analyzed using linear regression to ascertain significant trends. Data was also obtained from the 2010 US Census and BLS employment figures to provide context. **Results:** 467,610 injuries were recorded from 2004-2014. A median of 2 days of work was missed. 64% (299,120) of injuries were ocular trauma, which has declined from 36,680 in 2004 to 20,910 in 2014. Most other facial subsites showed no significant decline (jaw, forehead, lips, oral cavity, and nose  $n = 99,940$ ). Workplace assaults have significantly risen. Men suffered 75% of all injuries. Caucasians and African Americans suffered a proportional frequency of injuries comparable to their share of the general population, while Asians suffered less and Hispanics more. The highest risk time period was Tuesdays 2-4 hours into a shift. In 2014 the most



dangerous occupations were in natural resources, construction, and maintenance fields. **Conclusions:** Significant progress has been made over the past decade in improving facial workplace safety, with particularly striking declines in ocular trauma. The trauma rates of other facial subsites have not kept pace, though, and there are significant demographic disparities noted in the data. Further emphasis on facial protection, particularly in high risk occupations, would likely yield significant public health benefits.

**9:03 Comparison of Manual Reduction, Arch Bars, and Other Maxillomandibular Fixation Techniques for Mandibular Angle Fractures**

Ronald J. Schroeder, MD, Syracuse, NY; Kaete A. Archer, MD, Melbourne, FL;  
Amar C. Suryadevara, MD, Syracuse, NY; Robert M. Kellman, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the differences in malocclusion and infection rates between manual reduction, arch bar MMF, and other forms of MMF in the treatment of mandibular angle fractures.

**Objectives:** The purpose of this study is to compare postoperative complications of mandibular angle fractures treated with manual reduction, non-arch bar MMF, and arch bar MMF. **Study Design:** Retrospective chart review. **Methods:** A retrospective review of patients with mandibular angle fractures at a level 1 trauma center between 2001 and 2013. Reduction of the fracture(s) was classified into manual reduction, non-arch bar MMF, or arch bar MMF. The main outcome variables were postoperative malocclusion and infection. **Results:** The sample was composed of 47 single angle fractures and 118 angle plus 1 non-angle fractures. For all fractures, arch bar MMF was found to have significantly lower malocclusion rates than both manual reduction (2.8% vs 17.5%,  $p=0.01$ ) and non-arch bar MMF (2.8% vs 13.3%,  $p=0.04$ ). For patients with single angle fractures, there was no statistically significant difference in infection or malocclusion rates when comparing manual reduction, non-arch bar MMF, and arch bar MMF. For patients with an angle fracture plus 1 non-angle fracture, arch bar MMF had significantly lower malocclusion rates than manual reduction (3.2% vs 25.0%,  $p<0.01$ ) and was not significantly different compared to non-arch bar MMF. **Conclusions:** This study suggests that manual reduction of single angle fractures may be the preferred method of stabilization since malocclusion and infection rates are similar to both arch bar and non-arch bar MMF. However, arch bar MMF has lower malocclusion rates for patients with a single angle fracture plus at least one additional fracture, so it is still the preferred method of stabilization and reduction for this group of fractures.

**9:10 Q&A**

**9:15 Voice and Swallowing Outcomes Following Hypoglossal Nerve Stimulation for Obstructive Sleep Apnea**

Andrew J. Bowen, BS, Cleveland, OH; Paul C. Bryson, MD, Cleveland, OH; Michael S. Benninger, MD, Cleveland, OH; Douglas K. Trask, MD PhD, Cleveland, OH; Alan H. Kominsky, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, participants should be able to discuss the patient reported short term effects on voice and swallowing function following placement of a hypoglossal nerve stimulator for obstructive sleep apnea (OSA).

**Objectives:** Hypoglossal nerve stimulation is an effective treatment for a subset of patients with OSA. Although multiple clinical trials demonstrate its efficacy, no previous literature explores any potential impact the stimulator has on swallowing and voice function. Our primary objective is to uncover any postoperative changes in voice quality or swallowing following the placement of the stimulator. **Study Design:** Prospective clinical study. **Methods:** Patients scheduled for placement of an airway stimulator. Patients completed baseline Voice Handicap Index (VHI-10) and Eating Assessment Tool (EAT-10) questionnaires preoperatively and again at one week, three months, and six months postoperatively. Baseline characteristics (BMI, neck circumference, Epworth Sleepiness Scale) and pre/post Apnea Hypopnea Index (AHI) scores were also recorded. **Results:** 10 patients were enrolled. The average pretreatment AHI was 37.93 which improved significantly to 3.68 postoperatively at three months. The average VHI-10 and EAT-10 scores were 3.8 and 4 preoperatively and 1.8 and 2.4 following two months of airway stimulation. Wilcoxon Signed Rank testing revealed no differences between the baseline VHI and EAT-10 measurements and scores obtained one week, three months, and six months postoperatively ( $p > 0.05$ ). **Conclusions:** Hypoglossal nerve stimulation is an effective alternative treatment for OSA. The implantation and use of this device is not associated with any sustained, patient reported changes in voice handicap and swallowing function. This information can be used to provide further informed consent for hypoglossal nerve stimulator implantation.

## 9:22 Correlation of Friedman Tongue Position and Cone Beam Computed Tomography (CBCT) Results in Patients with Obstructive Sleep Apnea

Rebecca S. Harvey, MD, Ann Arbor, MI; Louise M. O'Brien, PhD, Ann Arbor, MI; Sharon Aronovich, DMD, Ann Arbor, MI; Anita V. Shelgikar, MD, Ann Arbor, MI; John M. Palmisano, BS, Ann Arbor, MI; Jeffrey J. Stanley, MD, Ann Arbor, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the correlation between cephalometric parameters that reflect the dimensions of the retroglossal space and Friedman tongue position.

**Objectives:** Evaluate the relationship between Friedman tongue position (FTP) and airway cephalometrics in patients with obstructive sleep apnea (OSA). **Study Design:** Retrospective review of adult patients with OSA undergoing CBCT at a single institution. **Methods:** Collected data included age, sex, body mass index, apnea-hypopnea index, FTP and airway cephalometric parameters. Data analyses were performed using ANOVA, dichotomous t-testing, and linear regression. **Results:** 203 patients were included in the analysis (M:F 132:71). The mean posterior airway space (PAS) was inversely correlated ( $p=0.001$ ,  $r = -.119$ ) with higher FTP grades with averages 12.3mm, 7.9mm, 6.6mm, and 4.3 mm, I-IV respectively. Minimal cross-sectional area for patients with FTP I-IV was 245.7, 179.8, 137.6, and 74.2 mm<sup>2</sup> respectively ( $p=0.002$ ,  $r=.095$ ). Average hyoid mandibular plane (H-MP) for FTP I-IV was 20.6 mm, 20.4 mm, 24.7 mm, and 28.9 mm respectively. No statistically significant difference between H-MP values when comparing patients with FTP I or II ( $p=0.22$ ). There were statistically significant differences when these two groups were individually compared to FTP III and IV ( $p=0.002$ ). Linear regression analysis confirmed an independent association between FTP and PAS ( $r^2 = -.206$ ,  $p<0.001$ ), minimal cross-sectional area ( $r^2 = -.4507$ ,  $p=0.02$ ), and H-MP ( $r^2=3.03$ ,  $p=0.01$ ) controlling for BMI, age, AHI, sex. **Conclusions:** Use of FTP is supported by objective CBCT cephalometric results, in particular the PAS, minimal cross-sectional area, and H-MP. Understanding the correlation between objective measurements of retroglossal obstruction should allow otolaryngologists to more confidently select patients with OSA who may benefit from hypopharyngeal surgery, particularly when routine access to cephalometric analysis is not available.

## 9:29 The Association of Palatine Tonsil Size and Obstructive Sleep Apnea in Adults

Sebastian M. Jara, MD, Seattle, WA; Edward M. Weaver, MD MPH, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better understand the relationship of subjective and objective measures of palatine tonsil size with sleep apnea severity in adults.

**Objectives:** The relationship between palatine tonsil (PT) size and obstructive sleep apnea (OSA) has not been well established in adults. The purpose of this study is to test the association between PT grade, PT volume, and OSA severity in adult patients. **Study Design:** Retrospective case series of all patients, age 18 years or greater, who underwent pharyngeal surgery for OSA that included palatine tonsillectomy, by a single sleep surgeon from January 2011 to June 2016. **Methods:** Medical records were reviewed for PT grade (measured on clinical exam by the Brodsky tonsil grading scale), PT volume (measured intraoperatively by water displacement), and apnea-hypopnea index (AHI). Associations were evaluated using Spearman's rank correlation and multivariate linear regression adjusting for age, sex, body mass index, smoking status, lingual tonsil volume (AHI models only), and multilevel surgery aside from lingual tonsillectomy (PT volume versus AHI model only). **Results:** The cohort (N=83) was middle aged (mean age 43+/-12 years), predominantly male (61%), obese (mean body mass index 33+/-7 kg/m<sup>2</sup>), and had severe OSA (mean AHI 32+/-28). PT grade was strongly correlated with PT volume ( $r=0.63$ ,  $P<0.001$ ) and modestly correlated with AHI ( $r=0.22$ ,  $P=0.04$ ); PT volume was not significantly correlated with AHI ( $r=0.11$ ,  $P=0.36$ ). Multivariate linear regression showed similar results except a stronger association between PT grade and AHI (beta coefficient, 14; 95% confidence interval, 3-24;  $P=0.01$ ;  $R^2=0.47$ ). **Conclusions:** Subjective evaluation of PT size by the Brodsky tonsil grading scale is strongly and independently correlated with objectively measured PT volume and AHI in adults.

## 9:36 Effect of Prior Airway Surgery on Outcomes Following Implantation of Hypoglossal Nerve Stimulator for Obstructive Sleep Apnea

Ahmad F. Mahmoud, MD, Philadelphia, PA; Erica R. Thaler, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss hypoglossal nerve stimulation as it is affected by prior surgery for OSA.

**Objectives:** To determine if patients with prior airway surgery for obstructive sleep apnea (OSA) had increased benefit following implantation with hypoglossal nerve stimulator. **Study Design:** Retrospective chart review at a single institution tertiary academic care center. **Methods:** Following implantation with hypoglossal nerve stimulator device, the outcomes of patients who underwent prior airway surgery for OSA were compared with those who did not. Primary outcome measures included apnea-hypopnea index (AHI) and nadir oxyhemoglobin desaturation as measured by polysomnography. Secondary outcome measures included Epworth Sleepiness Scale (ESS). **Results:** Twenty-eight consecutive patients underwent implantation with hypoglossal nerve stimulator. Of these, 17 patients had prior airway surgery for OSA, whereas 11 did not. Mean preoperative AHI and nadir oxyhemoglobin desaturation were  $43.2 \pm 3.6$  and  $77 \pm 2\%$  for all



patients,  $44.1 \pm 4.8$  and  $78 \pm 2\%$  for patients with prior airway surgery, and  $41.9 \pm 5.4$  and  $77 \pm 3\%$  for patients without prior surgery. Mean postoperative AHI and nadir oxyhemoglobin desaturation were  $4.7 \pm 1.9$  and  $91 \pm 1\%$  for all patients,  $5.1 \pm 2.9$  and  $91 \pm 1\%$  for patients with prior surgery, and  $4.1 \pm 2.0$  and  $92 \pm 1\%$  for patients without prior surgery ( $p = 0.646$  and  $0.211$ , respectively). **Conclusions:** Overall, patients had significant improvement following implantation with hypoglossal nerve stimulator. Prior airway surgery had no statistically significant effect on AHI, nadir oxyhemoglobin desaturation, or Epworth Sleepiness Scale.

9:43 Q&A

9:48 - 10:20 Break with Exhibitors/View Posters

10:20 - 12:00 ALLERGY/RHINOLOGY

10:20 - 11:05 SINUSITIS MANAGEMENT OF ATYPICAL RHINOSINUSITIS

**Moderator:** Peter H. Hwang, MD FACS, Stanford, CA  
**Panelists:** Alexander G. Chiu, MD, Kansas City, KS  
 Ralph B. Metson, MD FACS, Boston, MA  
 Richard R. Orlandi, MD FACS, Salt Lake City, UT  
 Brent A. Senior, MD FACS, Chapel Hill, NC

**Moderators:** Melissa A. Pynnonen, MD MSc, Ann Arbor, MI  
 Timothy L. Smith, MD MPH FACS, Portland, OR

11:05 Baseline Sleep Dysfunction Increases Likelihood of Escalation to Endoscopic Sinus Surgery after Continued Medical Therapy for Chronic Rhinosinusitis

Adam S. DeConde, MD, San Diego, CA; Jess C. Mace, MPH CCRP, Portland, OR; Vijay R. Ramakrishnan, MD, Aurora, CO; Jeremiah A. Alt, MD PhD, Salt Lake City, UT; Timothy L. Smith, MD MPH, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand some of the predictive factors influencing a patient's decision to elect and pursue endoscopic sinus surgery after completion of appropriate medical therapy for symptoms related to chronic rhinosinusitis.

**Objectives:** Medically refractory chronic rhinosinusitis (CRS) can be managed with appropriate continued medical therapy (CMT) or surgery followed by CMT. Patients and physicians navigate this choice based, in part, on risks and benefits associated with endoscopic sinus surgery (ESS). A minority of patients who initially elect CMT do not experience adequate symptom resolution and subsequently cross over to ESS. This investigation attempted to identify patient covariates associated with that treatment modality change. **Study Design:** Prospective, multicenter cohort of adult patients with CRS enrolled between March, 2011 and June, 2015 in academic, tertiary referral clinics. **Methods:** Subjects who initially elected CMT for medically recalcitrant CRS were followed up to 18 months, provided a comprehensive medical history, and completed the 22 item SinoNasal Outcome Test (SNOT-22) at baseline and during 6 month followup intervals. Hazard regression analysis was used to identify covariates associated with elective change in treatment modality. **Results:** 179 subjects were followed for an average  $15.1$  ( $SD \pm 4.6$ ) months. Subjects who elected ESS (55/179) had significantly worse average endoscopy scores and reported worse SNOT-22 sleep dysfunction scores at baseline ( $p < 0.026$ ). The unadjusted hazard ratio (HR) of treatment crossover for subjects with a history of prior ESS was  $0.55x$  (~50%) less compared to subjects with no prior ESS ( $p = 0.048$ ). After covariate adjustment, only SNOT-22 sleep dysfunction scores at baseline were associated with an increased hazard of treatment crossover (HR=1.07; 95% CI:1.02-1.11;  $p = 0.003$ ). **Conclusions:** Worse sleep dysfunction significantly predicts an increased likelihood of changing treatment modalities from CMT to ESS for patients with CRS.

11:12 Facilitating Early Diagnosis in Invasive Fungal Sinusitis: A Retrospective Study of Predictive Factors

Elizabeth M. Nichols, BS, Baltimore, MD; Liliana E. Ein, MD, Miami, FL; Amal I. Isaiah, MD, Baltimore, MD; Jeffrey S. Wolf, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the benefit of using both CT and MRI modalities to diagnose IFS at an earlier time point, in order to initiate treatment earlier and improve prognosis.

**Objectives:** To determine if combined modality imaging including a noncontrast computed tomography (CT) scan and a gadolinium enhanced magnetic resonance imaging (MRI) could improve accuracy of invasive fungal sinusitis (IFS) diag-

nosis. **Study Design:** Electronic medical records of 25 patients with pathologic confirmation of invasive fungal sinusitis following debridement were compared with 25 additional patients for whom a consultation was sought for early diagnosis of IFS but without confirmation. **Methods:** Factors compared included demographic information, symptomatology, basic laboratory values, and imaging findings obtained from both CT and MRI scans. **Results:** A significant difference was seen in symptomatic scores obtained in each group (meanifs,  $1.24 \pm 0.52$ ; meancontrol,  $0.4 \pm 0.53$ ;  $P < 0.005$ ). Flexible endoscopic examinations were equivocal in two-thirds of patients in the group with IFS whereas the control group did not show abnormal endoscopic examination findings. An initial CT scan was abnormal in 75% of IFS patients and 62% in control patients ( $P = 0.23$ , t-test). These findings ranged from mucosal thickening to bony destruction. Mucosal thickening was demonstrable in 100% of MRI scans performed thereafter to interrogate the CT findings, but these approached 80% in patients without IFS. Calculations of sensitivity thus revealed 72% sensitivity for MRI scans and approaching 100% in instances wherein CT was performed concurrently. **Conclusions:** Combined modality imaging increased the sensitivity for IFS diagnosis to 100% compared with the sensitivities of each modality used alone, thus leading to earlier diagnosis and intervention to decrease the morbidity and mortality associated with IFS.

## 11:19 Revision Rates Following Endoscopic Sinus Surgery

Nathan R. Stein, BS, La Jolla, CA; Aria Jafari, MD, San Diego, CA (Presenter); Adam S. DeConde, MD, San Diego, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the characteristics of patients undergoing endoscopic sinus surgery that are associated with an increased likelihood of needing a revision surgery in the future.

**Objectives:** Endoscopic sinus surgery (ESS) is performed for patients with chronic rhinosinusitis (CRS) that have failed maximal medical therapy. This study seeks to determine the prevalence of revision surgery and factors predicting the need for revision after ESS using a large statewide surgery database. **Study Design:** Large retrospective cohort study using the State Ambulatory Surgery Database between 2005-2011. **Methods:** We identified over 61,000 patients with CRS who underwent ESS, determined by CPT code. We identified which patients underwent a repeat surgery, and performed multivariable modeling to determine which factors (nasal polyps, age, gender, insurance, hospital setting, ethnicity) predicted the need for revision. Adjusted odds ratios (AOR) and 95% confidence intervals are presented. **Results:** Of 61,339 patients who underwent ESS, 4,078 (6.65%) returned for revision ESS during the time period investigated. In a multivariable logistic regression model, positive predictors of revision were a diagnosis of nasal polyps (AOR 1.20, 95% CI 1.11-1.29,  $p < 0.001$ ) and female gender (AOR 1.20, 95% CI 1.11-1.29,  $p < 0.001$ ). Patients of Hispanic ethnicity were less likely to have revision surgery (AOR 0.86, 95% CI 0.77-0.97,  $p = 0.011$ ). Public insurance was marginally predictive of increased reoperation (AOR 1.10, 95% CI 1.00-1.21,  $p = 0.048$ ). Age, income, and hospital setting were not significant predictors. **Conclusions:** A minority of patients with CRS who undergo ESS will have a revision surgery. This likelihood is increased in female patients and those with nasal polyps, and decreased in patients of Hispanic ethnicity, even when controlling for income, insurance, and hospital setting.

## 11:25 Anatomic Comparison of the Main Nasal Cavity and Paranasal Sinuses before and after Maximal Medical Therapy for Chronic Rhinosinusitis

Satyan B. Sreenath, MD, Chapel Hill, NC; Julia S. Kimbell, PhD, Chapel Hill, NC; Tatyana E. Fontenot, MD, Chapel Hill, NC; Charles S. Ebert Jr., MD MPH, Chapel Hill, NC; Brent A. Senior, MD, Chapel Hill, NC; Adam M. Zanation, MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe structural changes in the main nasal cavity and the paranasal sinuses observed using three dimensional reconstructions from computed tomography (CT) scans of patients before and after maximal medical therapy for chronic rhinosinusitis.

**Objectives:** Minimal literature exists investigating changes in mucosal inflammation and air space in the main nasal cavity (MNC) and paranasal sinuses (PS) before and after maximal medical therapy (MMT) for chronic rhinosinusitis (CRS). The differential impact of changes in the air volume of the MNC compared to changes in the PS on symptomatic disease in CRS remains unclear. We hypothesized that there are changes in the air volume of both the MNC and the PS as a result of MMT. **Study Design:** Retrospective study of 12 pre- and post-MMT sinus CT scans from 6 subjects with CRS, of which three subjects clinically succeeded with and three subjects failed MMT. **Methods:** Mimics software was used to create three dimensional (3D) reconstructions of the MNC and PS and calculate volumes. **Results:** In two of the three subjects in each outcome group, the directions of volume change of the MNC and PS were consistent. Mean differences in MNC and PS volume were  $6269 \pm 1435$  mm<sup>3</sup> and  $10747 \pm 5971$  mm<sup>3</sup>, respectively. Percent change in the volume of the MNC and PS compared to pre-MMT values ranged from 9-37% and 4-26%, respectively. Contribution of MNC and PS volume differences to the overall change of the sinonasal airspace volume ranged from 3-19% and 2%-23%, respectively. **Conclusions:** There is a differential contribution to sinonasal airspace volume change after MMT, when comparing the main nasal cavity and paranasal sinuses. Success or failure of MMT may not be solely attributable to changes in the paranasal sinuses and may include changes in the main nasal cavity.

- 11:32 What Drives Productivity Costs in Chronic Rhinosinusitis: A SNOT-22 Subdomain Analysis**  
Naweed I. Chowdhury, MD, Portland, OR; Jess C. Mace, MPH, Portland, OR; Timothy L. Smith, MD MPH, Portland, OR; Luke R. Rudmik, MD MSc, Calgary, AB Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the contributions of various symptom domains to productivity loss in chronic rhinosinusitis and begin to explain reasons for variance across domains.

**Objectives:** Previous studies have shown that declines in productivity due to CRS are correlated with disease specific quality of life (QOL) measures. However, it is unclear which symptom domains contribute primarily to this productivity gap. This investigation sought to define the impact of impairment in several CRS specific QOL domains on productivity loss. **Study Design:** Prospective, multi-institutional, observational cohort study. **Methods:** 198 patients with refractory CRS were enrolled between August, 2012 and June, 2015. Baseline QOL measures were obtained across five subdomains of the 22 item SinoNasal Outcome Test (SNOT-22). Lost productivity time was determined from patient reported measures of annual absenteeism, presenteeism, and lost leisure time, and then monetized using annual daily wage rates from the 2012 U.S. National Census and 2013 Department of Labor statistics. **Results:** Productivity losses strongly correlated with impairments in both SNOT-22 psychological dysfunction ( $R_s=0.428$ ,  $p<0.001$ ), and sleep dysfunction domain scores ( $R_s=0.355$ ,  $p<0.001$ ). Higher SNOT-22 total scores also significantly correlated with increased monetized productivity losses ( $R_s=0.366$ ,  $p<0.001$ ). Average productivity loss was \$11,820/year across the entire cohort; while patients with comorbid immunodeficiency (\$23,285/year), tobacco use (\$23,195/year), and steroid dependency (\$18,910/year) reported higher than average loss. Multivariate linear regression found maximum productivity loss in adjusted psychological (\$13,300,  $p<0.001$ ) and sleep dysfunction (\$9,275,  $p<0.001$ ) domains. **Conclusions:** Impairments in sleep and psychological symptom domains strongly correlate with losses in monetized productivity. Patients with comorbid immunodeficiency, smoking, and steroid dependency had higher average productivity losses. Targeted management of psychological and sleep dysfunction in combination with standard symptom control may help lessen the economic burden of CRS.

- 11:39 Serum Periostin as a Biomarker for Chronic Rhinosinusitis**  
Alice Z. Maxfield, MD, Boston, MA; Lukas D. Landegger, MD, Boston, MA; Christopher D. Brook, MD, Boston, MA; Ashton E. Lehmann, MD, Boston, MA; Konstantina M. Stankovic, MD PhD, Boston, MA; Ralph B. Metson, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the role of serum periostin as a novel potential biomarker for chronic rhinosinusitis and its subtypes.

**Objectives:** Periostin is a secreted extracellular matrix protein found to be elevated in the sinonasal tissues of patients with chronic rhinosinusitis (CRS). The purpose of this study was to determine whether serum periostin could serve as a molecular biomarker of sinonasal disease. **Study Design:** Prospective cohort study. **Methods:** Periostin levels were measured by ELISA method on blood serum samples collected from patients undergoing sinus surgery for CRS ( $n=71$ ). Results were compared to similar assays performed on control subjects ( $n=62$ ) without a history of chronic sinonasal disease. **Results:** Mean serum periostin level was significantly elevated in patients with CRS compared to controls (64.19 vs. 38.66 ng/ml, respectively,  $p=0.003$ ). For patients with CRS, serum periostin levels were higher in those with nasal polyps compared to those without nasal polyps (86.20 vs. 41.20 ng/ml, respectively,  $p=0.0001$ ). Mean serum periostin levels did not correlate with use of nasal steroid spray ( $p=0.243$ ) or smoking history ( $p=0.509$ ). **Conclusions:** These results suggest that serum periostin level may serve as a novel molecular biomarker for CRS and its subtypes.

- 11:46 Fungal Protease and Generated Cleavage Products as an Inducer of IL-33 Expression in Chronic Rhinosinusitis with Nasal Polyps**  
Caroline J. Padro Dietz, PhD, Houston, TX; Amber U. Luong, MD PhD, Houston, TX (Presenter); Ryan P. Drake, BS, Houston, TX; David B. Corry, MD, Houston, TX; William C. Yao, MD, Houston, TX; Martin J. Citardi, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of protease activity associated with fungi in the pathophysiology of chronic rhinosinusitis with nasal polyps.

**Objectives:** In the pathophysiology of chronic rhinosinusitis with nasal polyps (CRSwNP), aspergillus fumigatus can upregulate IL-33 from respiratory epithelial cells which activates innate lymphoid cells causing release of IL-13. The objectives of this study were to determine the specific fungal component of A fumigatus and to determine the role of fibrinogen cleavage products (FCP) generated by A fumigatus in inducing IL-33 production in human sinonasal epithelial cells (HSNECs) from patients with CRSwNP. **Study Design:** Basic science research study. **Methods:** Sinonasal cells from CRSwNP patients were cultured and stimulated with various fungal components and IL-33 expression was evaluated using quantitative real time polymerase chain reaction. FCPs were generated by incubating fibrinogen with thrombin or A fumigatus extract and the products were analyzed by protein electrophoresis and Coomassie staining. **Results:** Elevation of IL-33 expression in primary HSNECs was found in response to fungal protease but not fungal cell wall components.

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Furthermore, stimulation with thrombin derived FCPs resulted in increased IL-33 expression. Similarly, FCPs were found to be generated by *A fumigatus* protease activity and these *A fumigatus* derived FCPs elevated IL-33 expression in primary HSNECs. **Conclusions:** These data suggest that fungal protease and generated fibrinogen cleavage products are capable of inducing IL-33 expression in CRSwNP HSNECs.

11:53 Q&A

12:00 - 1:00 Lunch with Exhibitors

1:00 - 5:00 CLINICAL FUNDAMENTALS AND GENERAL OTOLARYNGOLOGY

1:00 - 1:50 OPTIMIZING OUTCOMES AFTER TONSILLECTOMY

**Moderator:** Scott C. Manning, MD FACS, Seattle, WA  
**Panelists:** Emily F. Boss, MD, Baltimore, MD  
Kenny H. Chan, MD FACS, Aurora, CO  
Charles M. Myer III, MD FACS, Cincinnati, OH  
Julie L. Wei, MD, Orlando, FL

**Moderators:** C. Ron Cannon, MD FACS, Jackson, MS  
Richard W. Waguespack, MD FACS, Birmingham, AL

1:50 **Interdisciplinary Assessment of Tracheostomy Care Knowledge: A Quality Improvement Project**  
Ruth J. Davis, BS, Cleveland, OH; Swathi Appachi, MD, Cleveland, OH (Presenter);  
Paul C. Bryson, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss potential gaps in knowledge regarding tracheostomy care.

**Objectives:** A 2013 AAOHNS consensus statement called for reduced variation in tracheostomy care. Multidisciplinary approaches and standardized protocols have been shown to improve tracheostomy outcomes. This study aims to identify inconsistencies in tracheostomy care knowledge in order to design standardized education targeting these areas to improve quality of care for tracheostomy patients. **Study Design:** A multiple choice tracheostomy care knowledge assessment was administered to 155 nurses, respiratory therapists, and otolaryngology residents. **Methods:** Data was collected regarding experience and comfort with tracheostomies, previous tracheostomy care education, and knowledge regarding routine and emergency management of patients with tracheostomies. Responses were compared using Fisher's exact test. **Results:** Over 75% of respondents identified correct answers to questions addressing basic tracheostomy care, such as suctioning and humidification. However, significant variation was observed in identification and management of tracheostomy emergencies and appropriate use of speaking valves. Only 46% of respondents identified all potential signs of tracheostomy tube displacement, and respondents who had previously received standardized tracheostomy education ( $p=0.0373$ ), or had over 20 years of experience ( $p=0.0367$ ), were more likely to answer correctly. Nurses were less likely to have received standardized tracheostomy education ( $p=0.0335$ ), and were less likely to choose the appropriate scenario for speaking valve use ( $p=0.0419$ ), highlighting the need for interdisciplinary education on this topic. **Conclusions:** An interdisciplinary assessment of tracheostomy care knowledge demonstrates variation in education regarding tracheostomy care, especially in the identification and management of tracheostomy emergencies and appropriate use of speaking valves. Design of a standardized educational program targeting these areas is currently underway.

1:57 **Prevalence of Work Related Musculoskeletal Symptoms among Otolaryngologists by Subspecialty: A National Survey**  
Thuy-Van T. Ho, MD, Kansas City, KS; Kevin J. Sykes, PhD, Kansas City, KS; Shannon M. Kraft, MD, Kansas City, KS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the prevalence and variance of work related musculoskeletal symptoms as well as awareness of surgical ergonomics principles among otolaryngologists by subspecialty.

**Objectives:** To assess the prevalence of musculoskeletal symptoms and to quantify knowledge of ergonomic principles amongst otolaryngologists. **Study Design:** Cross-sectional study. **Methods:** Residents, attending physicians and alumni affiliated with a single otolaryngology residency program were invited to complete an online survey investigating work related musculoskeletal symptoms and knowledge of ergonomics principles in surgery. **Results:** Sixty of 137 invited physicians participated in the survey (43.8%). Surgeons who performed endoscopic sinus surgery ( $n=18$ ), head and neck surgery ( $n=37$ ), and microvascular surgery ( $n=3$ ) were most likely to report musculoskeletal symptoms (45%, 66.7% and



75%, respectively). Microdirect laryngoscopy (n=6) and otologic surgery (n=18) were less likely to be associated with symptoms (17.6% and 26.7%, respectively). Symptom onset started in residency in 33.3% and 50% of respondents who performed endoscopic sinus surgery and head and neck surgery, respectively. The neck, shoulders, and back were the most commonly affected muscle groups. Among symptomatic respondents, 42.9% sought therapy (two required surgery). Three surgeons decreased their weekly caseload and none stopped performing surgery because of symptoms. Seventy-seven percent of respondents reported having no training in ergonomics principles in residency or fellowship. Only 15% of symptomatic respondents have independently sought out information on ergonomics in surgery. **Conclusions:** Awareness of surgical ergonomics principles among otolaryngologists is limited. Although musculoskeletal issues appear to be common, few surgeons seek treatment or information about ergonomics. Further education may be beneficial. The data presented are a part of a larger ongoing study, with invitation for responses from members of national otolaryngologic organizations currently underway.

## 2:04            **Expeditious Emergency Center Referral Pathway Improves Patient Access to Otolaryngology Care**

Jeffrey D. Johnson, MD, Houston, TX; Ibrahim T. Alava, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss a unique method to improve access to otolaryngology care and possibly improve resident duty hours and satisfaction.

**Objectives:** Historically at a multihospital residency program, there was an unexpected number of nonurgent consults from the county hospital emergency center that caused residents to make more trips between hospitals while on call and come closer to violating duty hours. Moreover, there was a poor followup rate for these patients. An alternate pathway to redirect such consults to the ORL-HNS clinic, staffed by an attending physician, was devised. This study illustrates how an undemanding process change can improve patient access to care and resident duty hours and satisfaction.

**Study Design:** Quality improvement study. **Methods:** The average rate of no-show appointments and overall number of patients referred from the county hospital emergency center; a survey of resident satisfaction; and an average number of on-call resident trips to county hospital were compared before and after implementation of an expedited referral pathway. **Results:** The average number of completed visits for patients referred to the ORL-HNS clinic from the emergency center increased by 50% and the no-show rate of referred patients decreased by 37%. The average number of resident trips to the county hospital while on call decreased by 75% and there was an improvement in overall resident satisfaction.

**Conclusions:** This pathway has improved access from the emergency center to the ORL-HNS clinic, improved resident satisfaction, and decreased the number of unexpected on-call trips between hospitals.

## 2:11            **Frailty, Hospital Volume, and Failure to Rescue after Head and Neck Cancer Surgery**

Carrie L. Nieman, MD MPH, Baltimore, MD; C. Matthew Stewart, MD PhD, Baltimore, MD; David W. Eisele, MD, Baltimore, MD; Peter J. Pronovost, MD PhD, Baltimore, MD; Christine G. Gourin, MD MPH, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role frailty plays in surgical outcomes among head and neck cancer patients and its relationship to hospital volume and failure to rescue.

**Objectives:** We have previously reported that frailty is an independent predictor of increased morbidity and mortality in patients undergoing head and neck cancer (HNCA) surgery, but was significantly less likely in HNCA surgical patients receiving high volume hospital care. We sought to investigate the relationship between frailty and hospital volume on mortality, complications, and failure to rescue rates in patients undergoing HNCA surgery. **Study Design:** Cross-sectional analysis. **Methods:** Discharge data from the Nationwide Inpatient Sample for 159,301 patients who underwent ablative surgery for a malignant oral cavity, laryngeal, hypopharyngeal or oropharyngeal neoplasm in 2001-2010 was analyzed using cross-tabulations and multivariate regression modeling. Failure to rescue was defined as death after a major complication. Frailty was defined based on frailty defining diagnosis clusters from our adjusted clinical groups frailty defining diagnosis indicator. **Results:** High volume care was associated with a lower odds of frailty (OR=0.7[0.5-1.0]). Frail patients had a higher odds of postoperative complications (OR=4.1[3.4-4.9]) and in-hospital mortality (OR=2.0[1.3-3.2]), but not failure to rescue rates (OR=1.0[0.6-1.6]). High volume hospital care was not associated with differences in odds of complications (OR=1.0[0.8-1.2]) but was associated with significantly decreased odds of death (OR=0.6[0.5-0.9]) and failure to rescue (OR=0.6[0.3-1.0]), compared to low volume hospital care, which was not attenuated by adjusting for frailty. **Conclusions:** Patients undergoing surgery for HNCA who receive surgical care at high volume have significantly lower odds of in-hospital mortality, which appears to be associated with differences in the response to and management of complications rather than differences in frailty composition or complication rates.

## 2:18            **Disparate Medicaid Payments: A National Study of Otolaryngologist Reimbursement**

Joseph H. Conduff, BS, Richmond, VA; Daniel H. Coelho, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare statewide

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Medicaid reimbursement for outpatient and inpatient services with federal Medicare benchmarks.

**Objectives:** To study state (Medicaid) reimbursement rates for inpatient and outpatient otolaryngology services and to compare with federal benchmarks (Medicare). **Study Design:** State and federal database query. **Methods:** Based on Medicare (MCR) claims data, twenty-six of the most common CPT codes reimbursed to otolaryngologists were selected and the payments recorded. These were further divided into outpatient and operative services. Medicaid (MCD) payment schemes were queried for the same services in forty-nine states and Washington, DC. The difference in MCD and MCR payment in dollars and percent was determined and reimbursement per relative value of work (RVW) calculated. MCD reimbursement differences (by dollar amount and by percentage) were qualified as a shortfall or excess as compared to the MCR benchmark. **Results:** Marked differences in MCD and MCR reimbursement exist for all services provided by otolaryngologists, most commonly as a substantial shortfall. The MCD shortfall varied in amount between states and great variability in reimbursement exists within and between operative and outpatient services. Operative services were more likely than outpatient services to have a greater MCD shortfall. Shortfalls and excesses were not consistent between procedures or states. **Conclusions:** The variation in MCD payment models reflects marked differences in the value of the same work provided by otolaryngologists, in many cases far less than federal benchmarks. These results question the fairness of the MCD reimbursement scheme in otolaryngology with potential serious implications on access to care for this underserved patient population.

**2:25 Patient Cost Savings Associated with an Outpatient Otolaryngology Telemedicine Clinic**  
Ramez H.W. Philips, BS, Columbus, OH; Nolan B. Seim, MD, Columbus, OH; Laura A. Matrka, MD, Columbus, OH; Brittany R. Locklear, MS RRT, Columbus, OH; Mark E. Inman, MBA, Columbus, OH; Garth F. Essig, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the economic benefit for patients, providers, and the entire healthcare system, of setting up a telemedicine system to expand specialty care to rural and underserved areas.

**Objectives:** Telemedicine is a well established care model used to improve access to specialty care from a distance in an efficient, cost effective manner. Our objective is to estimate the economic benefit for patients using a real time otolaryngology telemedicine clinic at a remote medical center. **Study Design:** Prospective. **Methods:** Consecutive new patients at a rural otolaryngology clinic were enrolled in a pilot study. Patients were evaluated concurrently by an onsite physician and remote physician located at a tertiary care center. Remote evaluations were conducted using real time telemedicine technology for all aspects of the clinical encounter including high definition endoscopic images. Demographic data was obtained and data from the National Institute of Justice (NIJ) telemedicine study was used to estimate patient cost savings. **Results:** Twenty-one patients have been enrolled in the pilot. The mean roundtrip distance saved travelling to the tertiary care center was 86 miles. The cost savings was set at \$0.60 per mile based on AAA Driving Cost Study (which includes fuel, insurance, and maintenance). The cost savings per mileage for lost work time was set at \$2.40. Per encounter costs of external specialist consultations and indirect costs for administration staff were calculated at \$197. This translates to an estimated mean cost savings of \$455.00 per patient and thus \$9,555 potential savings for the cohort. **Conclusions:** An outpatient otolaryngology telemedicine clinic provides a cost effective alternative to patients while expanding a specialty care to rural or remote areas. Additionally, there is an indirect economic benefit to the entire healthcare system that warrants further evaluation.

**2:32 Development of a Synchronous Otolaryngology Telemedicine Clinic: A Prospective Study to Assess Fidelity and Viability**  
Nolan B. Seim, MD, Columbus, OH; Ramez H.W. Philips, BS, Columbus, OH; Laura A. Matrka, MD, Columbus, OH; Brittany Locklear, MS RRT, Columbus, OH; Mark Inman, MBA, Columbus, OH; Garth F. Essig, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the technology, benefits and limitations associated with telemedicine clinics, the necessary equipment needed to develop a telemedicine otolaryngology clinic, and the potential that exists to provide and expand excellent care to underserved areas in need of otolaryngology coverage.

**Objectives:** Telemedicine is a proven care model used to increase access to specialty care over a distance; however, use of a synchronous, real time platform has not been well established in clinical otolaryngology. Our objective is to evaluate the utility of a real time otolaryngology telemedicine clinic with use of currently available technology. **Study Design:** Prospective study. **Methods:** Consecutive new patients at a rural otolaryngology clinic are enrolled in a pilot study. Patients are evaluated concurrently by an onsite physician (OP) and remote physician (RP) located at a tertiary care center. Remote evaluations are conducted using streaming telemedicine technology for all aspects of the clinical encounter including high definition endoscopic images. Both physicians and patient are blinded and asked to complete a post-encounter survey to assess satisfaction and diagnostic accuracy later analyzed with a McNemar's test. **Results:** Twenty-one patients have been enrolled in the pilot. Visual technology was found acceptable in all cases and audio



technology acceptable in 20/21 encounters. Diagnostic agreement by OP and RP was 95% ( $p=0.0001$ ). The RP, using the telemedicine system, reported all encounters provided sufficient history, exam and high quality endoscopic images to generate accurate diagnoses, order additional workup and/or make an appropriate tertiary referral. Patient satisfaction was 96% and these patients felt comfortable using this telemedicine system again in the future. **Conclusions:** A synchronous, real time otolaryngology telemedicine clinic is equivalent to a standard otolaryngology clinic in terms of diagnostic accuracy and patient satisfaction. This model is a viable option for tertiary care centers to expand specialty care to remote or underserved areas.

**2:39**            **Q&A**

**2:45 - 3:15**    **Break with Exhibitors/View Posters**

**3:15 - 4:05**    **TEACHING MILLENNIALS: WHAT WORKS AND WHAT DOES NOT**

**Moderator:**    Stacey T. Gray, MD FACS, Boston, MA

**Panelists:**     Kevin Fung, MD FRCS FACS, London, ON  
                  Judith E.C. Lieu, MD MSPH, St. Louis, MO  
                  Anna H. Messner, MD, Stanford, CA  
                  Mark K. Wax, MD FACS, Portland, WA

**Moderators: Robert A. Buckmire, MD, Chapel Hill, NC  
Ellen S. Deutsch, MD, Philadelphia, PA**

**4:05**            **WITHDRAWN - Variation in Training: Evaluating Differences in Otolaryngology Residents  
Surgical Case Experience**

Muhammad Abbas Abid, MD, Baltimore, MD; Charles W. Cummings, MD, Baltimore, MD;  
Sukgi S. Choi, MD, Pittsburg, PA; Nasir I. Bhatti, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the variation in otolaryngology residency training and the sources of the variability in training received.

**Objectives:** Competency based residency training has brought forth a need of more rigorous, yet standardized residency training. One of the problems that it intended to address was unwanted and unwarranted variability in residents' training. But factors such as differences in program size, geographic location of the program and varying interest of residents have led to increased variability in surgical exposure of the residents. The residency programs are challenged to provide standardized education and surgical experience to all residents. The objective of this study is explore the surgical experience of otolaryngology residents and assess the level of standardization or variation that exists in their training experience.

**Study Design:** Retrospective data review. **Methods:** The case logs of all graduating residents of otolaryngology were accessed from the Accreditation Data Systems. The case mix of graduating residents was studied and difference in surgical cases was calculated. Also the total number of each case seen by the resident was recorded. **Results:** There is variability in the type of cases attended by otolaryngology residents. Minor difference exists among the residents in the number of cases performed/attended for the common surgical cases in otolaryngology. For rarer cases, the difference in resident experience was found to be more profound. A number of procedures had a mode of zero for residents' attendance. **Conclusions:** There is variability in the surgical exposure and experience that otolaryngology residents receive. Careful monitoring and introduction of innovative methods to overcome deficiencies is required to ensure that the training provided is standard and equitable for all the residents.

**4:12**            **Impact of a Federal Healthcare Consortium on Otolaryngology Residency Training**

Alexander E. Lanigan, MD, San Antonio, TX; Mark Spaw, BS, Kansas City, MO; Christopher Donaghe, San Antonio, TX; Joseph Brennan, MD, San Antonio, TX

**Educational Objective:** At the conclusion of this presentation, the authors demonstrate the tangible academic benefit of integrating an otolaryngology residency program with the Veterans Affairs (VA) healthcare system. Key indicator procedures for head and neck and otology categories are utilized to quantify the impact on an ENT residency program and compare cases and experiences for otolaryngology residents. The authors discuss the unique role of military readiness and the benefits of VA integration.

**Objective:** To review the impact on ACGME Otolaryngology Key Indicator Procedures (KIP) following integration of a Veterans Affairs healthcare population into an otolaryngology residency program. **Project Design:** Retrospective review. **Setting:** Academic military medical center, Veterans Affairs hospital. **Procedures for Collecting and Evaluating Information:** Otolaryngology key indicator procedures, as defined by the ACGME, were reviewed at an academic military medical center before and after implementation of an ENT Federal Healthcare Consortium integrating care of VA

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patients at a military hospital. The surgical scheduling system at our institution was queried for cases within the KIP categories of “Head & Neck” and “Otology” from 2011-2015. **Findings:** Case data was reviewed from the San Antonio Military Medical Center prior to (2011-2012) and following integration of VA patient care (2013-2015). A total of 520 “Head & Neck” and 532 “Otology” key indicator procedures were performed following development of an ENT Federal Consortium. 165 KIPs were performed on patients referred from the VA. The range of VA generated cases contributing to total KIPs for “Head & Neck” and “Otology” ranged from 6.8%-59.5% and 0%-18.9% per year. **Lessons Learned:** The establishment of a Federal Healthcare Consortium and integration of VA patient population provided a tangible and quantifiable increase in otolaryngology KIPs. Development of a training relationship with VA patients is beneficial in reaching outcomes oriented goals for otolaryngology residents.

## 4:19 Craniomaxillofacial Trauma Experience in Otolaryngology Residency: A National Survey of Residency Program Directors

Melissa S. Oh, BA, Atlanta, GA; Anita B. Sethna, MD, Atlanta, GA; Oswaldo A. Henriquez, MD, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the depth and volume of craniomaxillofacial trauma exposure in U.S. otolaryngology residency training.

**Objectives:** To assess the depth and volume of craniomaxillofacial (CMF) trauma exposure and education in otolaryngology residency training in the United States. **Study Design:** Cross-sectional survey. **Methods:** A 15 question web based survey was distributed to all 106 residency program directors to inquire about program size and demographics, trauma coverage, case volume, and education. Responses were collected anonymously. **Results:** A total of 77 responses were received, representing 73% of residency programs. Seventy-five (97%) programs reported that their residents rotated at a level 1 trauma center, and 72 (94%) covered CMF trauma. Sixty-one (79%) programs included pediatric CMF trauma. The majority of programs (76%) allocated less than 10% of residency dedicated didactic lecture time to CMF trauma. Residents in all programs typically logged at least 11 cases before graduation with 24% of programs averaging more than 50 cases per resident. Number of cases had the strongest positive correlation with the program directors' perception of adequacy of CMF training. Ninety percent of respondents described the training as somewhat to very adequate. **Conclusions:** The majority of program directors felt the training in CMF trauma was adequate. Reasons for this may include the majority of residents rotate at level 1 trauma centers, have exposure to pediatric trauma, encounter an adequate volume of cases, and have dedicated didactic time to CMF education.

## 4:26 Simulation as a Tool for Increasing Medical Student Interest in and Understanding of Otolaryngology

Lara K. Reichert, MD MPH, Galveston, TX; Daniel Z. Farishta, BS, Galveston, TX; Kevin Lin, BS, Galveston, TX; Harold S. Pine, MD, Galveston, TX; Susan D. McCammon, MD, Galveston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the use of simulation to aid medical student instruction and ways to increase interest in otolaryngology.

**Objectives:** We sought to determine the utility of a low cost simulator to help students understand midline neck anatomy. **Study Design:** Survey with lecture and hands on instructional lesson. **Methods:** As part of the first year medical student curriculum at our university, the otolaryngology department offers a workshop on head and neck anatomy and related components of the physical exam. Students participated in five stations. One was devoted to neck anatomy with a model of midline structures and a tracheostomy. Students completed a survey at the end of the workshop. **Results:** At the end of the workshop, 183 students responded to the survey. Over 85% of participants felt the workshop and models helped them understand anatomy of the neck. Eighty-five percent of students responded the models helped them visualize what a tracheostomy would look like in a patient. Before the workshop, 16% of students agreed or strongly agreed that they had interest in ENT as a career. After the workshop, that increased to 73% ( $p < 0.05$ ). Sixty-nine percent of students stated the tracheostomy models specifically increased their interest in otolaryngology. **Conclusions:** Simulation is a useful adjunct for teaching head and neck anatomy to medical students. Our workshop, with lecture and simulation, strongly increased participant interest in otolaryngology and solidified relevant anatomy.

## 4:33 Social Media Presence of Otolaryngology Journals: The Past, Present, and Future

Kevin Wong, BA, Boston, MA; Varun Thakkar, BA, Boston, MA; Jessica R. Levi, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants will be able to explain the degree of social media involvement among leading otolaryngology journals.

**Objectives:** Popular among public figures, celebrities, and companies as a way to reach out to followers, social media has also become an increasingly popular way for journals to interact with readers, disseminate research, and increase viewership. The purpose of this study was to evaluate the use of social media by otolaryngology journals. **Study Design:** Retrospective cohort study. **Methods:** Twitter accounts for the top 25 otolaryngology related journals by Impact Factor

were identified. Each profile was evaluated over a one year period for activity (using Twitonomy software) and social media influence (using the Klout score). The Klout score is a value between 1-100 determined by the number and type of social media interactions. Impact Factors for each journal between 2008-2015 were recorded and the Impact Factor on the Twitter join date, if applicable, was noted. **Results:** Eleven journals (44%) were associated with Twitter profiles; four (36.4%) had dedicated Twitter profiles while seven (63.6%) had profiles associated with the affiliated society. The average Klout score was 36.9 (low-medium influence), average number of followers was 1665, average tweets per day was 1.03, and average number of user mentions was 202. The average impact factor for all journals was  $1.94 \pm 0.5$  (range: 1.1-3.03). Since joining Twitter, six journals (54.5%) increased in Impact Factor. Journals with Twitter profiles had higher Impact Factors compared to those without (1.94 vs. 1.88,  $P=0.74$ ) however this did not reach significance. **Conclusions:** Twitter has become increasingly popular among otolaryngology journals. Social media presence may impact journal influence and these relationships warrant further investigation.

#### 4:40 Otolaryngology Resident Education and the Core Competencies: A Systematic Review

Erynne A. Faucett, MD, Tucson, AZ; Jonnae Y. Barry, MD, Tucson, AZ; Hilary C. McCrary, MPH, Tucson, AZ; Ahlam A. Saleh, MD, Tucson, AZ; Audrey B. Erman, MD, Tucson, AZ; Stacey L. Ishman, MD MPH, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the evidence and gaps in otolaryngology resident education literature with respect to the six core competencies.

**Objectives:** The Accreditation Council for Graduate Medical Education (ACGME) requires that all residents demonstrate competency in six core areas. Our aim was to examine the quantity and nature of otolaryngology residency training literature through a systematic review and to evaluate if this literature is in line with the six core competencies. **Study Design:** Systematic review. **Methods:** Data sources include PubMed, Embase, Cochrane Library, Web of Science (Science Citation Index, Conference Proceedings Citation Index Science, Conference Processings Citation Index Social Science & Humanities), Scopus, and ClinicalTrials.gov for all indexed years through October 9, 2016. Inclusion criteria were English language, original human data, and a focus on otolaryngology resident education. Data regarding study design, setting, and ACGME core competency classification were extracted from each article. Two investigators independently reviewed all articles. **Results:** Our initial search yielded 3951 titles; 562 articles underwent full text evaluation and 135 remained in the final review. The majority of included studies were conducted in the United States (71.1%), United Kingdom (15.5%), and Canada (7.4%). Studies addressed the ACGME core competencies for practice based learning and improvement (48.8%), systems based practice (40.0%), patient care (34.8%), medical knowledge (23.7%), professionalism (11.1%), and interpersonal/communication skills (10.4%). Some papers addressed multiple competencies with only 4(3%) of them addressing all six. **Conclusions:** Studies indicate that there is a need for increased emphasis on nonclinical core competencies including professionalism and interpersonal/communication skills in otolaryngology residency training curriculum. We recommend a formal curriculum addressing nonclinical core competencies to be integrated into otolaryngology residency training.

#### 4:47 Proliferation and Contributions of National Database Studies

Rahul S. Subbarayan, MD, Kansas City, KS; Lindsey Koester, MD, Pittsburgh, PA; Jennifer Villwock, MD, Kansas City, KS

**Educational Objective:** At the conclusion of this presentation, the participants will have an understanding of the proliferation of database studies and their contributions to the otolaryngology fund of knowledge.

**Objectives:** Databases such as the Nationwide Inpatient Sample (NIS) and the Surveillance, Epidemiology, and End Results Program (SEER) allow for collection of large amounts of anonymous patient information. The former is the largest publicly available all payer inpatient healthcare database in the United States and provides national estimates of hospital inpatient stays. The latter documents cancer demographics, incidence, and survival. The resultant information can be used in aggregate to study a variety of patient conditions. **Study Design:** Literature review. **Methods:** A review of the literature from 2005 to 2015 for papers utilizing the NIS and/or SEER databases was conducted. Literature was confined to five journals: The Laryngoscope, JAMA-Otolaryngology, Head & Neck, Otolaryngology-Head and Neck Surgery, and International Forum of Allergy and Rhinology. Results were categorized based on the goal of the paper descriptive demographics, trends in treatments, outcome/survival, treatment analysis, cost analysis, or clinical recommendations. Trends in database publications were examined via binary logistic regression. **Results:** 145 studies were identified 103 SEER, 42 NIS. In reference to 2005, there was a statistically increase in database publications beginning in 2013 (OR 3.73,  $p=0.03$ ), persisting through 2015 (OR 8.08,  $p<0.001$ ). 44% of studies report descriptive demographics and outcomes/survival. 32% report trends in management. Less than twenty percent make treatment recommendations. **Conclusions:** 145 NIS and SEER papers have been published in the past 10 years, with rates increasing significantly over this period. The majority of papers provide descriptive demographics, outcomes measures, and cost analysis. The role of these studies warrants further investigation given their recent proliferation and paucity of clinical recommendations.

#### 4:54 Q&A

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**Introduction of President-Elect  
Mark Persky, MD FACS, New York, NY**  
*By Charles W. Beatty, MD FACS, Rochester, MN*

## **ALLERGY/RHINOLOGY**

### **H1. Invasive Fungal Sinusitis in a Patient with Intranasal Opiate Abuse**

Suhyla Alam, MD, Richmond, VA; Scott A. Hardison, MD, Richmond, VA;  
Joseph D. Jakowski, MD, Richmond, VA; Evan R. Reiter, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the risk of chronic invasive fungal sinusitis in patients with intranasal opiate abuse.

**Objectives:** Present a patient case of invasive fungal sinusitis arising in the setting of intranasal opiate abuse and review the literature on this entity. **Study Design:** Case report and literature review. **Methods:** Retrospective chart review and PubMed literature search. **Results:** A 52 year old male with longstanding traumatic spinal cord injury and tetraplegia presented to the emergency department for chronic throat pain. Examination revealed extensive necrosis of intranasal tissues, the posterior oropharynx and soft palate. He admitted to crushing and intranasally inhaling oxycodone and acetaminophen tablets for relief of his throat pain for at least three months. He was taken to the operating room for debridement, at which time endoscopy revealed thick deposits of white powder overlying areas of extensive dry mucus crusting and soft tissue necrosis. Final pathology demonstrated invasive fungal hyphae in the nasal and pharyngeal tissues. Intraoperative tissue cultures grew *Candida krusei* and *Aspergillus* species. Nasopharyngeal necrosis is a reported complication of intranasal cocaine and heroin use. Recent literature suggests that oxycodone and its derivatives may have similar effects. Rarely, chronic invasive fungal sinusitis has been identified in patients with oxycodone induced nasopharyngeal necrosis. This entity is uncommon in immunocompetent individuals and tends to occur in the setting of diabetes or chronic corticosteroid therapy. **Conclusions:** Patients with narcotic induced nasal and pharyngeal necrosis should be evaluated with tissue biopsies or debridement. Concurrent invasive fungal sinusitis may be present in these patients even in the absence of traditional risk factors.

### **H2. Prevalence of Clinically Significant Worsening after Endoscopic Sinus Surgery**

Adam S. DeConde, MD, San Diego, CA; Jess C. Mace, MPH, Portland, OR; Jeremiah A. Alt, MD PhD, Salt Lake City, UT; Claire Hopkins, MD, London, UK; Zachary M. Soler, MD MSc, Charleston, SC; Timothy L. Smith, MD MPH, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the prevalence of postoperative quality of life worsening after endoscopic sinus surgery and identify potential risk factors associated with increasing likelihood of experiencing worse quality of life after sinus surgery.

**Objectives:** Patients electing endoscopic sinus surgery (ESS) for medically recalcitrant chronic rhinosinusitis (CRS) must weigh the potential risks and benefits of surgery. A significant body of evidence has amassed reporting the prevalence of clinically significant improvement and identifying clinical factors associated with postoperative improvement, yet no study to date has investigated risk factors associated with significant postoperative worsening. **Study Design:** Secondary analysis of a prospective, multi-center cohort database. **Methods:** Enrollment of adult patients undergoing ESS for medically recalcitrant CRS, with and without nasal polyposis, was completed between March, 2011 and June, 2015. Clinically significant worsening has previously been associated with at least a 6 point decrement in the 22 item Sinonasal Outcome Test (SNOT-22) survey from preoperative baseline. Logistic regression was used to identify risk factors for significant postoperative worsening of SNOT-22 total scores. **Results:** A total of 440/565 patients (78%) met inclusion criteria and completed at least 6 month followup while 38/440 patients (9%) reported clinically significant worsening after ESS. After covariate adjustment, prior sinus surgery (OR: 4.65, 95% CI: 1.95-11.08, p=0.001) and Hispanic/Latino ethnicity (OR: 3.76, 95% CI: 1.19-11.86, p=0.024) were associated with increased risk of significant worsening after ESS. These associations persisted after inclusion of and adjustment for both site variation and socioeconomic covariates consisting of household income and insurance provision. **Conclusions:** Although ESS has proven an effective treatment modality for medically recalcitrant disease, clinically significant worsening may occur in a small subset and disproportionately impacts patients who have undergone prior ESS and those patients of Hispanic/Latino ethnicity, independent of economic factors.

### **H3. The Effects of Chronic Rhinosinusitis on Sniff Inspiratory Muscle Strength**

Dennis O. Frank-Ito, PhD, Durham, NC; Jihong Wu, MD, Chapel Hill, NC; Saikat Basu, PhD, Chapel Hill, NC; Julia S. Kimbell, PhD, Chapel Hill, NC; Brent A. Senior, MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, participants are expected to have a better understanding of how chronic rhinosinusitis impacts inspiratory ability during sniffing.



# Posters

**Objectives:** Most chronic rhinosinusitis (CRS) patients experience reduced quality of life characterized by symptoms such as chronic nasal congestion, facial pain, purulent sinonasal drainage, altered sense of smell and difficulty breathing through the nose. In the absence of concomitant respiratory condition(s), the effects of CRS on inspiratory muscle strength are poorly understood. Thus, our goal is to investigate sniff nasal inspiratory ability among subjects with CRS and compare our results with previous reports on healthy subjects. **Study Design:** Prospective patient observational study. **Methods:** As part of an ongoing National Institutes of Health grant, 13 (8 males, 5 females) adult subjects (24-73 years) with either unilateral or bilateral CRS without nasal polyps were selected for this pilot study. Sniff measurements were collected using the LifeShirt® system (VivoMetric, San Diego, CA); a vest-like garment worn by subjects that records breathing parameters via respiratory inductive plethysmography. Sniff was measured unilaterally by instructing subjects to close their contralateral nostril with their finger and then sniff gently. **Results:** Peak inspiratory flow (PIF), mean inspiratory flow (MIF), and minute ventilation (MV) measured in CRS subjects during sniffing were within ranges previously reported for healthy subjects. Among subjects with unilateral disease, subject reported predominately affected side had lower mean ( $\pm$  standard deviation) PIF ( $789\pm 143$ ml/s vs  $882\pm 259$ ml/s), MIF ( $391\pm 167$ ml/s vs  $439\pm 117$ ml/s), and MV ( $9.3\pm 4.1$ l/m vs  $10.2\pm 4.4$ l/m) than on the contralateral side. **Conclusions:** CRS subjects without concomitant respiratory condition(s) have sniff inspiratory flow profile that are comparable to healthy subjects. In cases where disease is unilateral, the side with CRS has lower sniff inspiratory flow.

#### H4. Recovery in a Grave Case of Rhinocerebral Mucormycosis

Edmund B. Haywood, MD, Temple, TX; David W. Clark, MD, Temple, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the risk factors, diagnosis, radiologic findings, and treatment of invasive fungal rhinosinusitis.

**Objectives:** To present a case of recovery in a patient with invasive rhinocerebral mucormycosis. Radiologic findings, diagnosis and treatment are discussed. **Study Design:** Single patient case review. **Methods:** The clinical course of a patient is described based on clinical interaction and chart review. We also provide a review of the literature on invasive fungal rhinosinusitis. **Results:** A 55 year old man presented with oral pain and left sided facial numbness. He was found to be in diabetic ketoacidosis. He developed diplopia with left gaze and an MRI was obtained which showed opacification of the left ethmoid and sphenoid sinuses as well as cavernous sinus thrombosis. Endoscopic sinus surgery was performed and biopsy showed invasive mucormycosis. The patient was placed on amphotericin and experienced progression of his disease including left facial weakness. Serial MRIs demonstrated occlusion of left internal carotid and invasion of the skull base including the left intracranial trigeminal nerve. The patient's condition stabilized over the following weeks and he was discharged to a skilled nursing facility for long term antifungal treatment with isavuconazole. After several months he began to experience improvement in his cranial nerve deficits. Endoscopic sinus exams have shown no recurrence 8 months after his initial diagnosis. **Conclusions:** Treatment of rhinocerebral mucormycosis includes surgical intervention as well as antifungal medications and aggressive management of comorbidities.

#### H5. Primitive Neuroectodermal Tumors (PNETs) of the Nose: A Case Report and a Literature Review

Ahmed Awad Hussein, MD, Cairo, Egypt; Hussam Mohamed Elbosraty, MD, Cairo, Egypt

**Educational Objective:** At the conclusion of this presentation, the participants should be able to consider primitive neuroectodermal tumors as a differential diagnosis with aggressive tumors in the nose and immunohistochemistry is essential in the diagnosis. Surgery followed by radiochemotherapy is the best treatment modality.

**Objectives:** Primitive neuroectodermal tumors (PNETs) are highly malignant tumors composed of small round cells of neuroectodermal origin that affect soft tissue and bone. Rare in the head and neck. Exhibit pathologic similarities with other small, round cell tumors. We report the second case in the literature of PNET arising in the nose with a review of the literature. **Study Design:** A case report and literature review. **Methods:** We report a 17 year old female patient presenting with long history of bilateral nasal obstruction. On examination, a firm and non-painful mass occluding both sides of nasal cavity and expanding causing fascial disfigurement with proptosis of the left eye. High resolution CT was performed and showed a mass filling the nasal cavity infiltrating the left orbit with invasion of both maxillary and ethmoidal sinuses and the hard palate. **Results:** Biopsy was taken and pathology diagnosed angiofibroma. Preoperative angiographic embolization was performed then complete excision was done. Immunohistopathology examination of specimen was consistent with PNET. Radiochemotherapy was introduced to the patient. She was completely cured and free of the disease in the past three years of followup. **Conclusions:** With aggressive tumors in the nose, PNETs should be considered as a differential diagnosis, immunohistochemistry is essential in the diagnosis. Complete excision with negative margins should be done and affect the prognosis. Surgery followed by radiochemotherapy is the best treatment modality, the orbital location seems to be associated with a particularly better prognosis. Larger studies are needed to assess the nature of PNETs and to formulate more effective therapeutic protocol.

#### H6. Management Strategies for Recurrent Acute Rhinosinusitis

Jiahui Lin, MD, New York, NY; Ashutosh Kacker, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that man-



agement of patients with recurrent acute rhinosinusitis (RARS) is often challenging and robust data in the literature is scant. They should be able to explain the current treatment strategies for RARS used by otolaryngologists.

**Objectives:** Management of patients with recurrent acute rhinosinusitis (RARS) is often challenging and robust data in the literature is scant. The aim of this study is to better characterize the current treatment strategies for RARS used by otolaryngologists. **Study Design:** Cross-sectional survey study. **Methods:** An online survey sent to all members of the American Rhinologic Society in May 2015 evaluated demographics, practice characteristics, and management strategies for patients with RARS, subdivided into those with (RARSwD) and without (RARSsD) septal deviation. **Results:** Ninety-four members responded of whom 38% were fellowship trained rhinologists. For most cases of RARSsD, 61% of otolaryngologists would primarily use medical management. Most would wait until patients had experienced 4 to 5 episodes to perform balloon sinuplasty (80%) or surgery (78%). The surgical procedure of choice was limited sinus surgery (62%). For RARSwD 51% primarily used medical management. Eighty-eight percent of private practitioners would wait to perform balloon sinuplasty until patients had experienced 4 to 5 episodes. Only 68% of those in academia would wait for the same amount of time, and 22% would perform balloon sinuplasty after only 1 to 3 episodes ( $P=0.05$ ). Nearly all fellowship trained rhinologists (97%) would perform limited sinus surgery with septoplasty for RARSwD, while 24% of other otolaryngologists would perform complete sinus surgery with septoplasty ( $P=0.05$ ). **Conclusions:** Treatment of patients with RARS is complex, and the differences in strategies employed between groups of otolaryngologists may reflect their training backgrounds and different patient populations, as well as a need for further research to establish more definitive guidelines for management.

#### H7. A Multicenter Study on Endoscopic Management of Esthesioneuroblastoma

Takayuki Nakagawa, MD PhD, Kyoto, Japan; Satoru Kodama, MD PhD, Yufu, Japan;  
Masayoshi Kobayashi, MD PhD, Tsu, Japan; Tetsuji Sanuki, MD PhD, Kumamoto, Japan;  
Shuho Tanaka, MD PhD, Tsukuba, Japan; Koichi Omori, MD PhD, Kyoto, Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to learn the efficacy and safety of endoscopic approach for the treatment of esthesioneuroblastoma.

**Objectives:** The aim of the present study was to illustrate the utility of the multilayer resection of esthesioneuroblastomas (ENB) using endoscopic endonasal approach (EEA). **Study Design:** Retrospective chart review. **Methods:** We retrospectively reviewed patients treated at 10 tertiary referral hospitals with a diagnosis of ENB. **Results:** A total of 32 patients (16 males and 16 females; mean age at presentation 51.3 years) underwent multilayer resection of ENBs using EEA. Thirty patients were newly diagnosed and two presented with recurrent disease. Dulguerov staging at presentation was T1, 6 patients; T2, 10 patients; T3, 8 patients; and T4, 8 patients. EEA alone was performed in 24 patients, and EEA with transcranial approach was performed in 8 patients. The mean period of followup was 38 months, ranging from 5 to 103 months. No postoperative complications were identified. Pathological margin studies revealed margin free resections in 31 patients (96.9%). Distant metastasis was found in one patient. No patients had evidence of disease at the last followup. Of the 10 patients who underwent EEA alone with intentional preservation of olfaction, preservation was achieved in eight patients. **Conclusions:** The results of the present study indicate the safety and utility of multilayer resection using EEA for treatment of ENBs.

#### H8. Seasonal Variation of Baseline Chronic Rhinosinusitis Symptomatology

Katie M. Phillips, MD, Boston, MA; Lloyd P. Hoehle, BA BS, Boston, MA; Regan W. Bergmark, MD, Boston, MA;  
David S. Caradonna, MD DMD, Boston, MA; Stacey T. Gray, MD, Boston, MA; Ahmad R. Sedaghat, MD PhD,  
Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare baseline sinonasal symptomatology in CRS patients among the four different seasons.

**Objectives:** Although chronic rhinosinusitis (CRS) exacerbation frequency may vary throughout the year, it is unknown whether there is seasonal variation in the baseline sinonasal symptomatology of CRS. **Study Design:** Cross-sectional study of 300 individuals with CRS. **Methods:** In order to capture baseline symptomatology, individuals with acute CRS exacerbations were excluded. Sinonasal symptomatology was quantified using the 22 item Sinonasal Outcomes Test (SNOT-22) survey. The season (winter, spring, summer or fall) when the SNOT-22 was completed was recorded. Linear regression, controlling for clinical and demographic characteristics, was performed to seek association between season of the year and SNOT-22 score. **Results:** Of these patients, 25.3% had a history of smoking, 44.0% had aeroallergen hypersensitivity, 27.3% had asthma, 42.0% had nasal polyps, and 65.3% were using topical nasal steroids. The mean SNOT-22 scores were 21.5 for those individuals queried in the fall, 45.9 for those queried in the winter, 33.5 in the spring and 32.6 in the summer. Compared to SNOT-22s completed in the fall, there was a statistically significant association with higher SNOT-22 score from the winter (adjusted  $\beta=17.5$ , 95%CI: 1.6-33.4,  $p=0.032$ ) but not from the spring ( $b=10.8$ , 95%CI: -1.-23.4,  $p=0.095$ ) or summer (adjusted  $\beta=9.0$ , 95%CI: -3.4-21.3,  $p=0.158$ ). **Conclusions:** There is seasonal variation in CRS symptomatology in the Northeast. Winter is associated with the greatest increase in baseline CRS symptomatology. Although this result is independent of having any aeroallergen hypersensitivity, further work is necessary to determine whether such seasonal variation in CRS symptomatology is related to hypersensitivity to specific aeroallergens.

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## H9. Malignant Fibrosarcoma of the Maxillary Sinus Masquerading as an Angioectatic Nasal Polyp: Case Report and Review of the Literature

Jordan W. Rawl, MD, Galveston, TX; Bailey A. LeConte, BS, Galveston, TX; Suimin M. Qiu, MD, Galveston, TX; Mohamad R. Chaaban, MD, Galveston, TX

**Educational Objective:** At the end of this case presentation participants should be able to discuss the diagnostic criteria for myxofibrosarcoma, recognizing it as a very rare entity. Additionally, the case should prompt discussion of the necessity for vigilance in obtaining correct diagnoses when perhaps initial biopsy results do not produce a diagnosis which fits the clinical picture.

**Objectives:** Myxofibrosarcoma (MFS) is a rare soft tissue tumor of the head and neck. The neoplasm is comprised of cells of a fibroblast lineage within a myxoid matrix without evidence of myogenic, lipoblastic, or chondrogenic features. MFS is graded according to the ratio of cellular to myxoid components. Low grade MFS has a higher myxoid component and a low rate of metastatic potential. However, its local recurrence rate roughly equals that of high grade lesions (50-60%). Management of these neoplasms consists of wide local excision with adjuvant radiation therapy for cases with positive margins. Histopathological and immunohistochemical analysis are essential for diagnosis. We present a case of a 55 year old male cabinet worker with a rapidly growing right maxillary sinus myxofibrosarcoma which was initially misdiagnosed as an angioectatic sinonasal polyp following two in-office biopsies. A final diagnosis was not achieved until deeper endoscopic intramaxillary biopsies were obtained in the operating room. This case underscores not only the need for vigilance in obtaining accurate diagnoses in clinically suspicious lesions, but also highlights the need for deeper biopsies where repeated sampling fails to elucidate a diagnosis. **Study Design:** NA. **Methods:** NA. **Results:** NA. **Conclusions:** NA.

## H10. Endoscopic Balloon Eustachian Tuboplasty (BET) for Treatment of Otitis Media with Effusion (OME) in Radiated Patients

Reza Vaezeafshar, MD, Palo Alto, CA; Jennifer Y. Lee, MD, Palo Alto, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss safety and feasibility of BET for treatment of OME in patients who have received radiation.

**Objectives:** To evaluate safety and feasibility of BET in patients with post-radiation otitis media with effusion. **Study Design:** Retrospective chart review. **Methods:** 4 ears (3 patients) underwent BET for post-radiation OME. Inclusion criteria included adult >18 years old patients, history of recent radiation to skull base or nasopharynx, persistent (> 3 months) of middle ear effusion via exam and symptoms or tympanometry in an audiogram, and no evidence of active malignancy. The Eustachian Tube Dysfunction Questionnaire (ETDQ-7) was measured as primary outcome in pre and postoperative period. **Results:** Out of 3 subjects, 2 had nasopharyngeal carcinoma and one had myxofibrosarcoma of the neck. They were all female with average age of 52 (range 39-61). Dosage of previous radiation was at least 60Gy (range 60-70). Average duration of OME symptoms was 20 months (range 5-30 months). Subjects had retracted tympanic membrane and middle ear fluid on exam. Tympanometry was performed in 3 out of 4 ears which was type B. Only one ear had previously undergone ventilation tube placement for OME--despite tube placement, patient had persistent symptoms. Average duration of followup was 3 month. Mean ETDQ-7 was 39.75 (range: 37-48) which significantly improved after balloon dilation of ET with an average of 14.25 (p.value: 0.001). **Conclusions:** The results show that BET can effectively improve ET function in post-radiation OME with minimal risk. This technique provides these patients with limited options an alternative approach to relieve their symptoms without risk of chronic draining ears.

## H11. Progression of a Frontal Sinus Pneumocele in a Patient with Recurrent Nasal Polyps

Jason L. Yu, MD, Philadelphia, PA; Erica Thaler, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the associated conditions seen with pneumoceles as well discuss the several different hypotheses for its etiology.

**Objectives:** Pneumocèles are a rare condition of abnormal expansion of one or more paranasal sinuses the most common of which is the frontal sinus. Its etiology remains unclear although several hypotheses have been proposed ranging from gas forming bacteria to a ball valve sinus outflow tract obstruction. We present the case of a 34 year old male with longstanding history of chronic rhinosinusitis with nasal polyps and a left frontal sinus pneumocele. The patient initially underwent revision endoscopic sinus surgery which improved his sinus and nasal symptoms but was subsequently lost to followup. He returned 5 years later with recurrent nasal polyps along with further expansion of his frontal sinus. Although the pathophysiology of pneumocèles remains a mystery, we present a case showing progression of frontal sinus pneumocele despite surgical alterations of patient's sinus outflow tract and discuss the implications on the possible pathophysiology of this condition. **Study Design:** Case report. **Methods:** Case report. **Results:** Case report. **Conclusions:** Case report.

**CLINICAL FUNDAMENTALS/GENERAL****H12. Allometric Quantification of Respiratory Minute Ventilation for Chronic Rhinosinusitis Subjects Using Body Mass**

Saikat Basu, PhD, Chapel Hill, NC; Julia S. Kimbell, PhD, Chapel Hill, NC; Dennis O. Frank-Ito, PhD, Durham, NC; Jihong Wu, MD, Chapel Hill, NC; Brent A. Senior, MD FACS, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to gain insight on quantifying the respiratory minute ventilation in chronic rhinosinusitis subjects using an allometric function of body mass.

**Objectives:** Topical drug delivery to areas of sinonasal cavity affected by chronic rhinosinusitis (CRS) is hypothesized to depend, amongst other factors, on breathing techniques during nasal spray use. To characterize breathing procedures, we track nasal airflow through computational fluid dynamics modeling, which requires the input of patient specific minute ventilation (MV). However, there is currently no consistent quantification of breathing rates under CRS, and our objective is to ascertain the relevance of allometric MV prediction for healthy people, in a CRS population. **Study Design:** Prospective observational study. **Methods:** Informed consent was obtained from 13 CRS patients (8 males, 5 females; 24-73 years) without nasal polyps, with no prior nasal surgery history, who failed maximal medical therapy and elected functional endoscopic sinus surgery. Pre-surgery breathing parameters were recorded via respiratory inductance plethysmography, using a vest like patient garment (LifeShirt® system from VivoMetric, San Diego, CA). Measurements were corrected for recording awareness. **Results:** A generic multi-term allometric function of body mass is proposed, with the extra terms accounting for CRS related inconsistencies. Error minimization analysis reveals an optimal leading order similar to published equations for healthy individuals. For this CRS cohort, the model demonstrates improved MV estimates for males ( $r^2=0.442$ ) and females ( $r^2=0.253$ ) over the estimates ( $r^2=0.423$  for males,  $r^2=0.122$  for females) using published allometric relations for healthy population. **Conclusions:** This methods study proposes a quantitative model for MV in a CRS cohort, additionally suggesting that CRS may not significantly affect normal MV. More upcoming recruitments are planned to reinforce the statistical confidence of this analysis.

**H13. The Use of Smartphone Adapters in Otolaryngology Residencies: A Survey of Program Directors**

Caroline M. Bockus, BS, Washington, DC; Johnny P. Mai, MD, Washington, DC (Presenter); Philip E. Zapanta, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the advantages and disadvantages of smartphone adapters experienced by otolaryngology residency programs as well as the barriers to using these products.

**Objectives:** Several adapters have recently come on the market which link smartphones to traditional endoscopes. However, no studies exist to date which evaluate potential benefits and drawbacks of these products for otolaryngologists. This study seeks to identify the extent to which otolaryngology residency programs use smartphone adapters and to describe advantages and disadvantages of this new technology. **Study Design:** Cross-sectional survey. **Methods:** A survey was distributed to directors of U.S. otolaryngology residency programs with questions directed at extent of use, barriers to use, and advantages and disadvantages. **Results:** There was a 42% (45/106) response rate. Of responding programs 28.9% (13/45) reported having used an adapter. The most common uses were consultations (70.6%, 12/45) and overnight call (58.8%, 10/45). When considering using the adapters, the most important factors were diagnostic accuracy, compatibility with existing equipment, and ease of set up. The most significant barriers to use were cost and privacy concerns. The most commonly used adapter was the ClearScope Adapter (53.8%, 7/13). The majority of respondents indicated their program was likely to use adapters in the future (53.3%, 16/30). **Conclusions:** This relatively new technology has not yet reached widespread use. Barriers such as cost and privacy concerns have prevented many programs from using the adapters, though most expect to use them in the future. Those using adapters primarily used them for ENT consult service and overnight call. More research on the benefits of these products and ways to improve HIPAA compliance would be warranted.

**H14. Penetrating Pharyngeal Trauma: A Unique Case Presentation**

Carolyn A. Brydon, MD, Albany, NY; Shilpa Darivemula, BS, Albany, NY; Kristina Piastro, MD, Albany, NY; Maria Brown, MD, Albany, NY; Christina Lee, MD, Albany, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a case of a rare penetrating oropharyngeal trauma with minimal deficits and recognize the need for standard of care surgical guidelines for approaching such unusual injuries.

**Objectives:** To present an unusual case of zone 1B/2A penetrating traumatic oropharyngeal injury by foreign object and to highlight the remarkable outcomes of an uncommon zone and method of injury. **Study Design:** Case report. **Methods:** A 52 year old male presented with a zone 1B/2A traumatic anterior neck injury by a 7.5 X 5.1 X 0.2 cm wedge shaped piece of a saw blade. In the emergency department, the patient was alert with stable vital signs but unable to phonate



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well. **Results:** He was taken to the operating room for tracheostomy and surgical exploration revealing penetration of the anterior and posterior oropharynx including base of tongue. Submandibular glands, hypoglossal nerves, and arterial vasculature were preserved bilaterally. A 6 layer closure (submucosa of tongue, tongue musculature, strap muscles, fascia, platysma, skin) with Penrose drains placed bilaterally was performed. Posterior pharyngeal wall transection was closed via direct laryngoscopy approach. Prior to initiation of an oral diet, the patient underwent flexible fiberoptic nasopharyngolaryngoscopy and leak trial with grape juice. The patient did well postoperatively with only mild tongue muscle fatigue at followup visit. **Conclusions:** Penetrating injuries of the oropharynx are relatively rare and are at increased risk for salivary fistulas and deep neck infections as well as nerve and vascular damage. This patient presents with minimal complications and no neurovascular injury. The outcomes of this rare oropharyngeal trauma provide evidence supporting the creation of standard otolaryngologic trauma guidelines for anterior neck dissection repair.

## H15. Quality of Preclinical Medical Student Otolaryngology Shadowing Experiences in the Operating Room

Yi Cai, AB, New York, NY; Kyle Zuniga, BS, New York, NY; Joseph Haddad Jr., MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the medical student extracurricular shadowing experience in OTO-HNS ORs.

**Objectives:** Medical student exposure to otolaryngology-head and neck surgery (OTO-HNS) has been relatively limited in US medical school curricula, and recent literature indicates exposure has been decreasing. At our institution, the medical school otolaryngology student interest group (OTO-SIG) offers preclinical students the opportunity to shadow in the OTO-HNS ORs. In light of limited OTO-HNS preclinical experience in medical school curricula, the quality and value of extracurricular exposure to OTO-HNS should be explored. **Study Design:** Retrospective cohort. **Methods:** Electronic surveys were sent to the 48 students who completed a shadowing session through OTO-SIG in 2016. The surveys utilized Likert scale questions probing around degree of interest, comfort in the OR, and specific interest in OTO-HNS. **Results:** Of the 31 respondents, 26% had never been in an OR before and 74% had been in an OR fewer than three times. Familiarity with sterile technique and interaction with attending or residents were rated highly as factors contributing to comfort in the OR setting. Only 42% rated themselves as being moderately to extremely comfortable in the OR. However, 74% of students found the experience to be a valuable learning experience and 81% reported being likely to pursue shadowing again; 59% reported that the experience increased their interest in OTO-HNS. **Conclusions:** Extracurricular OTO-HNS shadowing in the OR is a valuable experience for preclinical students: it may be one of their first exposures to the OR and increases their interest in the field. These opportunities may be further improved by identifying factors to increase the student level of comfort in the OR.

## H16. MRSA Bacterial Laryngitis: A Chronic Problem

Patrick S. Carpenter, MD, Salt Lake City, UT; Katherine A. Kendall, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate a better understanding of MRSA laryngitis and be able to discuss new treatment algorithms for treatment of chronic bacterial laryngitis.

**Objectives:** Chronic bacterial infection of the larynx is characterized by longstanding hoarseness and exudative laryngitis. Prolonged antibiotic therapy is required to clear the infection and MRSA may be the responsible pathogen. The objective of this study was to describe the presentation, comorbidities, treatment response and underlying etiology, including incidence of MRSA, in our patient population with chronic bacterial laryngitis. **Study Design:** Retrospective case review. **Methods:** A review of patients with a diagnosis of chronic bacterial laryngitis from 2012-2016 was performed. Diagnosis of chronic bacterial laryngitis was based on clinical history and findings on flexible laryngoscopy. In selected cases, the diagnosis of MRSA bacterial laryngitis was confirmed by operative biopsy. Information regarding clinical presentation and course was collected. **Results:** Twenty-eight patients were included in the study. Twenty-three were treated empirically with Augmentin for a minimum of 21 days. Twelve (52%) had recurrence or nonresolution of infection. Seven of the 12 non-responders (58%) were found to have MRSA by laryngeal tissue culture. The mean time required to eradicate the MRSA infection was 12 weeks. Five patients were treated initially with Bactrim and all resolved the infection without need for further treatment. There was a non-statistically significant increase in smoking and reflux in the MRSA population compared to the non-MRSA group. **Conclusions:** A significant proportion of chronic bacterial laryngitis patients have MRSA as the underlying pathogen. Based on the results of the study, a treatment algorithm for management of this unusual patient population is suggested.

## H17. A Diagnostic Dilemma: Sinonasal Intestinal Type Adenocarcinoma in a Patient with Peutz-Jeghers Syndrome

Divya Aditi Chari, MD, San Francisco, CA; Margaret Naunheim, MD, San Francisco, CA; Ivan H. El-Sayed, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the extraintestinal manifestations of intestinal polyposis syndromes, with particular emphasis on the head and neck. Additionally,

participants should be able to describe the appropriate workup for a sinonasal mass and compare intestinal type adenocarcinoma with non-intestinal type adenocarcinoma of the sinuses.

**Objectives:** We report an unusual case of workup of a malignant sinonasal intestinal type adenocarcinoma in a patient with an incidentally discovered intestinal polyposis syndrome. To our knowledge, this is the first documented case of a patient with Peutz-Jeghers syndrome presenting with a sinonasal mass. **Study Design:** Case report and review of relevant literature. **Methods:** We present the case of a 36 year old man with a one year history of a rapidly enlarging, destructive left sinonasal mass. Biopsies of the sinonasal mass revealed an immunohistochemical staining profile most consistent for primary sinonasal intestinal type adenocarcinoma versus a metastatic adenocarcinoma of upper gastrointestinal origin. Multiple intraluminal intestinal masses and pathologic appearing mesenteric adenopathy were discovered upon imaging, raising concern for metastatic disease and confusing identification of the primary site. Colonoscopy revealed sessile polyps throughout the colon and open abdominal biopsy revealed the absence of malignancy. **Results:** The patient was diagnosed with an intestinal type adenocarcinoma of the sinuses and concurrent Peutz-Jeghers syndrome. He was started on induction chemotherapy with plan for definitive resection and chemoradiation consolidation. No evidence of a secondary tumor site arose eight months after the initial presentation. **Conclusions:** Intestinal polyposis syndromes, such as familial adenomatous polyposis (FAP), Cowden's syndrome and Peutz-Jeghers syndrome, are often associated with extraintestinal manifestations. While many of these manifestations are benign, malignant extraintestinal manifestations do occur. Here, we present the first known case of a sinonasal intestinal type adenocarcinoma with concurrent intestinal polyposis. Recognition of the association between sinonasal intestinal type adenocarcinoma and benign intestinal polyposis is critical for prompt initiation of appropriate therapy.

#### H18. Community Acquired Methicillin Resistant Staphylococcus Aureus Abscesses of the Head and Neck: Comparing Populations

Wesley L. Davison, MD, New York, NY; Luke A. Donatelli, MD, New York, NY; Aaron N. Pearlman, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the differences between methicillin resistant staphylococcus aureus (MRSA) and methicillin sensitive staphylococcus aureus (MSSA) abscess at a community hospital and a tertiary hospital in the same city. Participants should also be able to identify the most common site of MRSA abscesses in the face as the chin and discuss treatment in light of this fact.

**Objectives:** To compare the incidence of community acquired staphylococcus aureus (CA-MRSA) abscesses of the head and neck between two distinct geographic and socioeconomic populations within the same city; to determine the anatomic site variation of CA-MRSA abscesses between the two groups. **Study Design:** Retrospective chart review. **Methods:** ICD-9 codes were used to search the electronic medical records at a community hospital (CH) from 2007-2012 and a tertiary hospital (TH) from 2007-2015. Inclusion required abscess of the head or neck and documented culture result. Comorbidities including diabetes mellitus and the human immunodeficiency virus were recorded. Site categories included: scalp, forehead, periorbital, face, ear, nose, lip, chin and neck. Sites were also classified as hair bearing (scalp, face, nose, chin, neck) and non-hair bearing (forehead, ear, periorbital, lip). **Results:** Of 4,761 charts reviewed, 415 (130 women and 285 men) were included. Mean age was 33 years (range 0-93). There was a statistically significant increase in the ratio of MRSA to MSSA at CH ( $P=0.02$ ) but not at TH ( $P=0.20$ ). Hair bearing sites were more likely MRSA than MSSA ( $p=0.02$  at CH,  $p=0.34$  at TH and  $p=0.01$  overall). The chin had significantly more MRSA than MSSA when compared to any other site ( $p=0.002$  to  $0.042$ ) and when compared to all other sites combined ( $p=0.004$ ). MRSA:MSSA in the chin was 23:6. **Conclusions:** The incidence of abscesses due to CA-MRSA in both cohorts increased over time, though more at CH. Hair bearing sites, specifically the chin, were predictive of CA-MRSA independent of all other factors. No difference was exhibited concerning gender, age, or comorbidities.

#### H19. Patient Positioning during In-Office Otologic Procedures Impacts Physician Ergonomics

William M. DeMayo, BS, Pittsburgh, PA; Nandini Govil, MD MPH, Pittsburgh, PA; Barry E. Hirsch, MD, Pittsburgh, PA; Andrew A. McCall, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, participants should be able to 1) discuss how patient positioning during in-office otologic procedures impacts physician ergonomics; and 2) demonstrate how repositioning a patient can lower the risk of developing musculoskeletal disorders.

**Objectives:** Our aim was to evaluate the impact of patient positioning on physician ergonomics during in-office otologic procedures. A previous simulation study from our institution suggested that placing patients in the supine position during in-office otology procedures is ergonomically favorable. This study aims to substantiate these findings during the routine care of patients in an otolaryngology practice setting. **Study Design:** Observational study. **Methods:** We observed two neurotologists performing cerumen removal procedures in the office setting with patients either in the seated position ( $n=24$ ) or supine position ( $n=24$ ). The Rapid Upper Limb Assessment (RULA), a validated instrument that measures body positioning with a focus on the upper arm, was used to measure ergonomic positioning. RULA scores correlate occupational body positioning with a numeric representation of musculoskeletal injury risk ranging from 1 (minimal risk) to 7 (very high risk). **Results:** Overall median RULA scores were 4.5 (medium risk) with patients in the seated position, and

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2 (low risk) with patients in the supine position ( $p < 0.0001$ ). Similarly, RULA scores were significantly lower with patients in the supine position when each physician was evaluated independently ( $p < 0.0001$ , for both). **Conclusions:** Placing patients in a supine position for cerumen removal results in a more favorable ergonomic position for the physician, thus reducing risk for work related musculoskeletal disorders. This suggests that providers should consider placing patients in the supine position for in-office otologic procedures. Further study is needed to investigate optimal ergonomic positioning for other common otolaryngology procedures.

## H20. Zitches vs. Stitches in a Rodent Model

Benjamin F. Erhardt, MD, Columbia, MO; Kaitlin K. July, BS, Columbia, MO; Eric J. Johannesen, DO, Columbia, MO; Robert P. Zitsch, MD, Columbia, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the potential utility and non-inferiority of a novel laceration repair product, compared to standard permanent suturing.

**Objectives:** To establish the utility of a novel noninvasive superficial laceration repair product, compared to standard suturing. **Study Design:** Prospective, randomized animal trial. **Methods:** 24 outbred mice were anesthetized per standard protocol and 2 separate longitudinal incisions through the epidermis and dermis were made. One side was closed with 3 simple interrupted 4-0 nylon sutures, the contralateral side was closed with Zitches and Zuture. Mice were separated into 4 groups of 6, harvested on days 3, 7, 14, and 21. Sutures and Zitches were removed on day 7. Wounds were examined and graded each day for: swelling, erythema, dehiscence, and discharge. Upon harvest, the areas of incision were excised and placed in 10% formaldehyde. These were randomized, evaluated histologically by a pathologist, and graded on: epithelization, inflammation, fibrosis, dehiscence, deep opening, residual material, and necrosis. **Results:** Gross examination revealed no statistically significant difference in graded swelling, erythema, dehiscence, or discharge. Histological analysis is underway. **Conclusions:** Zitches and Zuture appear to be grossly equivalent to traditional simple interrupted suturing of superficial lacerations in rodents. Histopathologic analysis is underway. Further investigation using a human model could provide additional validation.

## H21. Standardized Recommendation Letters for OTO-HNS Residency: A Review

Yaser Ghavami, MD, Irvine, CA; Jay Bhatt, MD, Irvine, CA; Yarah M. Haidar, MD, Irvine, CA; Kasra Ziai, MD, Irvine, CA; Omid Moshtaghi, BS, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the strengths and weaknesses in addition to the advantages and disadvantages of standardized letters of recommendation (LOR) for otolaryngology residency.

**Objectives:** This study was conducted to evaluate the strengths and weaknesses in addition to the advantages and disadvantages of standardized letters of recommendation (LOR) for otolaryngology residency. **Study Design:** Retrospective review. **Methods:** A retrospective study assessing otolaryngology residency applicants from April 2013 to March 2015 was carried out. Data on standardized LOR components on a visual analog scale (VAS) were compared to objective measures in the applications, USMLE scores, overall publications, otolaryngology publications, oral and poster presentations, and alpha omega alpha (AOA) membership. Correlations were obtained for the two sets of measures. **Results:** Seventy application forms with at least 2 standardized LOR were evaluated. There were 48 male and 22 female applicants. Mean age of applicants was  $27 \pm 1.3$ . Medical knowledge assessment on the standardized LOR was not found to be correlated with USMLE step 1 or step 2 scores ( $p = 0.83$  and  $p = 0.88$ , respectively). Research ability on the LOR did not correlate with oral or poster presentations ( $p = 0.1$  and  $p = 0.34$ ), or the number of overall or otolaryngology publications ( $p = 0.47$  and  $p = 0.65$ ). Initiative and drive assessment on the LOR did not correlate with the number of presentations or publications ( $p = 0.2$  and  $p = 0.37$ ). However USMLE step 1 score showed a significant correlation with being a member of alpha omega alpha ( $p = 0.001$ ). **Conclusions:** The standardized LOR was developed to reduce the subjectivity of the traditional LOR. Our study found that the individual components of the standardized LOR did not correlate with objective measures such as USMLE scores or the number of oral/poster presentations or publications. Standardized LORs may have the same degree of subjectivity as traditional LORs.

## H22. Validity of the Hum Test in Predicting Hearing Loss

Yaser Ghavami, MD, Irvine, CA; Omid Moshtaghi, BS, Irvine, CA; Jeffrey Gu, BS, Irvine, CA; Afsheen Moshtaghi, BS, Irvine, CA; Melissa Huang, BS, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the utility of the hum test in predicting hearing loss.

**Objectives:** To evaluate the efficacy of a simple test and determine the validity of the hum test for detecting various types of hearing loss. **Study Design:** In this prospective study, 67 patients aged 18 to 70 year old with a chief complaint of hearing loss presented to neurotology clinic at our medical center were evaluated over a two months period. **Methods:** Patients were asked to hum and report which side they heard the hum. Also the frequency and loudness of the hum



produced by the patients were assessed using a digital sound meter (Sound Level Meter 2238 Mediator; Bruel & Kjaer, Narum, Denmark). Tuning fork Weber and Rinne tests at 512Hz as well as a full audiologic profile were performed and blindly correlated to the results of the hum test. The audiometry test was used as a gold standard for evaluating the efficacy and reliability of hum test. Finally 34 patients with lower frequencies (500, 1000, 2000 and 3000 Hz) of hearing loss on the audiometry were included in this study. **Results:** The hum test has the sensitivity of 74% and 70% for identifying conductive hearing loss and sensorineural hearing loss in comparison to the pure tone audiogram (as the gold standard), respectively. **Conclusions:** The hum test can be used as a rough tool to see if post-stapedotomy hearing loss is conductive or sensorineural on the phone. It can also be used for patients calling with sudden hearing loss to roughly distinguish conductive from sensorineural loss.

## H23. WITHDRAWN -- Strategic Planning and Cultural Assessment for Otolaryngology Departments in Transition

Chelsea S. Hamill, MD, Kansas City, KS; Jennifer A. Villwock, MD, Kansas City, KS; Kevin J. Sykes, PhD, Kansas City, KS; Alexander G. Chiu, MD, Kansas City, KS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the function of an organizational needs assessment and how to interpret results in order to develop new departmental programs.

**Objectives:** Academic otolaryngology must balance excellence in the tripartite mission with organizational priorities, existing culture, the needs of non-physician staff, and limited resources. Unintentional disconnects between the priorities involved may develop and can be detrimental when trying to implement change or during times of transition. Organizational needs assessments are proven tools in industry, but are rarely applied to clinical academic departments. This pilot study demonstrates how an organizational needs assessment can be applied to an academic otolaryngology department. **Study Design:** Single center observational study. **Methods:** We created a needs assessment survey utilizing existing literature to assess the work environment, capacity for change, and current priorities of an academic otolaryngology department and distributed to all members. We discussed the needs identified by the surveys and developed department priorities and a strategic plan. Focus groups, involving staff at all levels, developed priorities and projects to address these needs. **Results:** 91 of 98 staff responded. Faculty and residents feel more able to take on new tasks (62%) and are less overwhelmed by their workload (18%) than mid-level and allied health members of the department (41% and 62% respectively). The department values clinical care (77%), teaching (54%), and research (47%). Non-physician staff was less likely to understand their role in contributing to the research (52%) and teaching (34%) missions. **Conclusions:** Although driven first by a commitment to clinical care, there is a need to emphasize the importance of research and educational efforts. Faculty and residents are more connected with the tripartite mission than mid-level and allied health. Successful program development must include all members of the department.

## H24. ANCA Positive Leukocytoclastic Vasculitis Presenting as Hypopharyngeal Mass

Jessica B. Howell, MD, Richmond, VA; Evan R. Reiter, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the presentation, evaluation, and management of laryngeal involvement by vasculitides.

**Objectives:** 1) Describe a case of leukocytoclastic vasculitis presenting as a hypopharyngeal tumor; and 2) review existing literature and discuss the presentation, evaluation, and management of laryngeal involvement by vasculitides. **Study Design:** Case report and literature review. **Methods:** Patient medical records and imaging reviewed retrospectively. Medline search conducted using terms vasculitis, larynx, laryngeal, relevant articles reviewed. **Results:** A 47 year old female smoker with a history of leukocytoclastic vasculitis presented to the emergency department with hoarseness and acute inspiratory stridor. Neck CT revealed a large, heterogeneous left hypopharyngeal mass concerning for malignancy. Fiberoptic laryngoscopy demonstrated left vocal fold paralysis, right vocal fold paresis, and airway narrowing. She was taken to the operating room for awake tracheostomy and laryngoscopy with biopsy. Biopsy of the left false vocal cord demonstrated focal high grade squamous dysplasia. Repeat biopsy revealed only chronic inflammation with no malignancy. Rheumatologic evaluation included proteinase 3, myeloperoxidase, and ANCA titers, which led to diagnosis of ANCA positive leukocytoclastic vasculitis. Immunosuppressive therapy with rituximab and prednisone led to gradual improvement in symptoms and increased tolerance of tracheostomy capping. Repeat fiberoptic examination showed improved right vocal fold abduction, although persistent immobility on the left. **Conclusions:** Laryngeal manifestations occur in 4 - 10% of patients with vasculitis, with involvement ranging from mild mucosal inflammation to upper airway obstruction. Although unusual, vasculitis must be on the differential for patients presenting with laryngeal abnormalities, especially those with rheumatological history or serologic abnormalities. Given the systemic nature of the disease, early recognition and prompt initiation of immunosuppressive therapy is critical to optimizing patient outcome.

## H25. Impact of a Novel Social Network Application to Enhance Resident Education in Otolaryngology

Wayne D. Hsueh, MD, Bronx, NY; John P. Bent, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the current

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uses of social media within otolaryngology. The presenters will demonstrate how to incorporate new technology into otolaryngology resident education for improved efficiency and effectiveness.

**Objectives:** There has been an increased trend toward the use of social media amongst millennial learners. The objectives of our study were to analyze within our department 1) attitudes toward social media; and 2) the educational impact of a novel social network application. **Study Design:** A prospective cohort study was conducted within an academic otolaryngology head and neck surgery department. **Methods:** A novel social network application was developed that allows sharing of medical literature and the ability to ask boards style questions. A survey was given at the beginning of the academic year to establish baseline attitudes towards social media. Surveys were then given at the end of the academic year to evaluate changes in these attitudes after implementation of the application. Objective data was collected regarding time spent on the platform. **Results:** A total of 20 residents and 10 faculty members were included in the study. Notably at baseline, 94% of the department admitted to using social media at least once a week, with 67% on social media daily. However, only 27% used it for medical education purposes. After implementing the platform, there was a significant shift in attitude with residents gaining a valuable perspective on clinically relevant medical literature (Z-score 3.45,  $p=0.00056$ ) and a sense of increased understanding of medical knowledge (Z-score 2.17,  $p=0.03$ ). **Conclusions:** Faculty and residents have differing engagement levels with social media. The implementation of a novel social network centered on medical education was well received by residents, who believed this technology increased their evidence based knowledge and understanding.

## H26. Macrolide Associated Sensorineural Hearing Loss: A Systemic Review

Allison K. Ikeda, BS, Atlanta, GA; Anthony A. Prince, MD, Boston, MA (Presenter); Jenny X. Chen, MD, Boston, MA; Judith E.C. Lieu, MD MPH, St. Louis, MO; Jennifer J. Shin, MD SM, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participant should be able discuss the current body of literature characterizing sensorineural hearing loss (SNHL) after macrolide exposure and explain whether such SNHL is reversible with medical therapy including drug cessation and oral steroid treatment.

**Objectives:** To investigate the potential association of macrolide antibiotics with sensorineural hearing loss (SNHL) and which agents and dosage may be related. To evaluate whether an optimal treatment exists for reversing SNHL which occurs after macrolide therapy. **Study Design:** Systematic review of the literature. **Methods:** Computerized (PubMed, EMBASE, Cochrane Library) and manual searches were performed to identify human studies of all ages (patients) who received macrolides (intervention, with or without control), and documented SNHL (outcome). All study designs were assessed. Extracted data included macrolide regimen details, as well as the timing, severity, and reversibility of SNHL with drug cessation alone or with additional medical intervention. Study designs and the associated risk of bias were assessed. **Results:** There were 44 criterion meeting publications (3 prospective, 41 retrospective) which described 78 cases of audiometrically confirmed SNHL. SNHL was associated with oral and intravenous macrolide administration at standard and elevated doses. SNHL proved irreversible in 6 cases, despite macrolide cessation ( $n=5$ ) and oral steroid treatment ( $n=1$ ). Irreversible SNHL was observed following 2-3 days of exposure. SNHL was reversible with macrolide cessation alone in 69 cases. In 3 cases, macrolide cessation coupled with oral steroid administration restored hearing. Reversible cases improved within hours to days. Nine studies also described 35 cases of subjective patient reported hearing loss. Limitations in the data arose from study design, related comorbidities, and concomitant drug administration. **Conclusions:** SNHL may follow macrolide exposure, even at standard oral doses. Further research is needed to understand the incidence, prevalence, and biological mechanism of its ototoxicity.

## H27. Impact of Humanitarian Experiences on Otolaryngology Trainees

Aria H. Jafari, MD, San Diego, CA; Kathryn R. Tringale, BS, San Diego, CA; Bruce H. Campbell, MD, Milwaukee, WI; Jacob W. Husseman, MD, San Diego, CA; Susan R. Cordes, MD, Ukiah, CA

**Educational Objective:** In this study, we surveyed past and present trainee participants of humanitarian otolaryngology trips in order to understand 1) the impact on residency education (short-term); and 2) interest in subspecialty training, career trajectory, and future volunteerism (long term). In doing so, we also hoped to better understand trainee and trip demographics, preparation, motivations, identify any barriers to participation and/or opportunities for improvement.

**Objectives:** This study seeks to characterize the impact of humanitarian experiences on otolaryngology trainees through an assessment of effect on residency training, subspecialty interest, career trajectory, and future volunteerism. We also hope to better understand trainee and trip demographics, preparation, motivations, and identify any barriers to participation or opportunities for improvement. **Study Design:** Cross-sectional survey of US otolaryngology trainees. **Methods:** A 30 question survey was electronically distributed to 207 recipients of the American Academy of Otolaryngology-Head and Neck Surgery Foundation (AAO-HNSF) Humanitarian Travel Grant between 2001-2015. **Results:** The survey response rate was 25.12% (52/207). Most respondents were male (61.5%) and participated in short term trips (96.2%) during advanced training years (PGY-4, PGY-5, or fellowship) focused on facial plastic and reconstructive surgery (63.5%). Vacation/personal time (84.6%) and personal funds (71.2%) and were most commonly utilized to account for time and additional cost, respectively. Trainees viewed the trip as extremely worthwhile (mean= 98/100) and experienced improved cultural understanding (75%) following the trip. Trainees expressed strong interest in subspecialty training (75.0%) and

participation in additional humanitarian trips (88.6%). Nearly half of respondents currently practice or plan to pursue academics (48.1%). Competency based evaluation yielded significant positive impact on patient care, systems based practice, and professionalism. **Conclusions:** Humanitarian trips during otolaryngology training are perceived as worthwhile by the participant, enhance cultural awareness, influence career trajectory, interest in future humanitarian efforts and competency based training metrics. Financial and logistical issues were identified as barriers. Given the demonstrable benefit to residency training, recognition and formalization of experiences should be considered.

## H28. Fine Needle Aspiration Utilization in the Community Hospital Setting: A Quality Improvement Study

Christopher R. Kieliszak, DO, Columbus, OH; Dustin J. Jones, BS, Athens, OH; Richard T. Klapchar, DO, Columbus, OH; David L. Steward, MD, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to be familiar with national standards and guidelines for utilization of FNA, recognize potential deficits in his or her home institution, implement an effective quality intervention, assess the improvements made by the institution after the intervention occurs.

**Objectives:** To evaluate impact of a quality improvement initiative regarding utilization of ultrasound and FNA prior to resection of malignant thyroid neoplasms at a community based hospital. **Study Design:** A retrospective chart review of medical records was performed for thyroid malignancy diagnoses. **Methods:** The quality improvement initiative included both an intradepartmental outreach effort and an interdisciplinary hospital cancer committee presentation. Descriptive statistics were used to compare preoperative US and FNA utilization before and after the quality improvement initiative. **Results:** The records of 366 patient charts were reviewed retrospectively over a 2.5 year period, and 23 unique patients with histologically proven thyroid malignancy were identified. In 2014, FNA was performed on 58% of patients prior to operative management of thyroid malignancy. In 2015 and after the quality improvement initiative, FNA was performed on 100% of patients prior to operative management of thyroid malignancy ( $p=0.0155$ ). Prior to the quality improvement initiative, 75% of patients undergoing surgery for thyroid malignancy had a preoperative ultrasound compared to 100% afterwards ( $p=0.0753$ ). **Conclusions:** Quality improvement can be bolstered through the implementation of interdepartmental action plans highlighting current national guidelines regarding preoperative utilization of thyroid US and FNA for patients with thyroid cancer. Statistical significance was found for FNA utilization. Failing to utilize preoperative US and FNA compromises an opportunity to gain additional information prior to operating on thyroid nodules that may contain malignancy. This study supports the effectiveness of a quality improvement initiative in a community hospital to improve patient management based upon national guidelines.

## H29. Survival for Lip Cancer: Europe vs. United States

Sarah S. Kilic, MA, Newark, NJ; Suat Kilic, BA, Newark, NJ; Zachary S. Mendelson, BS, Newark, NJ; Aykut A. Unsal, DO, Newark, NJ; Soly Baredes, MD, Newark, NJ; Jean Anderson Eloy, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare and contrast relative survival for lip cancer across geographical regions of Europe and the United States.

**Objectives:** To determine the relative survival (RS) rates for lip cancer across geographic regions of Europe and to compare those with rates for the United States (U.S.). **Study Design:** Retrospective database analysis. **Methods:** The EURO CARE and the Surveillance, Epidemiology, and End Results (SEER) databases were queried for cases of lip cancer (excluding skin of the lip) reported between 2000 and 2007. Frequency and RS rates were obtained. Subgroup analysis was performed by age groups and by gender. For Europe subgroup analysis was also performed by country and by geographic region. **Results:** A total of 23,747 cases of lip cancer were identified, 18,676 in Europe and 5,071 in the U.S. There were no differences in RS between the U.S. (1 year: 98.3%, 5 year: 90.6%) and Europe overall (1 year: 97.1%, 5 year: 87.5%). When comparing regions RS for eastern Europe (1 year: 94.9%, 5 year: 84.4%) was lower than all other regions including the U.S. ( $p<0.05$ ). There were no differences in survival between the remaining geographic regions and between the regions and the U.S. RS for the U.S. (1&5 year) did not vary between age groups. In Europe the  $\geq 75$  years old group (84.2%) had lower 5 year RS than both the 15-44 (94.7%) and 45-54 year old (92.5%) age groups ( $p<0.05$ ). Survival did not vary across genders. **Conclusions:** There are no differences in survival for lip cancer between the U.S. and Europe overall. However, survival in eastern Europe is worse than in the U.S. and in other parts of Europe. Further investigation is necessary to explain these differences.

## H30. Survival for Major Salivary Gland Cancer: Europe vs. United States

Suat Kilic, BA, Newark, NJ; Sarah S. Kilic, MA, Newark, NJ; Zachary S. Mendelson, BS, Newark, NJ; Aykut A. Unsal, DO, Newark, NJ; Soly Baredes, MD, Newark, NJ; Jean Anderson Eloy, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare relative survival for major salivary gland cancer between Europe and the United States, as well as regions within Europe.

**Objectives:** To determine the relative survival (RS) rates for major salivary gland cancer in Europe and to compare those with rates for the United States (U.S.). **Study Design:** Retrospective database analysis. **Methods:** The EURO CARE,



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and the Surveillance, Epidemiology, and End Results (SEER) databases were queried for cases of major salivary gland cancer reported between 2000 and 2007. The number of cases and RS values was obtained. Cases were broken down by age groups and gender. EURO CARE results were also broken down by country and geographic region. **Results:** A total of 23,941 cases of major salivary gland cancer were identified, 16,191 in Europe and 7,750 in the U.S. RS for the U.S. (1 year: 88.5%, 5 year: 72.1%) was greater than that of Europe overall (1 year: 82.0%, 5 year: 61.3%), and that of all European regions ( $p < 0.05$ ). Eastern Europe (1 year: 72.9%, 5 year: 50.5%) had the lowest, and northern Europe (1 year: 85.5%, 5 year: 67.1%) had the highest RS within Europe ( $p < 0.05$ ). For the U.S., 1 year RS was greater than in 16 of 29 European countries ( $p < 0.05$ ), and 5 year RS was greater than 19 of 29 European countries ( $p < 0.05$ ). In all regions, females had higher RS when compared to males. Older patients generally had lower RS when compared to younger patients. **Conclusions:** Survival for major salivary gland cancer varies between European regions and between the U.S. and Europe. Patients in the U.S. have better survival than their European counterparts except in certain countries. Eastern European patients have the worst survival. These reasons for these variations in survival deserve examination.

## H31. Cholesteatomas Arising from Misplaced Tympanomeatal Flap during Tympanoplasty

Garrett D. Locketz, MD, Philadelphia, PA; Oren D. Cavel, MD, Tel Aviv, Israel; Ophir D. Handzel, MD, Tel Aviv, Israel

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the potential complications of tympanomeatal flap misplacement during tympanoplasty, exercise appropriate caution when performing tympanoplasties, maintain clinical suspicion when monitoring these patients postoperatively, and understand imaging clues to diagnosing this complication.

**Objectives:** To describe the presentation and potential etiology of an underappreciated and underreported complication of tympanoplasty, wherein misplacement of an elevated tympanomeatal flap (TMF) induces development of invasive cholesteatoma originating from the bony cartilaginous junction (BCJ) of the external auditory canal (EAC). **Study Design:** Retrospective case series and chart review. **Methods:** Medical records were reviewed from surgical patients at a tertiary academic medical center who presented with cholesteatoma arising from the BCJ of the EAC. **Results:** Five patients were identified with cholesteatoma originating at the BCJ of the EAC following tympanoplasty without mastoidectomy. All patients presented with recurrent ear infections and conductive hearing loss, and each patient's past surgical history included one or more tympanoplasties where an ipsilateral TMF had been raised. Two patients presented with small cholesteatoma that developed an average of 6.5 years after TMF elevation, and three patients presented with extensive cholesteatoma an average of 33.7 years after TMF elevation. Clinical presentation and imaging suggested a misplaced TMF as the most likely source of cholesteatoma. **Conclusions:** TMF misplacement during tympanoplasty may cause iatrogenic cholesteatoma formation at the BCJ of the EAC. Concealed within the mastoid cavity, these cholesteatoma can grow substantially without symptoms, and may not affect the sound conduction system until late in the disease course. Meticulous replacement of elevated TMFs, along with exercising a high index suspicion postoperatively may reduce the incidence of this complication.

## H32. Survival for Thyroid Cancer in the 21st Century: Europe vs. United States

Zachary S. Mendelson, BS, Newark, NJ; Suat Kilic, BA, Newark, NJ; Sarah S. Kilic, MA, Newark, NJ; Aykut A. Unsal, DO, Newark, NJ; Soly Baredes, MD, Newark, NJ; Jean Anderson Eloy, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare survival for thyroid cancer between the United States, Europe, and geographic regions of Europe.

**Objectives:** To compare survival for thyroid cancer across European regions and the United States (U.S.). **Study Design:** Retrospective database analysis. **Methods:** Frequency and RS were obtained from the Surveillance, Epidemiology, and End Results (SEER) and EURO CARE databases for thyroid cancer reported between 2000 and 2007. Cases were broken down by age and gender. For Europe results were also broken down by country and geographic region. **Results:** From 2000 to 2007, 146,904 cases of major salivary gland cancer were identified, 86,691 in Europe and 60,213 in the U.S. RS for the U.S. (1 year: 97.9%, 5 year: 97.2%) was greater than that of Europe overall (1 year: 93.1%, 5 year: 89.7%), and that of all European regions ( $p < 0.05$ ). The United Kingdom (U.K.) and Ireland (1 year: 88.6%, 5 year: 83.5%) had the lowest and south (1 year: 95.9%, 5 year: 93.9%) had the highest RS within Europe ( $p < 0.05$ ). For the U.S. 1 year RS was greater than all European countries besides Malta, and 5 year RS was greater than all European countries ( $p < 0.05$ ). Females had higher RS than males ( $p < 0.05$ ), except in northern Europe. Older patients, especially those  $> 75$  years of age had lower RS when compared to younger patients ( $p < 0.05$ ). **Conclusions:** Survival for thyroid cancer in the U.S. is better than in Europe. While studies have shown eastern Europe to have the worst survival in Europe for head and neck cancers overall, this study demonstrates that the U.K. and Ireland have the worst survival for thyroid cancer. Further studies looking at survival by stage of presentation and histologic subtype, at a population level, are needed for Europe.

### H33. Intranasal Tissue Necrosis Associated with Oxycodone Abuse: A Case Report and Systematic Review

Danielle A. Morrison, BA, Atlanta, GA; Sarah K. Wise, MD, Atlanta, GA; John M. DelGaudio, MD, Atlanta, GA; Joshua M. Levy, MD MPH, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify oxycodone inhalation as a potential source of diffuse nasal necrosis. Best practices regarding patient presentation, diagnosis and treatment will be reviewed.

**Objectives:** Prescription opioid abuse represents a common malady, with deleterious effects involving multiple organ systems. Intranasal tissue necrosis represents a previously described sequelae of nasal oxycodone inhalation, with a clinical presentation similar to invasive fungal sinusitis. The goal of this systematic review is to evaluate the evidence supporting this uncommon disease, with qualitative analysis of the presentation, management and outcomes. **Study Design:** Systematic review. **Methods:** Preferred reporting items for systematic reviews and meta-analyses guidelines were utilized to identify English language studies reporting intranasal mucosal injury associated with prescription opioid abuse. Primary outcomes included clinical presentation, treatment strategies and outcomes. **Results:** Systematic review identified ten studies for qualitative analysis. Common clinical features include facial pain without a history of chronic sinusitis or known immunodeficiency. Diagnostic nasal endoscopy reveals superficial debris with underlying tissue necrosis, consistent with a preliminary diagnosis of invasive fungal sinusitis. Incisional biopsy reveals diffuse mucosal ulceration with an overlying acellular substrate. Superficial fungal colonization is often reported, but angiocentric invasion is universally not found. Complete symptom resolution is expected following surgical debridement with cessation of intranasal oxycodone abuse. **Conclusions:** Intranasal oxycodone abuse is associated with chronic pain and superficial tissue necrosis that is clinically concerning for invasive fungal disease. While fungal sinusitis must be excluded, even in patients without an identified immunodeficiency, complete resolution of symptoms can be expected following surgical debridement with cessation of intranasal opioid use.

### H34. Two Cases of Unusual Cholesteatomas Involving the Facial Nerve

Omid Moshtaghi, BS, Irvine, CA; Ronald Sahyouni, BA, Irvine, CA; Yarah M. Haidar, MD, Irvine, CA; Kasra N. Ziai, MD, Irvine, CA; Harrison W. Lin, MD, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the possibility of cholesteatomas involving the facial nerve.

**Objectives:** To understand the diagnostic challenge of middle ear cholesteatoma (MEC) invading the middle cranial fossa and causing facial paralysis. **Study Design:** Retrospective case series. **Methods:** Case records of two patients presenting with longstanding facial paralysis who were found to have missed MECs invading the facial nerve in the middle fossa were reviewed. **Results:** Patients A and B presented with facial paralysis (grade VI and V, respectively) for facial reanimation. Both patients had a history of cholesteatoma resection 20 and 15 years prior, respectively. They reported facial paralysis for 7 and 1 years, respectively. Both had had temporal bone imaging that was reported as negative by the reading radiologist. On CT imaging, patient A showed infiltration of the geniculate ganglion and cochlea. On MRI, patient B showed cholesteatoma expansion around the superior semicircular canal involving the geniculate ganglion. Both had resection by middle cranial fossa approach. Patient A experienced no improvement in facial function and hearing post-operatively. Patient B improved from grade V to III and experienced no hearing deficits. **Conclusions:** Cholesteatomas located on the floor of the middle fossa can be missed by traditional imaging techniques and require a high index of suspicion. The reading radiologists overlooked both lesions in these two cases. To confirm diagnosis, a non-echoplanar DWI is beneficial for assessing a possible presence of cholesteatoma on the floor of the middle fossa. In addition, these cases show that patients with a history of cholesteatoma resection must obtain radiological surveillance if no second look surgery is performed.

### H35. Evaluating the Readability of Spanish Patient Education Materials in Otolaryngology

Samih J. Nassif, BS, Boston, MA; Kevin Wong, BA, Boston, MA; Jessica R. Levi, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that patient education materials written in Spanish are too difficult to read by the average Spanish speaking reader. They should also be able to recount two formulas for evaluating the readability of Spanish texts.

**Objectives:** Evaluate the readability of Spanish patient education materials related to otolaryngology. **Study Design:** Cross-sectional readability analysis. **Methods:** All otolaryngology related patient education articles written in Spanish from the health libraries of the top 10 US News & World Report ranked hospitals, top 10 Doximity ranked otolaryngology residencies, the American Academy of Otolaryngology-Head and Neck Surgery website and the US National Library of Medicine online section on ears, nose and throat were collected. Readability was assessed using the Spanish readability tools Índice Flesch-Szigriszt and Spanish Lexile Analyzer. Additional readability assessments included the traditional English tools: Flesch-Kincaid Grade Level, Flesch Reading Ease Score and the SMOG Score. **Results:** A total of 497 articles were reviewed. The average INFLESZ score for all articles was 57.75, which is considered normal and requires the reading ability of a student who finished escuela secundaria obligatoria (ESO) in Spain; this is equivalent to that of a



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10th grade student in the US. The average Spanish Lexile measure for all articles was 1062L, equivalent to a 6th grade to 10th grade reading level. Overall, English readability tools calculated a more difficult reading level compared to Spanish tools when performed on the same text. **Conclusions:** Current Spanish patient education materials in otolaryngology may be too difficult for the average Spanish speaking reader to understand. Future improvements may be warranted to improve the readability of educational materials and increase health literacy.

### H36. Diagnosis of Bleeding Disorder after Ventilation Tube Placement

Ashley P. O'Connell Ferster, MD, Hershey, PA; Michele M. Carr, MD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the need for further workup of patients with excess bleeding after ventilation tube placement.

**Objectives:** To present a case of newly diagnosed bleeding disorder after placement of ventilation tubes. **Study Design:** Case report. **Methods:** Review of a pediatric patient's medical record who underwent ventilation tube placement with significant bleeding intraoperatively, resulting in new diagnosis of bleeding disorder. This patient's history and clinical course is presented along with a review of the literature on the topic. **Results:** This case reports a two year old female with hearing loss and otitis media with effusion who was scheduled for ventilation tube placement and auditory brainstem response (ABR) testing. There was no family history or personal history of abnormal bleeding. Placement of ventilation tubes was uneventful with no bleeding encountered. The middle ear mucosa was not disturbed although purulent effusions were suctioned out. However, throughout ABR testing, she was noted to have copious bleeding from her bilateral middle ear spaces. Bleeding was controlled and blood taken intraoperatively for coagulation studies. These were elevated (PT 14.7, PTT 49, INR 1.2). Mixing studies showed low von Willebrand factor activity and factor VIII deficiency. A diagnosis of von Willebrand disease was made. The patient recovered well with appropriate followup with the hematology clinic. **Conclusions:** Significant bleeding with ventilation tube placement is rarely found. Even in the absence of relevant bleeding history, coagulation studies may be indicated in patients who have unusual bleeding following uneventful ventilation tube insertion.

### H37. Gastroesophageal Reflux as a Precursor to Nasopharyngeal Carcinoma and Sinonasal Malignancy in the United States

Charles A. Riley, MD, New Orleans, LA; Eric L. Wu, BS, New Orleans, LA; Meichin L. Hsieh, PhD MSPH CTR, New Orleans, LA; Michael J. Marino, MD, Houston, TX; Xiao C. Wu, MD MPH, New Orleans, LA; Edward D. McCoul, MD MPH, New Orleans, LA

**Educational Objective:** At the conclusion of this presentation, the participants should understand the potential association between gastroesophageal and laryngopharyngeal reflux and the development of nasopharyngeal carcinoma and sinonasal malignancy.

**Objectives:** Chronic inflammatory states have been linked to the development of malignancy. Gastroesophageal reflux disease (GERD) is a known risk factor for esophageal carcinoma as the end result of chronic inflammatory changes. Laryngopharyngeal reflux (LPR) is postulated to affect the nasopharynx and sinonasal tract. The relationship of GERD and LPR to the development of nasopharyngeal carcinoma (NPC) and paranasal sinus malignancy in a large population has not been previously reported. **Study Design:** Analysis of the Surveillance, Epidemiology, and End Results (SEER) Medicare linked database. **Methods:** A case control study of United States adults aged 65 years and greater from 2003 to 2011 was performed. The study cohort included patients diagnosed with NPC and/or paranasal sinus malignancy. GERD and LPR were examined as exposures. Controls were selected from a 5% random sample of Medicare beneficiaries without cancer who lived in the same geographic region as those diagnosed with cancer. **Results:** A total of 2,009 patients with NPC or sinonasal malignancy were compared with 2,009 non-diseased patients matched for gender, age, race, geography, and year of diagnosis. The average age was 76.2 years and 59.4% were male. GERD or LPR was associated with a greater odds of developing NPC (adjusted odds ratio [aOR] 1.694; 95% CI, 1.293-2.218). LPR or GERD was also associated with greater odds of developing sinonasal malignancy (aOR 1.511, 95% CI 1.218-1.876). **Conclusions:** GERD and LPR may be related to the development of NPC and sinonasal malignancy. Prospective studies are necessary to further examine this relationship.

### H38. Trends in Ambulatory Otolaryngologic Surgery in the Era of the Affordable Care Act 2011-2015

Joshua E. Romero, MD, Syracuse, NY; Haidy A. Marzouk, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss possible early impacts of the Affordable Care Act on the volumes of common otolaryngologic surgeries.

**Objectives:** To familiarize otolaryngologists with recent trends in ambulatory otolaryngologic surgery during early implementation of the Affordable Care Act and its implications. **Study Design:** Retrospective database review. **Methods:** The Office of Statewide Health Planning and Development (OSHDP) database of all outpatient surgery performed in a large US state was queried for the years 2011-2015 for 55 common otolaryngologic procedures by CPT code. Resulting trends

were analyzed with linear regression. Contextual public health data was obtained from the Kaiser Foundation. **Results:** 729,106 common otolaryngologic ambulatory surgeries were performed in the state from 2011-2015. During this time of ACA implementation nearly three quarters of previously uninsured patients in this state have obtained insurance. Nonetheless, there was no significant change in overall yearly surgical volume. When broken down by CPT code, 10 codes, mostly head and neck and reconstructive procedures, showed significant increases. Meanwhile 10 codes, including common codes such as for tonsillectomy, showed significant decreases. Yearly surgical volume remained beneath 2011 levels in all years. **Conclusions:** The Affordable Care Act has triggered far reaching changes in the American healthcare system. Despite millions of patients obtaining insurance, there has not been a commensurate rise in ambulatory surgical volumes. While this may be partially due to changing practice patterns, these results also raise troubling questions about access to surgical subspecialty care. The reasons behind this disparity should be the focus of further research.

### H39. Management of Candida Parotitis with Abscess Formation Using VAC Therapy: A Rare Case and Review of the Literature

Isaac L. Schmale, MD, Rochester, NY; Glenn T. Schneider, MD MS, Rochester, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the management of a fungal parotid abscess including association with Warthin's tumor, and discuss the potential for VAC therapy in the treatment of complicated head and neck wounds.

**Objectives:** Discuss the management of fungal parotid abscess and the role of VAC therapy for head and neck wounds. **Study Design:** Case report and literature review. **Methods:** Case report and literature review utilizing the Medline database. **Results:** We report a case of a 45 year old female with poorly controlled diabetes who presented with a left sided fungal parotid abscess and possible associated Warthin's tumor. She failed initial treatment with incision and drainage, an oral antifungal and antibiotics. Repeat incision and drainage was necessary, and a wound VAC was placed. Her wound was successfully closed after 5 days of VAC therapy with completion of an antifungal and antibiotic course. **Conclusions:** This case adds to the limited literature on the management of parotid fungal abscesses. Common therapy includes incision and drainage with antifungal +/- antibiotic treatment. To our knowledge, this is the first case of parotid fungal abscess managed with VAC therapy. The data from limited published studies overwhelmingly supports VAC therapy as a useful modality in selected complex and poor healing head and neck wounds. In the only other reported case of multiply recurrent fungal parotid abscess, a Warthin's tumor was found. In our patient, biopsy results failed to confirm Warthin's tumor, however the presentation and CT scan is consistent with this associated diagnosis. Fungal parotid abscesses represent a rare clinical entity which may be associated with Warthin's tumors and can be complicated by poor wound healing. In such cases we propose VAC therapy as a useful aid to accelerate wound healing and prevent abscess reaccumulation.

### H40. Pemphigus Vulgaris of the Upper Aerodigestive Tract

Marissa A. Schwartz, MD, Farmington, CT; Todd E. Falcone, MD, Farmington, CT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the clinical manifestations of pemphigus vulgaris and the role of the otolaryngologist in managing patients with pemphigus vulgaris.

**Objectives:** The purpose of this presentation is to discuss the manifestations of pemphigus vulgaris and the role of the otolaryngologist in managing this condition. **Study Design:** This study is a case report and literature review. **Methods:** This is a case report describing a patient with pemphigus vulgaris affecting the larynx and manifesting as signs concerning for epiglottitis. **Results:** The diagnosis was made based on history, exam, and biopsy with positive direct immunofluorescent studies. The patient has responded well to standard therapy and has required routine otolaryngology followup. **Conclusions:** Pemphigus vulgaris is a rare bullous disorder of the mucosa and skin. Patients may manifest mucosal lesions, cutaneous lesions, or both. The most common location for mucosal lesions is the oral cavity. Patients with pemphigus vulgaris are primarily managed by dermatologists, however, mucosal lesions may also extend to the larynx causing odynophagia, hoarse voice, and even respiratory distress. Furthermore, literature review demonstrates that a large proportion of patients may have laryngeal findings, even if they deny throat symptoms. Therefore evaluation by an otolaryngologist is essential in the initial evaluation and to monitor the response to treatment. This case demonstrates the importance of a multidisciplinary approach to treating pemphigus vulgaris of the upper aerodigestive tract and highlights the critical role of the otolaryngologist in the management of the disease.

### H41. Sensitivity of Emergency Medicine Residents in Triage of Airway Pathology on Flexible Laryngoscopy

Manan Udayan Shah, MD, Farmington, CT; Seth A. Lotterman, MD, Hartford, CT; Gregory S. Bonaiuto, MD, Hartford, CT

**Educational Objective:** Increasingly, in many academic centers, emergency medicine residents perform flexible laryngoscopies in response to airway complaints prior to calling otolaryngology consults. At the conclusion of this presentation, participants will learn the sensitivity and specificity of a sample of emergency medicine residents in their ability to triage flexible laryngoscopy findings as compared to a panel of board certified otolaryngologists.

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**Objectives:** Each year, more than two million patients present to U.S. emergency departments with throat symptoms. To distinguish concerning versus benign symptoms, emergency physicians are now increasingly performing flexible laryngoscopies to determine the need for otolaryngology (ENT) consults. While the otolaryngology literature supports a need for formalized training in flexible laryngoscopy, many emergency medicine (EM) residents do not receive formalized training. On one hand, screening laryngoscopies could avoid unnecessary consults and save resources; however, the risk of missed diagnosis is high. We aim to evaluate the sensitivity and specificity of EM residents in their ability to assess when an otolaryngology consult is necessary based solely on laryngoscopy findings as compared to a panel of board certified otolaryngologists. **Study Design:** Cross-sectional analysis. **Methods:** 20 laryngoscopy videos of varying pathology were viewed by 26 EM residents and 5 board certified otolaryngologists. All viewers attempted basic diagnosis and determined whether no consult, an outpatient followup, a non-urgent consult, or a stat ENT consult was indicated. The opinion of a panel of 5 attending otolaryngologists served as the gold standard. Sensitivity and specificity were calculated. **Results:** For knowing when to consult, sensitivity and specificity was found to be: 71%/85% for no consult, 52.88%/89.10% for outpatient followup, 34.62%/79.19% for routine ENT consult, 58.24%/87.87% for stat ENT consult, and 78.85%/76.54% for call or do not call ENT. **Conclusions:** Based on the sensitivity found, prior to EM residents performing triage flexible laryngoscopies, formalized education should be considered.

## H42. Smartphone Telemedical ER Consults for BPPV: Proof of Concept and Cost Saving Potential

Manan U. Shah, MD, Farmington, CT; Seth A. Lotterman, MD, Hartford, CT; Danial S. Roberts, MD, Farmington, CT; Marc D. Eisen, MD, Hartford, CT

**Educational Objective:** At the conclusion of this presentation, participants will learn the sensitivity/specificity and potential cost saving utility of screening telemedical BPPV consults. Participants will learn a method to easily employ this process at their facility.

**Objectives:** Each year the U.S. spends over \$4 billion on emergency room visits for evaluation of dizziness. A very common cause of dizziness is benign paroxysmal positional vertigo (BPPV), which can easily be diagnosed by observing characteristic eye movements during the Dix-Hallpike test (DHT). The DHT is rarely performed in emergency departments, but patients are often subjected to costly imaging tests in this context. While the DHT is straightforward to perform, interpretation of the resulting eye movements typically requires more training. We aim to evaluate whether telemedical videos of eye movements during DHT could allow a remote otolaryngologist to accurately diagnose BPPV. In the future, remote consults could help to avoid unnecessary imaging and create significant cost savings. **Study Design:** Evaluation study. **Methods:** Dizzy patients underwent objective vestibular testing and evaluation by a neurotologist. Subsequently, these patients underwent a DHT with a physician recording eye movements via a smartphone. These videos were remotely reviewed by two otolaryngologists for BPPV screening. Remote diagnosis was compared to the initial gold standard diagnosis by in-person examination. **Results:** 30 dizzy patients were evaluated; 7 had BPPV. The sensitivity of remote diagnosis was 92.86%, with a specificity of 100% and a NPV of 97.87%. **Conclusions:** Remote diagnosis of BPPV via telemedical consults is possible with high specificity. Since the DHT is easily taught, having an otolaryngologist interpret the resulting eye movements remotely may increase usage of the test and may lead to cost savings.

## H43. Elective Tracheostomy in a Second Trimester Pregnant Female with Subglottic Stenosis

Karthik S. Shastri, MD, Albany, NY; Jessica W. Scordino, MD, Albany, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss surgical management of the airway in pregnant patients as well as appreciate the need for multidisciplinary care of such patients.

**Objectives:** To highlight the safety and efficacy of tracheostomy for pregnant patients with subglottic stenosis. **Study Design:** Case report. **Methods:** We present the case of a pregnant patient with subglottic stenosis receiving definitive airway management via elective tracheostomy. **Results:** A 30 year old pregnant female with known subglottic stenosis presented to the emergency department at 23 weeks gestation for worsening stridor and dyspnea. The patient had been evaluated multiple times for shortness of breath episodes early on in this pregnancy, thought initially to be asthma exacerbations until diagnosis of idiopathic subglottic stenosis was made via flexible laryngoscopy at 8 weeks gestation. Evaluation at time of presentation to the emergency department revealed a 4 mm subglottic stenosis as well as mild edema of the arytenoids and false vocal cords. She was placed on IV dexamethasone and recommended to undergo awake local tracheostomy for secure airway establishment, which was completed successfully. Evaluation of the patient and fetus was performed in conjunction with the obstetrics service, who checked fetal viability with fetal heart monitoring pre and postoperatively. The patient tolerated this procedure well and was discharged with plans for balloon dilation of the stenosis following delivery. **Conclusions:** Subglottic stenosis in pregnancy is rare and airway obstruction may endanger patients and successful delivery. Elective tracheostomy represents a safe method of establishing a secure airway for these patients, and multidisciplinary coordination between surgical and obstetrical services is important to ensure the wellbeing of the patient and fetus throughout the surgical and postoperative periods.



#### H44. Post-obstructive Pulmonary Edema (POPE) and Negative Pressure Pulmonary Edema (NPPE) after Upper Airway Surgery: A Systematic Review and Meta-Analysis

Sungjin A. Song, MD, Honolulu, HI; Joseph Sarette, BS, Bethesda, MD; Cindy L. Pubols, BA, Bethesda, MD; John Neighbors, BS, Bethesda, MD; Scott E. Brietzke, MD MPH, Bethesda, MD; Macario Camacho, MD, Honolulu, HI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify and differentiate the types of post-obstructive pulmonary edema (POPE), understand the current treatment and management of POPE, and recognize patient populations at increased risk for this rare complication.

**Objectives:** To provide an up to date systematic review and critical appraisal of case reports and performed studies evaluating post-obstructive pulmonary edema (POPE) and negative pressure pulmonary edema (NPPE) in patients after upper airway surgery. **Study Design:** Systematic review and meta-analysis. **Methods:** Searches were performed from inception through October 11, 2016 of PubMed/MEDLINE, EMBASE, Scopus, Web of Science, and the Cochrane Library. We collected information on patient demographics, preoperative medications, surgical procedures, medical histories, and treatment of POPE. **Results:** Fifty-one manuscripts, 113 patients, met criteria and reported postoperative treatment outcomes and individual patient data for 77 patients. Average age was 34±20.1 years (range 6 months-73 years) with 56.9% male. Majority of POPE were type I (68.8%) compared to type II (31.2%). The most common operative procedures included variations of tonsillectomy and septorhinoplasty. Treatment included 63.6% of patients were reintubated, 75.3% were treated with diuretics, and only 24.7% were treated with steroids. There was no difference in length of stay between patients who did and did not receive steroids. The majority of patients (58.5%) were discharged within three days of complication, however, notably 22.6% had hospital stays greater than a week. **Conclusions:** The majority of the published literature shows heterogeneity within clinical studies, lack of controlled data, and lack of prospective studies. However, post-obstructive pulmonary edema can occur after various upper airway surgeries, and a keen awareness of the both types of POPE can help with early recognition and mitigate potentially devastating effects of this rare complication.

#### H45. Migration of Broken Dental Needle through the Internal Jugular Vein in the Parapharyngeal Space

Jeffrey C. Teixeira, MD, Bethesda, MD; Lauren P. Kecskes, BA, Bethesda, MD; Wayne A. Cardoni, DO, Bethesda, MD; George L. Coppit, MD, Bethesda, MD

**Educational Objective:** At the conclusion of this presentation the participant should be able to recognize the rarity in migrating foreign objects into the parapharyngeal space and importance of CT imaging for localization of the foreign object with respect to critical anatomical structure. Furthermore, the participant will understand the importance for neck exploration and extraction of the foreign object given the close proximity and relationship to important neurovascular structures.

**Objectives:** 1) Report on the rare occurrence of a migrating broken dental needle into the parapharyngeal space; 2) demonstrate the propensity for foreign objects to migrate; 3) understand the role of preoperative imaging; and 4) understand the role of surgical exploration. **Study Design:** Case report. **Methods:** Review of clinical case records. **Results:** We report on a 48 year old male who underwent a dental procedure in November of 2014 with local anesthetic using a 30G needle. During the procedure, it was noted that the needle used was missing. A plain film x-ray was performed which demonstrated the needle at the level of the condylar head. Initial attempts at extraction were unsuccessful and the patient elected to not have the foreign object removed. Over the course of two years, CT scan imaging revealed migration of the dental needle into the right parapharyngeal space, through the internal jugular vein and abutting the posterior entrance to the jugular foramen. The patient underwent surgical exploration through a transcervical approach with successful extraction of the 30G needle without significant hemorrhage or neurovascular compromise. **Conclusions:** Our case is the third reported case of a broken dental needles migrating into the parapharyngeal space in the medical literature. In our case, the needle migrated through the internal jugular vein and abutted the posterior wall of the jugular foramen. Given previously reported case of neurovascular compromise secondary to foreign object in the parapharyngeal space and propensity for further migration, our case demonstrates the importance of surgical exploration with successful recovery.

#### H46. Competitiveness of Otolaryngology Applicants without a Home Program

James C. Wang, MD PhD, Cincinnati, OH; Rebecca Gabrijska, BS, Lubbock, TX; Mayank Aranke, BS, Lubbock, TX; Maleeh Effendi, BS, Lubbock, TX; Phillip Watkins, MS, Lubbock, TX; Joehassin Cordero, MD, Lubbock, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the differences between applicants applying to an otolaryngology residency with and without a home program.

**Objectives:** To investigate if availability of an otolaryngology residency home program leads to any advantages to match by comparison of competitiveness to applicants without home programs. **Study Design:** Survey study. **Methods:** Two anonymous surveys were distributed electronically: one to fourth year medical students who applied to otolaryngology residency programs in 2016 and another to administrators of U.S. allopathic medical schools. Participants were split into three groups: home program (HP); no home but have ENT staff (staff); no home or staff (none). Data was analyzed for

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statistical significance between groups. **Results:** Sixty-two surveys were included in our analyses, with 95% (59/62) of participants matching into otolaryngology, 96% (43/45) with a HP, 90% (9/10) with staff, and 100% (7/7) with none. A sub-analysis of match preference revealed 63% (27/43) of HP participants matched to their first choice compared to the 56% (5/9) with staff and 14% (1/7) with neither ( $p=0.058$ ). Comparison of match rate between those with any staff (home or not) versus those without was statistically significant ( $p=0.037$ ). Participants without a home program went on more away rotations than HP participants (mean  $2.5\pm 0.5$  versus  $1.7\pm 0.07$ ,  $p=0.0002$ ). No statistical significance was seen between applicants with and without home programs in regards to board scores, research experiences, publications, or number of interviews. **Conclusions:** Applicants applying to otolaryngology residency without a home program do not appear more or less competitive than those who do have home programs. However, without a home program, applicants tend to participate in more away rotations and may be less likely to match at their top choice.

## H47. Opioid Associated Bilateral Sudden Sensorineural Hearing Loss: A Case Report and Literature Review Yin Yiu, MD, Columbus, OH; Minka L. Schofield, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize opioid abuse as a potential etiology of bilateral sudden sensorineural hearing loss and become familiar with suspected mechanisms of action for sudden sensorineural hearing loss in this population.

**Objectives:** Opioid drug abuse is increasing, particularly among young adults. A devastating, less commonly described complication of opioid abuse is bilateral sudden sensorineural hearing loss (SSNHL). Our objectives are to describe a case of opioid associated SSNHL, review the literature, and delineate potential mechanisms of action. **Study Design:** Case report and literature review. **Methods:** Review case of a 27 year old who suffered bilateral SSNHL after a heroin overdose. A PubMed literature search was performed using the key words hearing loss, opioids, and heroin to identify related articles. **Results:** After a heroin overdose, the patient was admitted with multi-organ failure and anoxic brain injury. Once extubated, he immediately endorsed bilateral hearing loss. He was treated empirically with an oral high dose steroid taper followed by an outpatient audiogram one month later demonstrating bilateral moderate SNHL. He opted for salvage therapy with bilateral intratympanic steroid injections without subjective improvement. Although the exact mechanism of injury is unknown, hypoperfusion to the cochlea seems probable. In the absence of hypoperfusion, opioids also have direct effects on inner ear opioid receptors, which can lead to ototoxic effects. Of reported cases in the literature, hearing loss often occurred during a relapse in chronic opioid abusers, and most cases failed to fully recover their hearing. **Conclusions:** Bilateral SSNHL can result from opioid abuse with young adults being most at risk. The mechanism of action for opioid associated hearing loss is likely multifactorial with potential factors including cochlear toxicity, hypoperfusion from drug induced vasospasm, and cerebral infarction from systemic hypotension.

## FACIAL PLASTIC & RECONSTRUCTIVE

### H48. The Role of Gli1+ Mesenchymal Stem Cells in Facial Nerve Regeneration Gabriela L. Bobarnac Dogaru, BS, Los Angeles, CA; Alireza Shokrani, MD MS, Los Angeles, CA; Roseanne Y. Hui, BA, Los Angeles, CA; Jon-Paul Pepper, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of Gli1+ mesenchymal stem cells in the regeneration of the facial nerve after injury.

**Objectives:** Facial nerve paralysis is a significant cause of morbidity, affecting speech, oral competence, vision, and emotional expression. Extensive efforts have been undertaken to determine the cellular events that occur during nerve regeneration, in hopes of finding molecular therapeutic targets to improve this process. Increasingly, non-neural cell lineages are recognized as having critical roles in the process of nerve regeneration. However, little is known about the role of mesenchymal stem cells (MSCs). This is partly due to the lack of known in vivo markers that allow cell fate tracing. Recently, a population of in vivo MSCs was identified in the perivascular space of the mouse incisor, identified by the marker Gli1. Here, we explored the role of Gli1+ MSC's in a mouse model of facial nerve regeneration. **Study Design:** Animal research study. **Methods:** We used a transgenic mouse line with an inducible reporter for lineage tracing of Gli1+ cells (Gli1-CRE;Tdt), and induced a unilateral facial nerve cut injury, using the contralateral side as a control. We analyzed the nerve via immunohistochemistry at 1 day, 1 week, 2 weeks, and 4 weeks after injury. **Results:** There was a significant increase in Gli1+ cells both at the site of injury and within the distal nerve segment. Preliminary results show a subpopulation of these cells to be NG2+ pericytes. The Gli1+ cells do not appear to be Schwann cells, as shown by S100 and p75 staining. **Conclusions:** These findings represent a new role in nerve regeneration for a previously undescribed cell population that may represent a novel therapeutic target.

### H49. First Case of Pyoderma Gangrenosum after Submental Kybella (Deoxycholic Acid) Injection Shumon I. Dhar, MD, Syracuse, NY; Amar C. Suryadevara, MD, Syracuse, NY; Richard O. Davila, MD, Syracuse, NY; Mark F. Marzouk, MD, Syracuse, NY; Ramsey S. Farah, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the pathologic



features of pyoderma gangrenosum and differentiate it from other infectious or autoimmune conditions.

**Objectives:** To report the first case of pyoderma gangrenosum (PG) of the submentum after Kybella injection. We intend to describe the clinical course, workup, and clinical features of this extremely rare presentation of PG. **Study Design:** Case report and literature review. **Methods:** PubMed search terms: pyoderma gangrenosum, Kybella, head and neck. **Results:** We report the case of a healthy 44 year old lady who underwent Kybella injection for submental fullness. Five days after injection she presented with pain and erythema at the injection site. Along with high grade fevers and elevated WBC she was treated for presumed cellulitis. The patient's clinical condition worsened with further blistering and induration. She was taken to the OR for debridement of skin/subcutaneous fat, resulting in a large submental ulcer. Cultures failed to yield pathogenic bacteria. Despite antibiotic therapy, more extensive debridements, and HBO she failed to improve. Nevertheless, after each debridement the patient initially improved, and then the edges would become more violaceous and firm. Biopsies were eventually sent to our dermatopathologist for expert review and the findings were consistent with PG. She was started on a combination of prednisone, infliximab, minocycline, and topical tacrolimus. After initiation of this massive immunosuppression the ulcer began to slowly resolve to a shallow scar. **Conclusions:** Predominately associated with autoimmune comorbidities and found in the lower extremities, PG is rare and often a diagnosis of exclusion. This case, initially misdiagnosed as cellulitis represents the first report of PG after Kybella injection.

#### H50. Repair of Nasal Mucocutaneous Fistula and Scarring Caused by Leishmaniasis through Excision, Local Tissue Advancement, and Alar Rim Grafting

Yula A. Indeyeva, MD, Richmond, VA; Thomas S. Lee, MD, Richmond, VA; Rajanya S. Petersson, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the technique of excision of nasal mucocutaneous fistula and reconstruction of resultant defect utilizing knowledge of nasal subunit principles and rhinoplasty maneuvers.

**Objectives:** Describe the technique of excision of nasal mucocutaneous fistula and reconstruction of resultant defect utilizing photographic documentation. Report cosmetic and functional results of 2 year followup. Review the epidemiology, clinical presentations, and treatment of leishmaniasis. **Study Design:** Case report and literature review. **Methods:** Case report and literature review. **Results:** Our patient developed a nasal mucocutaneous fistula associated with unsightly nasal scarring as a result of mucocutaneous leishmaniasis. The scar involved her left lateral nasal wall, extending down to the left alar rim, and across towards the supratip area, where the fistula was located. This caused her aesthetic and functional issues characterized by nasal scarring, nasal obstruction, and chronic drainage. After determining she was cleared of active infection, she underwent excision and reconstruction of the defect in two stages, with resolution of symptoms and excellent aesthetic outcome at 2 years. **Conclusions:** Mucocutaneous leishmaniasis can lead to a multitude of functional and cosmetic defects, including nasal mucocutaneous fistula and distracting scarring. This condition can be successfully treated by surgical excision and reconstruction, with thorough understanding of nasal subunits and rhinoplasty techniques.

#### H51. Endoscopic and Transcervical Approach for Free Flap Reconstruction of Nasopharyngeal and Clival Defects

Natalie A. Krane, MD, Portland, OR; Scott H. Troob, MD, New York, NY; Mark K. Wax, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate understanding of additional options for reconstructing posterior nasopharyngeal and clival defects. Participants should be able to discuss the utility and technical considerations of the method presented.

**Objectives:** To understand the role and technical considerations of free flap reconstruction of posterior nasopharyngeal and clival defects. **Study Design:** Case report. **Methods:** We present a case of a 45 year old female with granulomatosis with polyangiitis complicated by sinonasopharyngeal destruction and chronic fungal osteomyelitis of the cervical spine with extension to the skull base. Preoperative imaging revealed complete full thickness defects of the nasopharynx extending to the prevertebral soft tissues with erosion of the clivus. **Results:** The patient was taken to the operating room for a combined endoscopic and transcervical approach for reconstruction of the nasopharyngeal defect using a myogenous serratus anterior free flap. The pedicle was tunneled through the parapharyngeal space and anastomosis was performed in the neck. Inset of the free flap was accomplished endoscopically with absorbable tacks using a laparoscopic fixation device. Followup endoscopy revealed a viable flap, which healed into the defect and was completely mucosalized. She remains without recurrence of meningitis. **Conclusions:** Where local vascularized flap reconstruction is not available, microvascular free flap reconstruction of posterior nasopharyngeal wall and skull base defects is possible via a combined endoscopic and transcervical approach.

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## H52. Alaeque Nasi Myocutaneous Flap: A Novel Approach for Reconstruction of Through and Through Nasal Defects

Richard W. Thompson, MD, Shreveport, LA; Kevin A. Moore, MD, Shreveport, LA;  
Timothy S. Lian, MD MBA FACS, Shreveport, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the technical details of performing the alaeque nasi myocutaneous flap and appreciate features of selected patients that have undergone the procedure.

**Objectives:** Trauma and advanced cutaneous malignancy of the nose often leave the reconstructive surgeon with complex, through and through defects to repair. The reconstructive surgeon must be mindful when constructing the internal nasal lining, structure, and covering of the nose in an effort to achieve the maximal functional and aesthetic outcome for these full thickness nasal defects. Anecdotally, there has been a shift toward patients opting to avoid multi-staged procedures, even when counseled that such procedures would provide the best long term outcome. We describe a single staged surgical technique based upon the alaeque nasi muscle to provide the internal lining, structure, and outer covering of full thickness defects of the nose. **Study Design:** Cadaver study and case review of selected patients undergoing alaeque nasi myocutaneous flap reconstruction of the nose. **Methods:** The harvest technique of the alaeque nasi myocutaneous flap, a transpositional, myocutaneous flap utilizing the epidermis, dermis, subcutaneous tissue, and a portion of the alaeque nasi muscle is demonstrated in cadavers. Patient cases where the alaeque nasi myocutaneous flap was employed to reconstruct through and through defects of the nose were assessed for form and function. **Results:** The alaeque nasi myocutaneous flap harvest technique is demonstrated to be straightforward. Patients who have undergone nasal defect reconstructions utilizing the alaeque nasi myocutaneous flap achieved satisfactory outcomes with respect to form and function. **Conclusions:** Based on our experience, the alaeque nasi myocutaneous flap is an acceptable alternative for complex, full thickness nasal defects, particularly in those patients opting for single staged reconstructions.

## HEAD & NECK

### H53. Online Reviews of 526 Otolaryngologists

Mai M.G. Al Khadem, MBBCh, Baltimore, MD; Monira M. Albathi, MBBS, Baltimore, MD;  
Jonathon O. Russell, MD, Baltimore, MD; Salem I. Noureldine, MD, Washington, DC; Ralph P. Tufano, MD,  
Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the online ratings and reviews of otolaryngologists across the United States.

**Objectives:** To describe online patient ratings and reviews of otolaryngologists and identify factors associated with positive and negative reviews. **Study Design:** Cross-sectional analysis of survey data. **Methods:** A random sample of 526 otolaryngologists representing 5% of 10,463 otolaryngologists in active practice was selected from the ABOto member directory website. Data were collected from two websites (Vitals.com and Healthgrades.com). Ratings from both websites were weighted and combined to give an overall rating scaled between 0.0-1.0. Written reviews from each website were classified as extremely positive, positive, neutral, negative, and extremely negative. Ratings were considered favorable if they were greater than 0.51, and reviews were considered favorable if they were positive or extremely positive. Other variables included gender, state, years in practice, subspecialty, and academic versus private practice. Descriptive statistics were used to examine trends, and linear and logistic regressions were used to compare ratings based on the listed factors. **Results:** Of our overall sample, 418 otolaryngologists had profiles on both Vitals and Healthgrades, of whom 85.7% were male, 40.1% had a fellowship or subspecialty training, and 55.5% have been in practice for more than 20 years. Mean combined rating was 0.79 (SD=0.15; range 0.20-0.96). Favorable ratings were 80% more likely for younger physicians, i.e., if time spent in practice was less than 20 years ( $p=0.010$ ). There were 134 otolaryngologists with written reviews on Vitals.com. Overall, 69.7% of otolaryngologists had favorable reviews. **Conclusions:** The majority of online ratings and reviews for otolaryngologists are favorable, but physicians with more time in practice have lower scores.

### H54. Magnesium Disorders and Hypocalcemia after Total Thyroidectomy in Commercially Insured Patients

Monirah M. Albathi, MBBS, Baltimore, MD; Jason C. Nellis, MD, Baltimore, MD; Jonathon O. Russell, MD,  
Baltimore, MD; David W. Eisele, MD, Baltimore, MD; Ralph Tufano, MD MBA, Baltimore, MD; Christine  
Gourin, MD MPH, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the relationship between postoperative hypocalcemia and magnesium disorders in total thyroidectomy patients and the association with long term hypocalcemia and costs.

**Objectives:** To identify factors associated with long term postoperative hypocalcemia after total thyroidectomy and to understand the relationship between hypocalcemia and costs of care. **Study Design:** Retrospective cross-sectional analysis of MarketScan Commercial Claim and Encounters data. **Methods:** We evaluated 41,329 patients undergoing

total thyroidectomy between 2010-2012 using cross-tabulations and multivariate regressions. **Results:** Postoperative hypocalcemia was present in 19.1% of patients the first 30 days following surgery and in 4.4% of patients at 1 year. Magnesium disorders were present in 2.1% patients the first 30 days and in 0.3% patients at 1 year. Short and long term hypocalcemia were significantly more likely in women, age <40 years, surgery for thyroiditis or cancer, vitamin D deficiency, concurrent neck dissection, and intraoperative parathyroid or recurrent laryngeal nerve injury. Compared to the initial postoperative period, the odds of hypocalcemia decreased by 90% (OR=0.10[0.09-0.11]) at 6 months and 93% (OR=0.07[0.06-0.08]) at 1 year. After controlling for all other variables, magnesium disorders were associated with the highest odds of postoperative hypocalcemia at 30 days (OR=9.03[7.77-10.50]) and at 1 year (OR=28.88[22.67 36.80]). Overall 1 year costs of care were significantly greater for patients with hypocalcemia (\$3,710) and magnesium disorders (\$14,868). **Conclusions:** Hypocalcemia is common after total thyroidectomy but resolves in the majority of patients by 1 year. Magnesium disorders are a significant predictor of short and long term hypocalcemia and are associated with significantly greater overall costs of care. These data suggest a potentially modifiable target to reduce morbidity of long term hypocalcemia following total thyroidectomy.

#### H55. 3D Printed Tracheoesophageal Puncture and Prosthesis Placement Simulator

Samuel R. Barber, MS, Boston, MA; Elliott D. Kozin, MD, Boston, MA; Matthew R. Naunheim, MD MBA, Boston, MA; Rosh Sethi, MD MPH, Boston, MA; Aaron K. Remenschneider, MD MPH, Boston, MA; Daniel G. Deschler, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain what a tracheoesophageal prosthesis is and discuss how procedures with multiple steps contribute to their technical difficulty.

**Objectives:** A tracheoesophageal prosthesis (TEP) allows for speech in patients after total laryngectomy. However, TEP placement is technically challenging, requiring a coordinated series of steps to avoid complications. Surgical simulators improve technical skills, reduce operative time, and increase safety. We hypothesize that a reusable 3 dimensional (3D) printed TEP simulator will facilitate comprehension and rehearsal of procedures prior to entering the operating room.

**Study Design:** Pilot study. **Methods:** The simulator was designed in Fusion 360 software (Autodesk, San Rafael, CA). Components were fabricated inhouse using polylactic acid on an Ultimaker 2+ printer (Ultimaker, Netherlands). The esophageal membrane was simulated using squid. A 16 French Blom-Singer TEP prosthesis (InHealth Technologies, Carpinteria, CA) and insertion device replicated surgical placement. Subjects watched an instructional video before simulation and filled out pre and post-simulation surveys. **Results:** The simulator was designed in two pieces: the esophageal lumen and superficial stoma. All components were printed to scale. The squid was placed in between the two components, representing the common tracheoesophageal wall. In a training laboratory, 10 trainees completed simulation. Significant differences existed between junior and senior residents for variables including surgical anatomy knowledge ( $p < 0.05$ ), technical details ( $p < 0.01$ ), and equipment setup ( $p < 0.01$ ). All subjects strongly agreed that simulation felt representative of real surgery, and rehearsal resulted in confidence of higher performance on future TEP procedures in the operating room. **Conclusions:** A 3D printed TEP simulator is feasible for surgical training. Simulation for procedures involving multiple steps may accelerate technical skills and improve education in residency.

#### H56. The Futility of Intraoperative Frozen Section in the Evaluation of Follicular Thyroid Lesions

Craig A. Bollig, MD, Columbia, MO; David R. Gilley, BS, Columbia, MO; David W. Lesko, BS, Columbia, MO; Laura M. Dooley, MD, Columbia, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to comment on the value of obtaining intraoperative frozen section in patients with follicular thyroid lesions following publication of the 2015 American Thyroid Association guidelines.

**Objectives:** Investigate the utility of intraoperative frozen section (iFS) in patients with follicular thyroid lesions following publication of the 2015 American Thyroid Association (ATA) guidelines. **Study Design:** Single institution case series. **Methods:** Patient demographics, preoperative cytology, frozen pathology and final pathology were reviewed on patients undergoing thyroid surgery at a tertiary care hospital in which iFS was utilized over a 5 year period. The test performance of iFS and the frequency of indicated completion/total thyroidectomies pre- and post-publication of the 2015 ATA guidelines were calculated. **Results:** 101 patients met inclusion criteria: 54 patients with follicular lesions of undetermined significance (FLUS) and 47 patients with a cytologic diagnosis of suspicious for follicular neoplasm/follicular neoplasm. The malignancy rate was 36%, but only 14% of malignancies were identified on iFS. A definitive benign or malignant diagnosis was given on iFS in only 21% of cases and operative management was altered in 2 cases as a result of iFS. There was a statistically significant reduction in the frequency of indicated total/completion thyroidectomies based on high risk features as a result of the 2015 ATA guidelines compared to prior recommendations (20.8% vs 5.0%,  $p = < 0.001$ ). None of these patients had findings on iFS that would have altered management intraoperatively. **Conclusions:** Intraoperative frozen section offers minimal diagnostic utility in the evaluation of follicular thyroid lesions. Updates in the 2015 ATA guidelines further diminish its potential to impact management intraoperatively. Significant improvements in its ability to identify malignancies would be needed to justify its use.

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## H57. Fibrin Sealant and Parotidectomy Wound Complications

Stephen R. Chorney, MD MPH, Syracuse, NY; Jesse Ryan, MD, Syracuse, NY

**Educational Objective:** At the end of this presentation, the participants should be able to appreciate the relationship between the use of fibrin sealant and the development of wound complications after parotidectomy.

**Objectives:** To determine whether the use of fibrin sealants impacted the rates of postoperative wound complications following parotidectomy. **Study Design:** Retrospective cohort study. **Methods:** We identified patients at an academic medical center between 2011 and 2016 who had a parotidectomy without additional procedure. Records were analyzed to determine whether fibrin glue was used intraoperatively. Primary outcomes were development of seroma, sialocele, abscess, or hematoma within the first 30 days as well as prolonged hospital stay for high drain output if one was placed. Secondary outcomes included smoking status, diabetes mellitus, or the use of AlloDerm. **Results:** There were 100 surgeries analyzed, 74 superficial parotidectomies and 26 total parotidectomies. The most common pathology was pleomorphic adenoma (39) followed by Warthin's tumor (27). Fibrin sealant was used in 46 patients. Postoperative wound complications occurred in 20 patients and were more frequent in the fibrin sealant group (23.9% vs. 16.7%,  $p=0.454$ ). We found no significant association between the use of AlloDerm, history of smoking, or diagnosis of diabetes and the development of postoperative wound complications. No patients required prolonged hospitalization for high drain output. **Conclusions:** The development of postoperative wound complications following parotidectomy does not appear to be significantly impacted by the use of a fibrin sealant.

## H58. Online Referral for Endocrine Surgical Pathology within Institutions

Vaninder K. Dhillon, MD, Baltimore, MD; Mai Al-khadem, BS, Baltimore, MD; Jonathan O. Russell, MD, Baltimore, MD; Ralph P. Tufano, MD MBA, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) determine the pathways for non-referred patients with thyroid and parathyroid pathology within their institution and whether or not a pathway exists to refer to head and neck surgery; 2) provide information to guide individual institutions with head and neck departments to establish online resources allowing patients to preference head and neck surgery for endocrine related problems; and 3) analyze institutions with multidisciplinary institutes related to thyroid and parathyroid disorders in order to unify head and neck surgeons with general surgeons in treating endocrine related pathologies.

**Objectives:** Multiple departments manage surgical thyroid and parathyroid pathology at various institutions. Pathways for non-referred patients are not always clear. Online sources may route some patients preferentially to one department over another. We hypothesize that non-referred patients will be randomly but equally distributed between departments that perform thyroidectomy and parathyroidectomy. Multidisciplinary thyroid centers offer the most equitable and appropriate method to distribute and manage endocrine surgical pathology. **Study Design:** Online survey of all ACGME accredited academic otolaryngology programs with associated divisions of head and neck surgery through online search engines such as Google and Bing as well as academic websites and main call center telephone lines. **Methods:** Keywords thyroid surgery and thyroid cancer were used along with the name of the ACGME listed otolaryngology program in both Google and Bing search engines to determine the top three routes for which patients would be directed to either otolaryngology or general surgery departments. Individual academic websites were surveyed similarly. Individual telephone calls were made to all listed programs' main call center, with the inquiry in new patient consultation for thyroid and parathyroid related surgery. **Results:** Our online search using Google and Bing resulted in a 60-70% distribution of results towards general surgery dedicated websites for endocrine surgery compared to otolaryngology/head and neck surgery ones. Through the individual academic websites, there was a similar distribution. Telephone calls made to main academic call centers showed an even distribution in access to both general surgery and otolaryngology departments. **Conclusions:** There is not a random and equal distribution of non-referred patients with thyroid and parathyroid surgical pathology through online sources to either general surgery or otolaryngology. It is important that otolaryngologists acknowledge the uneven distribution and work toward garnering accessibility online to capture thyroid and parathyroid surgical disease as it is an important component of head and neck surgery. Uniquely, those programs with multidisciplinary centers focused on thyroid and parathyroid surgical disease, exemplify the best model to treat this subset of patients.

## H59. Trends of Patients by Age Undergoing Thyroidectomy: An Analysis of Inpatient Data in the U.S. from 2005-2011

Kristen A. Echanique, BS, Newark, NJ; Aparna Govindan, BA, Newark, NJ; Michael Sylvester, AB, Newark, NJ; Soly Baredes, MD FACS, Newark, NJ; Mary Ying, MD, Newark, NJ; Evelyne Kalyoussef, MD FACS, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss age related trends in patients undergoing thyroidectomy.

**Objectives:** As the country ages, thyroidectomies can be expected to be performed more commonly in the elderly. In this study, we sought to evaluate demographics and stratify patients by age to determine incidence and associated complications of patients undergoing thyroidectomy. **Study Design:** Retrospective study of cases from the Nationwide Inpatient



Sample (NIS) database. **Methods:** Analysis of the NIS revealed 74,716 patients undergoing thyroidectomy between 2005 and 2011. Complications, outcomes, patient demographics, length of stay, and hospital charges were evaluated among patients and stratified by age. **Results:** There were 74,716 thyroidectomy cases identified: ages 18-44 (30.6%), ages 45-59 (45%), ages 60-79 (20.6%), and age 80 and above (3.4%) ( $P < 0.001$ ). A significant difference was found in lengths of stay, total hospital charges, and mortality across different age groups ( $P < 0.001$ ), all trending upward with advancing age. Patients over the age of 40 were found to have higher rates of solid tumor without metastases ( $P < 0.001$ ), while those under the age of 40 were found to have higher rates of metastatic cancer ( $P < 0.001$ ). In the aging population, incidence of recurrent laryngeal nerve (RLN) injury, hematoma, transfusion, and acute cardiac complications increased with age  $> 40$  ( $P < 0.001$ ) while hypocalcemia and hypoparathyroidism decreased with age  $> 40$  ( $P < 0.001$ ). **Conclusions:** This study seeks to use a national perspective to describe and elucidate trends found in aging populations undergoing thyroidectomy. Age was found to correlate with mortality and thyroid related complications such as hypocalcemia and RLN injury. This information will help guide pre and postoperative care in aging patients undergoing thyroidectomy.

#### H60. Accuracy of Preoperative Ultrasound for Characterizing the Size of Obstructive Salivary Ductal Calculi

Nahir R. Estremera, MD, Washington, DC; Arjun S. Joshi, MD, Washington, DC (Presenter);  
Andrew R. Fuson, MD, Washington, DC; Bernard L. Mendis, BS, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the accuracy of ultrasound (US) measurements preoperatively for parotid and submandibular salivary gland sialolithiasis when compared to direct pathology measurements after excision.

**Objectives:** The present study was developed to evaluate the accuracy of ultrasound (US) measurements preoperatively for parotid and submandibular salivary gland sialolithiasis when compared to direct pathology measurements after excision. **Study Design:** We evaluated and reviewed the charts and US examinations of 167 patients who underwent procedures for treatment of sialolithiasis involving the parotid and submandibular glands. **Methods:** US exams were performed between June 2009 and April 2016 in a tertiary level hospital setting by the senior author. Measurements were collected from ultrasound evaluation before sialolithotomy. Patients then underwent surgical sialolithotomy. Pathology measurements were then taken after removal. The correlation between the two sizes of calculi was analyzed. **Results:** 167 calculi were studied. The data was analyzed using Pearson correlation and a Bland-Altman plot. Good concurrent validity was suggested by a Pearson correlation between pathology and ultrasound measurements of 0.92, with a mean difference of 0.095 ( $p = .51$  on a 2 tailed, 1 sample t-test). On the Bland-Altman plot, the correlation between the difference between US and pathology measurements and their mean is  $-.01$ . There were some positive outliers, indicating overestimation by ultrasound. These measurements indicated the mean difference is 0.1 mm (95% ci  $-0.19$  to  $0.38$ ). **Conclusions:** Ultrasound is a highly accurate, minimally invasive, imaging tool for salivary gland sialolithiasis. Preoperative size of calculi can be reliably used to guide management.

#### H61. Sonolocation during Submandibular Gland Sialolithotomy

Nahir R. Estremera, MD, Washington, DC; Andrew R. Fuson, MD, Washington, DC (Presenter);  
Bernard L. Mendis, BS, Washington, DC; Arjun S. Joshi, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to determine the efficacy of sialolith localization using ultrasound during SMG sialolithotomy.

**Objectives:** The use of ultrasound has been demonstrated to be useful for the diagnosis of submandibular calculi. The goal of the study is to determine whether ultrasound is useful during submandibular sialolithotomy for guiding surgical exploration by allowing the surgeon to sonolocalize the calculus. **Study Design:** Planned prospective study with data collection performed utilizing data compiled from 2009 through 2016 in a tertiary academic center. **Methods:** 164 patients with sialadenitis and sialolithiasis were treated by transoral sialolithotomy in either the office or the operating room for symptomatic submandibular calculi. Ultrasound was used during every procedure for precise localization of sialoliths during SMG sialolithotomy. Main treatment outcomes studied were success of procedure, recurrence, complications, and followup. **Results:** Successful sialolithotomy was performed in 151/164 (92%) patients using ultrasound to guide surgical dissection. Complications were minimal, and included stricture formation, which occurred in 5/164 (3%), followed by ranula formation in 3/164 (1.8%) of cases. There were no incidences of lingual nerve injury or perforation. Mean followup averaged 19 months (range of 12-28 months). **Conclusions:** Ultrasound can be effectively used for precise localization of submandibular calculi intraoperatively. The concomitant use of ultrasound during this procedure is associated with minimal postoperative complications.

#### H62. Ultrasound Characteristics of Sublingual Calculi

Andrew R. Fuson, MD, Washington, DC; Nahir J. Romero Estremera, MD, Washington, DC;  
Bernard L. Mendis, BS, Washington, DC; Arjun S. Joshi, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the ultrasound characteristics of sublingual gland sialolithiasis.



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**Objectives:** Sublingual sialolithiasis is a rarely reported entity. In this study, which represents the largest cohort of patients in the medical literature, we will describe the ultrasound characteristics of 5 cases of sublingual gland sialolithiasis to help guide management. **Study Design:** Retrospective review of patients over a 8 year period, with sublingual calculi. **Methods:** Using a high frequency transducer, the floor of mouth was imaged and submandibular region was imaged. Ultrasound findings studied included intraglandular and main ductal dilation, presence of echogenic foci, echotexture of the gland, and presence of posterior acoustic shadowing. Representative images were captured and relevant measurements were taken. **Results:** In all 5 cases, there were either one or multiple stones found in the anterior floor of mouth region. The main submandibular duct was not visualized in all cases. In the majority of cases, the submandibular gland itself was otherwise normal in size, echotexture, and vascularity. There was no evidence of chronic sialadenitis involving the submandibular gland. All patients underwent sublingual gland resection for treatment and the diagnosis was confirmed. **Conclusions:** This represents the largest cohort of patients with sublingual calculi thus published. These calculi present as hyperechoic foci with posterior acoustic shadowing in the anterior floor of mouth. Along with the absence of a dilated submandibular duct, normal submandibular parenchyma, and normal vascularity, the clinician can discern that the disease process is confined to the sublingual gland and helps make the diagnosis.

## H63. Application of a Novel Vibrating Device for Fine Needle Aspiration Cytology

Ryusuke Hori, MD PhD, Tenri, Nara Japan; Mami Morita, MD, Kyoto, Japan; Tsuyoshi Kojima, MD PhD, Tenri, Nara Japan; Koichi Omori, MD PhD, Kyoto, Japan; Kazuhiko Shoji, MD PhD, Tenri, Nara Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to acquire knowledge of a novel vibrating device and sampling techniques for fine needle aspiration cytology. Our novel device is considered to be a safe tool and is easy to control precisely. Sufficient amounts of materials were obtained with our device, as well as with the conventional technique. Therefore, this device and sampling technique are expected to be popular.

**Objectives:** Fine needle aspiration cytology (FNAC) is a valuable diagnostic technique. However, the procedure involves back and forth motions of a needle within a mass, which can lead to unexpected complications. We have developed a novel device and sampling techniques that use vibration and rotation instead of back and forth motions. **Study Design:** Prospective clinical experiment. **Methods:** The new device consists of a vibrating motor fixed to the stopper of a 5 mL syringe with its piston. A 22 gauge needle attached to the 5 mL syringe is used for FNAC. Samples were obtained from resected specimens using the following four procedures: suction only; suction and vibration for 5 seconds; suction and 180° rotation of the syringe; and suction, vibration for 5 seconds, and 180° rotation of the syringe. Samples were also obtained using the conventional technique. The numbers of well visualized follicular groups on glass slides were counted to compare the amounts of cellular material obtained using the five different procedures. Next, 415 patients with thyroid nodules underwent ultrasound guided FNAC to evaluate the rate of inadequacy. **Results:** Sufficient amounts of material were obtained from resected specimens using suction, vibration and rotation, and using the conventional technique. Inadequate thyroid FNAC material was obtained in 12.3% of cases. **Conclusions:** The new device and sampling techniques for thyroid FNAC collected sufficient amounts of adequate material and allowed safe and precise control of the device. Our device and sampling techniques are expected to be widely used not only for thyroid FNAC sampling but also for sampling from other anatomical sites.

## H64. Destructive Lesion of Temporomandibular Joint: A Rare Case of Tophaceous Pseudogout

Jessica B. Howell, MD, Richmond, VA; Yula A. Indeyeva, MD, Richmond, VA; Evan R. Reiter, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss pathophysiology, workup, differential diagnosis, and treatment for tophaceous pseudogout involving the TMJ.

**Objectives:** Tophaceous pseudogout of the temporomandibular joint (TMJ) is a rare entity that clinically and radiographically mimics neoplastic or infectious conditions. Diagnosis requires histopathologic examination. Given the rarity of this condition, there is a paucity of information pertaining to the surgical approach, reconstructive options, and postoperative outcomes. **Objectives:** 1) Discuss pathophysiology, workup, differential diagnosis, and treatment for tophaceous pseudogout involving the TMJ; and 2) illustrate the multidisciplinary approach to successful surgical resection and reconstruction, with emphasis on postoperative outcomes. **Study Design:** Case report and literature review. **Methods:** Patient medical records and imaging reviewed retrospectively. Medline search conducted using terms “temporomandibular joint”, “tophaceous pseudogout”, “pseudogout”, “TMJ”, “reconstruction”, relevant articles reviewed. **Results:** A 62 year old male presented with diffuse nontender preauricular fullness, refractory TMJ pain and trismus. Imaging revealed a destructive, expansile mass of the glenoid fossa, involving the middle cranial fossa floor and middle ear cavity. Open biopsy demonstrated calcium pyrophosphate dihydrate deposition consistent with pseudogout. He underwent radical surgical resection and reconstruction of the TMJ, utilizing multiple approaches in conjunction with neurosurgery and oral and maxillofacial surgery services. Postoperative management included intensive rehabilitation in the form of physical/occupational therapy, speech therapy, and neuropsychological therapy with excellent functional outcome. **Conclusions:** Tophaceous pseudogout involving the TMJ is a rare presentation of this disorder. Diagnosis requires histopathological confirmation, as imaging may be suggestive of neoplasm. Depending on extent of involvement, radical surgery including extensive reconstructive efforts and rehabilitative therapies may be required to achieve optimal cosmetic and functional outcomes.

**H65. Follicular Dendritic Cell Sarcoma: Case Report and Review of Literature**

Natalie A. Kim-Orden, MD, Los Angeles, CA; Ksenia A. Aaron, MD, Los Angeles, CA; Uttam Sinha, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the importance of suspecting follicular dendritic cell sarcoma on the differential for a nondiagnostic head and neck mass.

**Objectives:** Case presentation of follicular dendritic cell sarcoma (FDSC), a rare lymphoid neoplasm with significant recurrence rates and metastatic potential that requires a high level of suspicion for prompt diagnosis. **Study Design:** A case study of a patient at a tertiary academic otolaryngology center and a Medline literature review. **Methods:** N/A. **Results:** 42 year old male with rapidly enlarging left parapharyngeal tumor who underwent three biopsies at three different institutions with inconclusive diagnoses over 4.5 months. Imaging revealed a 52mm parapharyngeal mass invading into nasopharynx and carotid space, suggesting neurogenic tumor. Fine needle aspiration was obtained, but again nondiagnostic. Thus, the patient underwent transcervical approach to the parapharyngeal space and transoral partial glossectomy, pharyngectomy, and palatotomy for resection and final diagnosis. There are less than 150 English published cases to date of FDSC in the head and neck, 13 of which were in the parapharyngeal space. In our patient final pathology was positive for CD 4 (weak), CD 21, CD 23, and vimentin with a low proliferation rate confirming FDSC. The plan was for subsequent chemoradiation. However, on postoperative week 6, clinical exam and MRI revealed a recurrent oropharyngeal mass. Mandibulotomy with wide re-resection of pharyngeal mass, left modified radical neck dissection with radial forearm free flap was done prior to completion of adjuvant chemoradiation. **Conclusions:** Diagnosis is commonly delayed due to nondiagnostic biopsies containing necrotic and reactive lymphocytes; or, misdiagnosed as undifferentiated carcinomas, extracranial meningioma, etc. FDSC should be considered an important differential diagnosis in spindle cell tumors of the head and neck.

**H66. Differences in Predictors for Oral Tongue Squamous Cell Carcinoma Survival as Stratified by Age and Sex: A SEER Analysis**

Edward C. Kuan, MD, Los Angeles, CA; Jose E. Alonso, BS, Los Angeles, CA; Thomas E. Heineman, MD, Los Angeles, CA; Karam W. Badran, MD, Los Angeles, CA; Maie A. St. John, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the differences in predictors of survival for oral tongue squamous cell carcinomas as stratified by age (40 years and younger vs. older than 40) and sex.

**Objectives:** To utilize the Surveillance, Epidemiology, and End Results (SEER) database to elucidate differences in predictors of survival in oral tongue SCC as stratified by age and sex. **Study Design:** Retrospective population based analysis. **Methods:** The SEER registry was utilized to calculate survival trends for patients with oral tongue SCC between 1973 and 2012. Patient data was then stratified by age ( $\leq 40$  years vs.  $> 40$  years) and sex, then analyzed with respect to race, stage, grade, and treatment modalities. Overall (OS) and disease specific survival (DSS) were calculated and compared. **Results:** 16,423 cases of oral tongue SCC were identified, with 526 and 706 young female and male patients, respectively. Young female patients had improved OS and DSS as compared to young male patients (75% vs. 67% at 5 years), which is better than older patients ( $p < 0.001$ ). Younger patients were more likely to receive surgery ( $p < 0.001$ ) and combination surgery and radiation ( $p < 0.001$ ) as compared to older patients. On multivariate analysis, tumor stage was uniformly associated with worse OS and DSS ( $p < 0.05$ ), with surgery predicting improved OS and DSS in all groups except young females ( $p < 0.05$ ). Interestingly, higher tumor grade predicted worse OS and DSS in older patients, but not younger patients ( $p < 0.05$ ). **Conclusions:** Despite being a relatively common head and neck malignancy, oral tongue SCC appears to present with relatively heterogeneous characteristics across different age groups and sexes. Young female patients were found to have overall good prognosis. Tumor grade may play a role in prognostication in older patients.

**H67. Characteristics of Head and Neck Cancer Patients Seen in Multidisciplinary Tumor Clinic**

Anisha R. Kumar, MD, Baltimore, MD; Amy Brady, BS, Baltimore, MD; Carole Fakhry, MD MPH, Baltimore, MD; Wayne Koch, MD, Baltimore, MD; David Eisele, MD, Baltimore, MD; Christine G. Gourin, MD MPH, Baltimore, MD

**Educational Objective:** At the end of this presentation, participants should be able to discuss demographic and socioeconomic characteristics of head and neck cancer patients evaluated in a multidisciplinary clinic.

**Objectives:** As head and neck cancer (HNCA) treatment becomes increasingly multidisciplinary and complex, the multidisciplinary clinic (MDC) model may improve coordination and collaboration across disciplines. We sought to characterize patients who participated in MDC and determine impact on care. **Study Design:** Retrospective analysis of newly diagnosed HNCA patients evaluated in a HNCAMDC at a tertiary care center. **Methods:** The medical records of 597 patients evaluated in MDC from 2009-2015 were evaluated using cross-tabulations. **Results:** The majority of patients were male (82%), white (79%), and married (69%), with a median age of 59 years. The majority of patients had private insurance (49%), followed by Medicare (45%); 69% of participants had a median annual income per household greater

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than \$60,000. Oropharyngeal tumors were the most common primary site (54%), of which 79% were HPV+. Nonoperative management was recommended in 63% of cases, and 20% of patients enrolled in clinical trials. Out-of-state and international patients comprised 41% of the MDC population, of which majority of those treated (67%) were self-referred. Overall, 80% of patients chose to stay and receive care from the MDC team (88% of in-state residents and 74% of out-of-state or international patients). The geographic distribution of patients did not differ over time; however, between 2009 and 2015, the overall percentage of patients who self-referred to the MDC clinic increased steadily from 24% to 43% ( $p=0.05$ ). **Conclusions:** The MDC model encourages multidisciplinary collaboration and care for HNCA patients. The observed upward trend in self-referrals suggests that patients increasingly value the MDC model.

## H68. Survival of Renal Cell Carcinoma Metastatic to Non-Thyroid Head and Neck Regions

Tzyy-Nong Liou, MD, St. Louis, MO; Nicholas R. Scott-Wittenborn, BA, St. Louis, MO;

Kallogjeri Dorina, MD MPH, St. Louis, MO; Judith E. Lieu, MD, St. Louis, MO; Patrik Pipkorn, MD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the value of complete metastasectomy when facing distant renal cell metastasis to the head and neck region, particularly when complete resection in this region can often impair speech, swallowing, or alter breathing mechanisms.

**Objectives:** Metastasis of renal cell carcinoma (RCC) to non-thyroid head and neck region is rare. Survival benefit for complete metastasectomy of RCC foci has been reported in the literature. It is uncertain whether metastasectomy in non-thyroid head and neck region would provide a similar benefit. **Study Design:** A retrospective review of all RCC metastases to non-thyroid head and neck region in the past 15 years at an academic tertiary referral center, and a systematic search of all relevant cases and case series with survival data in the literature. **Methods:** An analysis of pooled data was performed to evaluate overall survival. **Results:** Six cases from our institution and 262 independent cases reported in the literature were included in the survival analyses ( $n = 268$ ). The median followup time was 12 months (range 0 to 180 months). The 1 year overall survival rate was 69% (95% CI 63%-74%). Eighty-six (32%) patients received no surgery, 27 (10%) patients had partial metastasectomy, and 153 (58%) patients underwent complete resection. The 1 year survival of patients receiving complete resection (82%, 95% CI 76%-88%) was significantly higher than the 1 year survival of patients who received partial resection (44%, 95% CI 24-64%) and who had no surgery (51%, 95% CI 39-62%). Multivariable Cox proportional hazards model showed that after controlling for potential confounders, complete resection was associated with reduced risk of death (HR 0.27, 95% CI 0.15-0.49). **Conclusions:** Complete metastasectomy was associated with improved overall survival even after controlling for other risk factors.

## H69. Preoperative Assessment of Benign Parotid Masses: Further Imaging and When?

Bernard Mendis, BSc, Washington, DC; Nahir Romero, MD, Washington, DC; Arjun S. Joshi, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to provide evidence based rationale for an approach to imaging benign parotid masses.

**Objectives:** There is a movement in literature towards the sole use of ultrasound (US) and fine needle aspiration (FNA) in the preoperative workup of benign superficial lobe parotid masses. Authors have argued further cross-sectional imaging (CT, MRI) does not provide surgeons with additional information unless the deep margin of the tumor is difficult to assess, there is concern for malignancy, or in cases of anatomically challenging tumors. To our knowledge, no study exists which has published rates of postoperative complications following this practice. **Study Design:** We present a 6 year retrospective study examining 33 patients with benign parotid masses. **Methods:** Patients were divided into two groups. The first group consisted of patients with benign superficial lobe parotid masses as determined by cytology and ultrasonography. The second group received further imaging (CT/MRI) due to concern for malignancy, difficult anatomical considerations, or unclear deep margins. Patients were also divided into superficial and total parotidectomy groups to further characterize the complication rates. **Results:** Six of 32 total patients (18.8%) had complications. Two of 14 patients receiving only US/FNA had complications versus 4 of 18 patients receiving additional imaging ( $p = 0.67$ ). Four of 24 receiving superficial parotidectomy versus 2 of 8 receiving total parotidectomy had complications ( $p = 0.62$ ). **Conclusions:** The total complication rate in this study (18.8%) compared favorably to the largest single center studies examining complication rates in parotidectomy for benign masses. We acknowledge that our study requires added power, however our preliminary results suggest favorable complication rates as well as a theoretically cost effective approach.

## H70. Identifying Preoperative Variables and Ultrasound Data to Better Predict Operative Times in Thyroidectomy Surgeries

Jeremy A. Mock, MD, Danville, PA; Eric F. Succar, MD, Danville, PA; Benjamin A. Dixon, BA, Danville, PA; Nicholas C. Purdy, DO, Danville, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify preoperative variables that correspond to longer operative times in thyroidectomy surgeries allowing for more efficient use of OR scheduling and eventually incorporation into logarithmic predictive models.



**Objectives:** Predicting operative times is a common tool for structuring surgical schedules and has implications in terms of utilization management, decreasing OR costs, and patient satisfaction; however, it is fraught with inaccuracies. The aim of this study was to evaluate thyroidectomy surgeries across a hospital system to determine the degree of error involved in an established prediction system and identify preoperative variables that correspond to longer operative times. **Study Design:** Retrospective chart review. **Methods:** Thyroidectomy surgeries within a hospital system were evaluated for demographic data, associated comorbidities, and thyroid ultrasound information (presence of nodules, nodule size, thyroid volume). Univariate and multivariate analyses were completed to determine preoperative factors with significant correlation ( $p < 0.05$ ) to inaccurate operative time predictions. **Results:** 290 patients/surgeries were evaluated from 1/1/2014 to 1/1/2016. Analysis revealed BMI ( $p = 0.003$ ), hypothyroidism ( $p = 0.048$ ), multinodular goiter ( $p = 0.021$ ), and total thyroid volume (0.001) were independently associated with increased operative times. Gender, number/size of nodules, and diagnosis of Grave's disease or Hashimoto's thyroiditis were not correlated with increased operative times. **Conclusions:** Accurate operative time prediction is a complicated and patient specific undertaking. The current results demonstrate objective, preoperative variables which correlate to longer operative times in thyroidectomy surgeries. An awareness of these factors can enhance the surgeon's ability to predict operative duration. Further, incorporation of this information into predictive models can ultimately streamline and improve operative time predictions on a larger scale.

#### H71. Management of T1 and T2 Oropharyngeal Malignancies--Geographic Trends and Outcomes--An Analysis of the SEER Database

Hani M. Rayess, MD, Detroit, MI; Andrew P. Johnson, MD, Detroit, MI; Aaron Dezube, MD, Boston, MA; Syed N. Raza, MD, Detroit, MI; Ho-Sheng Lin, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand options for management of oropharyngeal tumors, factors determinant of survival and geographic trends in management of oropharyngeal malignancies.

**Objectives:** The goal of this study was to evaluate geographic trends in management of T1 and T2 oropharyngeal malignancies. **Study Design:** Retrospective analysis of the United States National Cancer Institute's Surveillance, Epidemiology and End-Results (SEER) database. **Methods:** Using the most up to date November 2014 submission of the SEER database in addition to the SEER 18 data files a cohort was created of T1 and T2 oropharyngeal cancers from 2004-2014. The treatment groups radiation only, surgery only and surgery followed by radiation were compared with respect to several pretreatment covariates including age, race, location of treatment and American Joint Committee on Cancer (AJCC) stage. Patients who had a prior head and neck malignancy were excluded. **Results:** In analyzing geographic trends of management a significant difference was found in treatment patterns between the states and between different regions of the country (west, east, south, midwest)  $p < 0.0001$ . Physicians in the midwest and east coast were more likely to perform surgery +/- radiation compared to physicians from southern states, 51.2%, 46.5% and 39.7% respectively. A significant difference in survival was noted between patients receiving surgery followed by radiation compared to surgery alone or radiation 90.7%, 88.4% and 81.2% respectively. There was a significant difference in treatment by racial distribution, with white patients being significantly more likely to receive surgery followed by radiation compared to black patients  $p < 0.0001$ . **Conclusions:** Geographic factors impact overall treatment of early oropharyngeal tumors. Nationwide, overall survival was significantly better in patients who received surgery followed by radiation.

#### H72. Oropharyngeal Adenoid Cystic Carcinoma - A Population Based Analysis of Trends and Outcomes

Hani M. Rayess, MD, Detroit, MI; Ho-Sheng Lin, MD, Detroit, MI; Syed N. Raza, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the epidemiology of oropharyngeal adenoid cystic carcinoma. Discuss management options and factors predictive of survival.

**Objectives:** Analyze the clinical trends, pathologic features, management options and survival trends for patients with oropharyngeal adenoid cystic carcinoma. **Study Design:** Retrospective analysis of the United States National Cancer Institute's Surveillance, Epidemiology and End-Results (SEER) database. **Methods:** Using the most up to date, November 2014 submission of the SEER database in addition to the SEER 18 data files a cohort was created of adenoid cystic oropharyngeal cancers from 2004-2014. Demographic factors, management and outcomes were analyzed. In addition 5 year disease free survival was calculated. **Results:** 192 patients were identified, of which 45.3% were male and female 54.7% were female. 79.2% of patients were white and 13.5% were black. The mean age was 59.4 years. The most common sites of involvement were base of tongue at 61.5% followed by soft palate at 29.7%. 10.9% of patients had nodal disease at the time of diagnosis and 12.0% of patients had distant metastasis. The most common treatment regimen was surgery followed by radiation at 58.3% followed by radiation only at 16.7%. There was a significant difference in survival by treatment, with surgery only having the highest mean survival followed by surgery and radiation  $p = 0.03$ . The 5 year disease specific survival was 90.9% for surgery only, 84.1% for surgery followed by radiation and 36.8% for radiation only. Soft palate subsite had the highest disease specific survival at 89.3%. **Conclusions:** Oropharyngeal adenoid cystic carcinoma is a rare tumor. Surgery or surgery followed by radiation had significantly improved survival compared to other treatments.

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## H73. Robotic Facelift Thyroidectomy: A Case Series

Jonathan O. Russell, MD, Baltimore, MD; Mai M.G. Al Khadem, MBBCh, Baltimore, MD;  
Sejal R. Saraf, BDS MPH, Baltimore, MD; Jason D. Prescott, MD PhD, Baltimore, MD;  
Heather M. Starmer, MA CCC-SLP BCS-S, Stanford, CA; Jeremy D. Richmon, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the safety, feasibility and patient outcomes of robotic facelift thyroidectomy.

**Objectives:** The transcervical approach is conventionally used for thyroidectomy. However, some patients are willing to undergo a potentially more invasive procedure to avoid a visible scar in the neck. Technological advances in remote access surgery have allowed scarless procedures in the head and neck. Despite the significant progress in Asia, the North American experience has been muted for various reasons. We aim to describe our initial clinical experience of robotic facelift approach for thyroidectomy on 20 patients in a 5 year period. **Study Design:** Case series. **Methods:** A retrospective review of consecutive patients who underwent robotic facelift thyroidectomy by a single high volume surgeon between August 2011 and August 2016 was conducted. Data collected included demographics, procedure data including procedure minutes, pathology reports, and complications. **Results:** A total of 20 robotic facelift procedures were undertaken in 20 patients. There were 20 female patients, with a mean age of  $37.65 \pm 10.11$  years (range: 21-60). The mean BMI was  $28.49 \pm 7.68$ . The procedures included 10 right lobectomies and 10 left lobectomies. Postoperative pathology was benign in 14 patients and malignant in 6 patients. There were no conversions to open surgery, permanent nerve injuries, or postoperative hypocalcemia. Only 3 patients had postoperative hypertrophic scar and one patient suffered from a hematoma that required surgical intervention. Total case time ranged from 167 to 336 minutes (Mean:  $242 \pm 41.27$ ). Total procedure time ranged from 124 to 293 minutes (Mean:  $202 \pm 43.48$ ). **Conclusions:** Robotic facelift thyroidectomy is a safe and feasible option for a select group of patients very motivated to avoid a visible neck scar.

## H74. A New Nasoseptal Flap for Skull Base Reconstruction

Saurav Sarkar, MBBS FACS, Bhubaneswar, Orissa India; Ashis Pattnaik, MBBS MS, Bhubaneswar, Orissa India; Sumit Bansal, MBBS MS, Bhubaneswar, Orissa India; Chapity Preetam, MBBS, Bhubaneswar, Orissa India; Preetam Mahajan, MBBS MD, Bhubaneswar, Orissa India; Rabin Narayan Sahoo, MBBS MS, Bhubaneswar, Orissa India

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss a new type of a nasoseptal flap designed to provide with effective closure of skull with lesser morbidity.

**Objectives:** To test the effectiveness of a new type of nasoseptal flap for skull base reconstruction. **Study Design:** Case control study. **Methods:** Bipedicled nasoseptal flap designed to reconstruct skull base surgery specially. Post-pituitary surgery and other middle skull base surgery, compared with reconstruction of single pedicled flaps and fascia reconstruction. **Results:** Bipedicled nasoseptal flaps found to be better with less postoperative morbidity nasal functions. **Conclusions:** The new bipedicled nasoseptal flap is a good alternative for reconstruction of skull base defect.

## H75. Association of Diabetes with Head and Neck Malignancies

Saurav Sarkar, MBBS FACS, Bhubaneswar, Odisha India; Shibani Mishra, MBBS, Bhubaneswar, Odisha India; Dillip Samal, MBBS, Bhubaneswar, Odisha India; Anjan Kumar Sahoo, MBBS, Bhubaneswar, Odisha India

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the association of diabetes with various head and neck malignancies. Participants would be able to reflect on this presentation and compare with the finding in their own setting, thereby forming a greater cooperation in future for the bigger study in various countries. This would help to explain a lot about head and neck cancers and their approach and treat modalities for better outcome.

**Objectives:** 1) To find out if there is any association of head and neck cancers with diabetes mellitus; and 2) to find out if control of diabetes can have any health implications in control of head and neck cancers. **Study Design:** A retrospective case control study. **Methods:** In this study cases were considered to be all the patients were operated for head and neck cancer in a tertiary care hospital in the past 3 years, were studied in detail from the history records and by telephoning them to know their present status as well as clinical examination. Controls taken after proper matching from the patients attending the hospital for nonmalignant ailments. Data was obtained as per a proforma and compared. **Results:** A significant association has found in between diabetes and CA buccal mucosa. Diabetics having a 3.14 times higher risk of having CA buccal mucosa than non-diabetics. **Conclusions:** In this study has been noted that diabetics have a higher risk of CA buccal mucosa. A much bigger data pool worldwide with a much deeper understanding in respect of influence of diabetes mellitus on the molecular pathogenesis of head and neck cancers is needed, for better control of the disease load and better management of the disease.



## H76. Amyloidoma of the Carotid Body: A Rare Presentation of Head and Neck Amyloidosis

Ameer T. Shah, MD, Boston, MA; Andrew Katz, BS, Providence, RI; Mark D. Iafrati, MD, Boston, MA; Richard O. Wein, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the common presentations of amyloidosis in the head and neck. They will also be able to review an interesting case of amyloidosis of the carotid body, which is an uncommon pathologic finding in carotid body tumors. They will also be able to review preoperative imaging workup for carotid body tumors and appreciate the interdisciplinary approach when surgery does not go as planned, specifically in reference to the management of intracarotid artery injury.

**Objectives:** Review the literature of both masses of the carotid body and the presentation of head and neck amyloidosis. The preoperative workup, intraoperative decision making, histologic diagnosis, and postoperative care and additional workup will be presented and discussed. **Study Design:** Case presentation and literature review. **Methods:** The preoperative imaging and workup is presented, followed by intraoperative findings and postoperative course and histology. **Results:** The patient had a complicated intraoperative course due to injury to the carotid artery that required the assistance of vascular surgery. Postoperatively the patient experienced an expanding hematoma in the intensive care unit that required exploration. Histology later returned with an unexpected diagnosis of amyloidosis. **Conclusions:** Amyloidosis can present in the head and neck, however the carotid body is an extremely rare and unexpected location. This case was interesting with respect to the workup, intraoperative and immediate postoperative complications. The histologic findings were also interesting and invoked a multidisciplinary approach to the patient's care.

## H77. Lacrimal Sac and Nasolacrimal Duct Non-Keratinizing Squamous Cell Carcinoma: Diagnostic Challenge

Megan P. Sterling, DO, Bethesda, MD; Jeffrey C. Teixeira, MD, Bethesda, MD; Wayne A. Cardoni, DO, Bethesda, MD; Ester L. Kim, MD, Bethesda, MD; James T. Castle DDS, Bethesda, MD

**Educational Objective:** At the conclusion of this presentation the participant should be able to recognize the rarity in primary nasolacrimal duct and sac tumors as well as the diagnostic challenges associated in obtaining a preoperative tissue diagnosis.

**Objectives:** 1) Report on the rare occurrence of primary nasolacrimal duct and sac carcinoma; and 2) understand imaging features consistent with primary lacrimal tumors. **Study Design:** Case report. **Methods:** Review of clinical case records. **Results:** We report on a 30 year old male who presented with one year history of left epiphora and expanding subcutaneous medial canthal mass. A CT scan was obtained which demonstrated left fungating lacrimal sac mass with extension into nasolacrimal duct resulting in dilation of nasolacrimal and evidence of osseous remodeling without erosive changes. Several biopsies were obtained over the course of three visits given the difficulty in establishing a diagnosis. On the final biopsy, the pathology team was unable to make a final diagnosis stating that the tissue was consistent most with atypical epithelial proliferation favoring squamous papilloma malignant epithelial transformation given the presence of atypia within the sample however no direct invasion. Given MRI finding demonstrating invasion of the orbital fat and possible impingement of the inferior orbital muscle with pathology favoring malignancy, a multidisciplinary tumor board recommended surgical excision. The patient underwent medial maxillectomy with orbital exenteration and reconstruction using a superficial temporoparietal flap with split thickness skin graft. The final pathology was consistent with primary lacrimal sac p16 negative and EBV negative non-keratinizing squamous cell carcinoma involving the orbital fat. **Conclusions:** Our case demonstrates the importance of a multidisciplinary approach in managing these rare tumors. Furthermore, it highlights the difficulty in establishing a preoperative diagnosis and imaging finding characteristic of lacrimal system tumors.

## H78. Diagnosis of Double Hit Diffuse Large B Cell Lymphoma

Olivia Twu, MD PhD, San Francisco, CA; Christopher G. Tang, MD, San Francisco, CA

**Educational Objective:** Raise awareness of the need to have high clinical suspicion for malignancy and proceed to excisional biopsy if a needle biopsy is negative.

**Objectives:** Describe diagnosis of a lymphoma missed with needle biopsy but diagnosed on excisional biopsy. Discuss the clinical presentation, prognosis, and current treatment of double hit B cell lymphoma. **Study Design:** Case report including a detailed histopathological analysis, radiology findings, and review of the literature. **Methods:** A case report is described from a community hospital. Histopathologic assessment and radiological details are described. A literature review of the background, incidence, disease course, and treatment options are presented. **Results:** This case report presents a 61 year old Hispanic male with history of smoking, prostate cancer in 2014, and positive PPD status post-treatment with clean chest X-ray in 2015 who presented to his primary care physician with neck lumps. A CT showed bilateral cervical lymphadenopathy and a sclerotic 7th rib lesion. An IR guided needle biopsy of a neck lump was performed and showed mixed CD20 positive B cells and CD3 positive T cells with negative pancytokeratin stain. Due to high suspicion for malignancy, a PET/CT was obtained showing evidence of diffuse disease in the lung, mediastinum, pericaval and periaortic lymph nodes, and throughout the skeleton. An excisional biopsy of an enlarged lymph node was performed which revealed atypical lymphoid cells varying in size that immunohistochemically stained for CD20 with FISH positive for MYC oncogene (8q24) and BCL2 rearrangement. Thus, the patient was diagnosed with stage IV double hit diffuse large B

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cell lymphoma and is currently being treated with dose adjusted R-EPOCH chemotherapy. **Conclusions:** Double hit lymphoma is an aggressive form of diffuse large B cell lymphoma where MYC rearrangement is associated with either BCL2 or BCL6 rearrangement thus patients often present with a rapidly growing mass, B symptoms and extra nodal disease. Here we present a case of bilateral lymphadenopathy that was negative for malignancy via needle biopsy but positive on excisional biopsy. High clinical suspicion for malignancy should lead one to obtain additional tissue for diagnostic workup.

## H79. Experience of First Bite Syndrome during Chemotherapy for Hodgkin's Lymphoma: A Case Report

Carla V. Valenzuela, MD, St. Louis, MO; Joseph P. Bradley, MD, St. Louis, MO

**Educational Objective:** To demonstrate the presence of first bite syndrome in a subject undergoing chemotherapy treatment for Hodgkin's lymphoma without well characterized risk factors of parapharyngeal tumor or prior head and neck surgery that have been associated with first bite syndrome.

**Objectives:** First bite syndrome represents a rare, but known, symptom of prior surgery or tumor involving the deep parotid gland, parapharyngeal space, or infratemporal fossa. Sympathetic denervation is suspected as the causative mechanism leading to this syndrome. The objective of this study is to report first bite syndrome occurring in a patient being actively treated with primary chemotherapy for Hodgkin's lymphoma. **Study Design:** Case report. **Methods:** A comprehensive literature review was undertaken to evaluate for first bite syndrome occurring in a patient without well established risk factors. The search term first bite syndrome was used in PubMed, Embase, Web of Science, and SCOPUS databases. No articles reported first bite syndrome occurring in a subject with Hodgkin's lymphoma or during active chemotherapy cycles. There was 1 letter to the editor that described idiopathic first bite syndrome in a patient of 40 years duration without evidence of head and neck malignancy or previous surgical resection. **Results:** This study is the first to report first bite syndrome occurring in a patient with Hodgkin's lymphoma. The subject's symptoms developed within months of his initial diagnosis and occurred within a day after receiving chemotherapy. He underwent one round of intraparotid chemodenervation with botulinum toxin. He experienced pain resolution by 50% at the second chemotherapy treatment following injection. **Conclusions:** We report a case of first bite syndrome occurring in a subject with Hodgkin's lymphoma during chemotherapy, without classic risk factors. There appears to be a correlation between severity of first bite symptoms, and presumed sympathetic hypersensitivity, with chemotherapy.

## LARYNGOLOGY/BRONCHOSOPHAGOLOGY/SLEEP MEDICINE

### H80. Improving Residents' Education for Sleep Disordered Breathing

Muhammad Abbas Abid, MD, Baltimore, MD; Matthew C. Stewart, MD, Baltimore, MD;  
Charles W. Cummings, MD, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the effectiveness of a structured curriculum for teaching sleep disordered breathing to otolaryngology residents.

**Objectives:** Obstructive sleep apnea has a high prevalence and is continuously on the rise. Little time is spent on education of sleep disorders during medical school and residency, and as a result, sleep disorders are often misdiagnosed or remain undiagnosed. There is a need to incorporate sleep disordered breathing in otolaryngology residency training. Our aim was to design an educational program for obstructive sleep apnea for otolaryngology residents and to determine its effectiveness by assessing residents' performance using a standardized OSCE. **Study Design:** Educational tool development. **Methods:** Otolaryngology residents participated in an OSCE for obstructive sleep apnea that we previously developed and their performance was evaluated. The residents were then enrolled in a structured program to improve their understanding of the disease. The training program included specific guidelines for residents to improve understanding and skills, which was reinforced by live and video lectures from internal and external faculty, provision of resources to review and periodic multiple choice questions for reinforcement of the material. The rigorous teaching program was designed by faculty involved in care for patients with sleep disordered breathing. The residents went through another OSCE session that was identical to the pre-test. The pre-test and post-test results were compared for improvement. **Results:** Residents' performance which was nonsatisfactory earlier showed significant improvement after the implementation of the structured obstructive sleep apnea curriculum. **Conclusions:** Residents require directed training to improve their knowledge and skills regarding obstructive sleep apnea. Including a structured curriculum for obstructive sleep apnea in residents' training will help residents better diagnose and manage patients with this disorder.

### H81. Transcervical Ultrasound Guided Needle Decompression of Combined Laryngocele Presenting as Acute Airway Obstruction - A Novel Approach to a Rare Condition

James R. Biery, PA-C, Sayre, PA; Phillip K. Pellitteri, DO, Sayre, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the novel approach of ultrasound guided needle decompression of combined laryngoceles presenting as acute airway obstructions while being able to simultaneously compare the traditional management of external, internal and combined laryngoceles.

**Objectives:** A laryngocele is an inherently rare entity, occurring in an estimated 1 in 2.5 million people per year. The classical presentation is that of a benign dilatation of the laryngeal saccule occurring in patients who routinely increase their intralaryngeal pressure, such as in glass blowers, those with chronic cough, or in patients who play wind instruments. It has been reported that large internal and/or combined laryngoceles can be a source of acute upper airway obstruction; however, in the reported cases, affected patients are able to be endotracheally intubated or undergo emergent tracheotomy in an effort to bypass the obstruction. This report is the first to describe a patient with a large obstructing combined internal/external laryngocele urgently managed with endoscopic video assisted transcervical ultrasound guided needle decompression of the laryngeal saccule, providing relief to the patient's obstructive symptoms without need for further urgent intervention thru intubation or tracheotomy. This discussion will address traditional management of laryngocele, including those presenting with acute airway obstruction, together with a description of this novel technique. **Study Design:** NA **Methods:** NA **Results:** NA **Conclusions:** NA

## H82. Trends in Sleep Studies Performed for Medicare Beneficiaries

Whitney Chiao, BA, San Francisco, CA; Megan L. Durr, MD, Oakland, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the trends and characteristics of sleep studies performed in the United States between 2000 and 2014.

**Objectives:** To quantify trends and characteristics of sleep studies performed for Medicare beneficiaries in the United States. **Study Design:** Retrospective longitudinal study of the Centers for Medicare and Medicaid Services' Part B National Summary Data and Medicare Provider Utilization and Payment Data from 2000 to 2014. **Methods:** Sleep study data were analyzed according to type of study performed, total expenditure amount, provider specialty, and geographic location. **Results:** In 2014, 845,569 sleep studies were completed by 1.4% of Medicare beneficiaries for a total of \$189 million. Since 2010, annual expenditures for sleep studies have declined, while the number of studies performed has increased by 9.1%. In 2014, polysomnography, split night polysomnography, and unattended home sleep studies accounted for 40%, 48%, and 12%, respectively, of total sleep studies. This represents a dramatic growth in the number of unattended sleep studies performed since 2000, when they represented only 0.9%. Pulmonologists, independent diagnostic testing facilities, and neurologists are the top specialties that bill for sleep studies. Sleep medicine is a growing specialty and ranked fifth among providers while otolaryngologists ranked eighth. **Conclusions:** The healthcare burden of administering sleep studies is substantial, although the annual cost is declining. Unattended sleep studies contribute to decreasing costs and should be considered for patients who meet the correct indications.

## H83. Improved Cardiac Function after Upper Airway Stimulation Therapy: A Case Report

David W. Chou, BS, Philadelphia, PA; Colin Huntley, MD, Philadelphia, PA; Maurits Boon, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the potential cardiac benefits of upper airway stimulation therapy in the treatment of obstructive sleep apnea.

**Objectives:** To report a patient with obstructive sleep apnea (OSA) who, after upper airway stimulation (UAS) therapy, not only had improvement of apnea indices but also in cardiovascular indices, as indicated by echocardiography. **Study Design:** Single patient case report. **Methods:** We evaluated the patient's outpatient records for apnea indices and cardiovascular workup results. **Results:** We describe a patient with pulmonary arterial hypertension and OSA who underwent implantation of a UAS device. The patient had a previous uvulopalatopharyngoplasty but continued to suffer from residual daytime somnolence and fatigue. A preoperative polysomnogram showed an apnea-hypopnea index (AHI) of 34, and echocardiography revealed an elevated right ventricular systolic pressure (RVSP) of 46mmHg (normal = 15-25mmHg). Postoperatively, the patient reported marked improvement of daytime symptoms, and a polysomnogram performed one and a half months after activation of the UAS device revealed an AHI of 0. The patient also had an improved postoperative RVSP of 34mmHg. **Conclusions:** UAS is an alternative treatment for patients with moderate to severe OSA who are refractory to more traditional options, such as continuous positive airway pressure (CPAP) and upper airway surgery. Little has been reported about the short and long term cardiac benefits of UAS, and recently, the benefit of CPAP therapy in patients with preexisting cardiovascular conditions has been called into question. This case report provides evidence that UAS reduces pulmonary arterial hypertension and may improve cardiac function. Additionally, this case reinforces early findings from the Stimulation Therapy for Apnea Reduction trial that report sustainable improvement of OSA symptoms and apnea-hypopnea index.

## H84. The Effects of Vibrotactile Stimulation on Spasmodic Dysphonia, a Crossover Trial

Shumon I. Dhar, MD, Syracuse, NY; Richard T. Kelley, MD, Syracuse, NY; Soren Y. Lowell, PhD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the pathophysiology and effects of peripheral sensory stimulation on patients with adductor spasmodic dysphonia.

**Objectives:** To determine the effects of vibrotactile stimulation on the auditory-perceptual characteristics of patients with adductor spasmodic dysphonia (ADSD). **Study Design:** Prospective crossover trial. **Methods:** Voice samples from ten patients with confirmed ADSD were collected using research quality recording equipment prior to their routine Botox



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treatments. The vibrotactile stimuli was provided directly to the anterior thyroid cartilage with the SIRI2 device (125 Hz) and an all voiced consonant sentence was recorded pre-stimuli, during stimuli, and post-stimuli. These recordings were then rated using a modified CAPE-V assessment by an otolaryngologist and speech language pathologist. The raters were blinded regarding the intervention status of each sample during their analysis via a superimposed hum, mimicking the vibratory stimuli. **Results:** Our patient population was majority female (60%), with a mean age of 59.5 years, and average VHI score of 21.5. The majority of patients, 84%, had a deterioration in dysphonia severity (15.6% on the visual analog scale) as a result of the intervention. A minority of patients had a positive response, with 8% of patients showing improvement in dysphonia severity during stimulation by a margin of 12.3%. Lastly, 8% of patients showed improvement of dysphonia after stimulation by a margin of 19.5%. **Conclusions:** The pathophysiology of ASD is not well understood, although recent functional imaging studies suggest alterations in the primary motor and somatosensory cortex may be involved. Our results show mechano-vibratory stimulation resulting in an overall worsening of dysphonia, which although may not be applicable in terms of treatment, may aid in diagnosis and understanding the pathophysiology of ASD.

## H85. Pyogenic Granuloma of the Larynx: A Rare Cause of Hemoptysis

Andrea L. Hanick, MD, Cleveland, OH; Paul C. Bryson, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss successful management of pyogenic granuloma of the larynx.

**Objectives:** Pyogenic granuloma, also called lobular capillary hemangioma or granuloma gravidarum, classically occurs during pregnancy. It is uncommon in the airway. This case report describes a rare clinical situation and perhaps the only reported presentation of pyogenic granuloma in the larynx causing hemoptysis at a late stage of pregnancy. **Study Design:** Case report. **Methods:** N/A. **Results:** A 23 year old female presented for laryngology consultation in her third trimester of pregnancy for evaluation of hemoptysis. A vascular, right false vocal cord neoplasm was identified. Given the concern for hemorrhage and airway compromise during delivery, the patient underwent elective induction at 38 weeks gestation in the high risk obstetrical unit with otolaryngology on standby. Delivery was uneventful and the neoplasm was removed via microlaryngoscopy 6 weeks later. Pathology was consistent with pyogenic granuloma. **Conclusions:** Pyogenic granuloma is a common tumor of pregnancy but rarely involves the larynx. In the case of airway involvement, it is best managed in coordination with the high risk obstetrical team and can be removed safely via standard microsurgical techniques.

## H86. Selective Upper Airway Stimulation for Obstructive Sleep Apnea in Obese Patients

Colin Huntley, MD, Philadelphia, PA; Clemens Heiser, MD, München, Germany; Benedikt Hofauer, MD, München, Germany; Maurits Boon, MD, Philadelphia, PA; Armin Steffen, MD, Luebeck, Germany

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss patient evaluation prior to UAS therapy in patients with OSA; and 2) discuss outcomes after UAS therapy in patients with OSA.

**Objectives:** Selective upper airway stimulation (UAS) is a novel therapy for patients with obstructive sleep apnea (OSA). The aim of this study was to analyze the application and outcome of UAS in patients with obesity. **Study Design:** Retrospective review of patients with a BMI greater than 32 undergoing UAS at 3 international centers. **Methods:** Thirty-five patients with a body mass index (BMI) of more than 32 kg/m<sup>2</sup>, who underwent UAS (Inspire Medical Systems) were included. Treatment outcomes were recorded between 2 and 6 months after surgery. Data collection included demographics, body mass index (BMI), apnea hypopnea index (AHI), oxygen saturation and desaturation index (ODI) and adverse events. **Results:** The mean age was 59.5 years. Mean BMI was 34.3 kg/m<sup>2</sup>. The mean pre-implantation AHI was 42.7/h and was reduced to 11.7/h with UAS (p<0.05). The mean pre-implantation ODI of 40.1/h was reduced to 18.0/h with UAS (p<0.05). Serious adverse events did not occur. **Conclusions:** UAS therapy is associated with good clinical outcomes in patients with moderate to severe OSA and a BMI more than 32 kg/m<sup>2</sup>. The AHI and ODI were significantly reduced in these patients. It is encouraging that UAS has been shown to be also successfully in well selected overweight patients.

## H87. Upper Airway Stimulation Can Successfully Treat Obstructive Sleep Apnea in Patients with a BMI Greater than 32

Colin T. Huntley, MD, Philadelphia, PA; Karl Doghramji, MD, Philadelphia, PA; Maurits Boon, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe 1) a means of selecting patients for upper airway stimulation; and 2) how selection of patients for upper airway stimulation requires, in part, evaluation of body habitus in addition to BMI.

**Objectives:** 1) To evaluate outcomes of patients undergoing upper airway stimulation with a BMI greater than 32; and 2) to compare outcomes of patients undergoing upper airway stimulation with a BMI greater than 32 to those with a BMI less than 32. **Study Design:** Retrospective review. **Methods:** We retrospectively evaluated our cohort of patients undergoing UAS. We evaluated demographic data, BMI, pre and postoperative polysomnography (PSG) data, and operative data.



We compared the cohort of patients with a BMI greater than 32 to those with a BMI less than 32. Our institutional trend is to include patients with a BMI of greater than 32 who have favorable neck anatomy and size, but a larger waist. **Results:** To date, we have postoperative PSG data on 44 patients who have undergone UAS. Nine of these patients have a BMI greater than 32 and 35 have a BMI less than 32. We found no significant difference in age, preoperative AHI, preoperative O2 nadir, preoperative Epworth sleepiness score (ESS), neck circumference, operative blood loss, operative time, postoperative AHI, postoperative O2 nadir, postoperative ESS, surgical success, patients reaching a postoperative AHI less than 10 and patients reaching a postoperative AHI less than 5. We did find a significant difference in BMI between cohorts ( $p < 0.0001$ ). **Conclusions:** If selected properly, UAS can be used successfully to treat patients with OSA and a BMI greater than 32. We suggest selecting patients with a body shape of a proportionally smaller neck and larger waist compared to other patients with a similar BMI.

## H88. Upper Airway Stimulator Implantation Is Safe to Perform on Systemically Anticoagulated Patients

Colin T. Huntley, MD, Philadelphia, PA; Karl Doghramji, MD, Philadelphia, PA; Maurits Boon, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a means of managing anticoagulation in those patients undergoing upper airway stimulation.

**Objectives:** 1) To evaluate outcomes of a population of patients undergoing upper airway stimulation (UAS) who are concurrently under anticoagulation therapy; and 2) to assess our institutional practice in managing anticoagulation in those patients undergoing upper airway stimulation. **Study Design:** Retrospective review. **Methods:** We retrospectively reviewed our cohort of patients undergoing UAS and compared those on systemic anticoagulation to those not on medications impairing platelet or clotting function. Our departmental policy is to stop the anticoagulation preoperatively based on the cardiologist or vascular medicine consultant's recommendations. We then restart the anticoagulant one day postop. **Results:** To date we have performed 60 UAS. 40 patients were not on any anticoagulation. Four were on aspirin 325mg, 12 on aspirin 81mg, 2 on warfarin, 1 on rivaroxaban, and 1 on clopidogrel. We compared patients not anticoagulated to those on any anticoagulation, on aspirin 325mg, on aspirin 81mg, or on clopidogrel, rivaroxaban, or warfarin. We then compared the aspirin 325mg group to the aspirin 81mg cohort and to the clopidogrel, rivaroxaban, or warfarin cohort. Lastly we compared the aspirin 81mg group to the clopidogrel, rivaroxaban, or warfarin cohort. We found no difference in operative time, estimated blood loss, postoperative hematoma or seroma, or return to the operating room to control bleeding between the cohorts. **Conclusions:** UAS can be safely used in patients concurrently treated with anticoagulant medications. It can be restarted as early as postoperative day one without any increase in bleeding risk.

## H89. Nasal Septal Deviation among Patients with and without Obstructive Sleep Apnea: A Pilot Study

Yoseph A. Kram, MD, Tripler AMC, HI; Macario Camacho, MD, Tripler AMC, HI; Soroush Zaghi, MD, Redwood City, CA; Camilo Fernandez-Salvador, MD, Tripler AMC, HI; Clete A. Kushida, PhD, Redwood City, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the relationship between nasal septal deviation and OSA.

**Objectives:** This study aims to compare frequency and severity of nasal septal deviation in OSA patients to non-OSA patients, both of whom have not had nasal surgery or nasal trauma. **Study Design:** Retrospective chart review. **Methods:** Inclusion criteria: sleep medicine clinic patients with OSA or without OSA, with a polysomnogram and detailed nasal examination. Exclusion criteria: previously undergone nasal surgery and patients who had a history of nasal trauma. The nasal septum was classified grade 1-4. Pearson's chi square test was used to evaluate correlation of OSA severity to nasal septal deviation severity. **Results:** Of two hundred and fifty consecutive patients in a sleep medicine clinic who underwent a detailed nasal examination, sixty-seven adults, age  $53.5 \pm 17.8$  years and body mass index  $28.2 \pm 6.0$  kg/m<sup>2</sup>, met inclusion criteria. Of OSA patients, 25/58 (43.1%) had a nasal septal deviation, while 3/9 (33%) of patients without OSA had a nasal septal deviation. Of the fifty-eight OSA patients, three had severe deviations, seventeen had mild deviations, and five had moderate deviations, while thirty-three had no septal deviation. Of the nine non-OSA patients, none had moderate or severe deviations and only three had mild septal deviations. There was a trend of correlation between OSA severity and septal deviation severity with an overall  $p = 0.0673$ . **Conclusions:** This preliminary study of OSA and non-OSA patients without nasal surgery or nasal trauma found a higher frequency of nasal septal deviations amongst patients with OSA (43.1%) compared to those without OSA (33%). OSA severity trended toward correlation with septal deviation severity.

## H90. Upper Esophageal Sphincter Assist Device Effectiveness in Treating Aspiration Due to Radiation and Surgically Induced Patulous Upper Esophageal Sphincters

Phong T. Le, MD, Charleston, SC; Lucinda A. Halstead, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare effectiveness of an FDA approved upper esophageal assist device in treating challenging cases of aspiration due to radiation and surgically induced patulous upper esophageal sphincters (UES).

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**Objectives:** Demonstrate effectiveness of an FDA approved upper esophageal assist device in treating challenging cases of aspiration due to radiation and surgically induced patulous upper esophageal sphincters (UES). **Study Design:** Case series. **Methods:** Symptom presentation, Reflux Symptom Index (RSI), endolaryngeal examinations and treatment outcomes from 3 patients, aged 48-72, were reviewed before and after an UES assist device. **Results:** Two patients with patulous UES resulting from dilation of radiation induced UES stenosis, and one patient with completely patulous UES from congenital tracheoesophageal fistula repaired by colonic interposition 47 years ago, reported symptomatic improvement and maintained compliance with the device for greater than 6 months. RSI scores improved. Endolaryngeal examination in irradiated patients demonstrated reshaping of the patulous UES to a more physiologic kidney bean shape and a tendency for the UES to close for brief periods of time without the device. The colonic interposition patient experienced less aspiration pneumonias from 6-8/year to one episode in 6 months. **Conclusions:** As many head and neck cancer patients suffer radiation induced UES stenosis or have esophageal anastomoses high in the neck, less severe forms of this complication are likely occurring frequently and are left untreated. This study demonstrates considerable resolution of aspiration and reshaping of the patulous UES to a more physiologic shape in irradiated patients. It decreased aspiration and eructation with speaking in all patients without changing their ability to swallow. This study highlights a unique and easily applied treatment to a difficult problem.

## H91. Vocal Cord Injection Augmentation: An Option for Temporary Pitch Elevation for the Male-to-Female Transgender Voice

Brian A. Nuyen, MD, Stanford, CA; Christopher G. Tang, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss a unique reversible method of pitch elevation using vocal cord injection augmentation in a male-to-female (MtF) transgender individual.

**Objectives:** At the conclusion of this presentation, the participants should be able to discuss a unique reversible method of pitch elevation using vocal cord injection augmentation in a male-to-female (MtF) transgender individual. **Study Design:** A case report with description of surgical technique, with succinct literature review of MtF transgender voice feminization options. **Methods:** A 50 year old MtF patient presented with a desire to elevate her baseline pitch temporarily prior to her glottoplasty. A trial injection of 0.1ml of normal saline into each vocal cord gave her desirable results for around 45 minutes. The patient decided to pursue a longer lasting temporary filler with hyaluronic acid. One week after the saline injection, the patient had 0.1 ml of hyaluronic acid injected into each vocal cord. **Results:** Prior to hyaluronic acid injection, her range was 100 Hz to 340 Hz with a baseline modal phonation of 135 Hz. After the injection her range changed to 206 Hz to 340 Hz with any attempts at phonating below 206 Hz causing her mucosal vibrations to be aperiodic and her voice to crack. **Conclusions:** Although vocal cord injection augmentation with hyaluronic acid does not extend vocal range in the high frequencies, it does guide the patient to phonate within her upper limit, which is very desirable in certain transgender individuals. This may be an excellent, well tolerated temporizing vocal management option as MtF patients approach and undergo gender transition.

## H92. Morbidity and Mortality in Children Undergoing Bronchoscopy for Foreign Body Removal

Christopher A. Roberts, BS, Hershey, PA; Michele M. Carr, DDS MD PhD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the morbidity and mortality associated with bronchoscopy performed for foreign body identification and removal in the pediatric population.

**Objectives:** Analyze morbidity and mortality in pediatric bronchoscopy for foreign body removal. **Study Design:** Multicenter retrospective review using the American College of Surgeons Pediatric National Surgical Quality Improvement Program from 2014. **Methods:** Patients were identified using CPT code 31635. Demographics, time to surgery, operative times, hospitalization time, and complications were collected. Multivariate logistic regression was used to identify predictive factors for major adverse events. **Results:** 106 patients were identified (mean age 3.7 years). Five patients had a preoperative sepsis syndrome and 14 had asthma. Ten patients had a tracheostomy. Bronchoscopy was performed by an otolaryngologist (n = 67) or a pediatric surgeon (n = 39). Mean operative time was 28 minutes, while mean total operating room time was 62 minutes. Airway foreign bodies were located in 80 patients (75.5%) with 57.5% being located in the mainstem bronchus. Mean time to surgery was 0 days and mean hospitalization was 1 day. No patients required a related operation or remained hospitalized at 30 days. There were no morbidities recorded, including reintubation or postop pneumonia. Two patient deaths occurred within 2 weeks of bronchoscopy, with one patient having been diagnosed with an airway foreign body and no foreign body identified in the other. No significant differences were identified in operative time, time to surgery, or hospitalization time based on gender, presence of a tracheostomy, or surgical specialty. **Conclusions:** Bronchoscopy for identification and removal of airway foreign bodies has minimal morbidity, but there is a high risk of mortality in this patient population.

**OTOLOGY/NEUROTOLOGY****H93. Utility of Intraoperative Imaging in Cochlear Implantation: A Systematic Review**

Swathi Appachi, MD, Cleveland, OH; Samantha Anne, MD, Cleveland, OH; Stacey L. Ishman, MD MPH, Cincinnati, OH; Seth R. Schwartz, MD MPH, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the literature available on the use of intraoperative imaging during cochlear implantation.

**Objectives:** During cochlear implant (CI) surgery, many institutions routinely perform intraoperative imaging to determine accurate electrode placement. However, there remains some controversy regarding its usefulness. This study aims to systematically review the literature regarding the utility of intraoperative imaging in CI surgery and implications for management. **Study Design:** This study is a systematic review. **Methods:** PubMed, EMBASE, Medline, CINAHL, and Cochrane library were searched from inception to August 2016. Studies analyzing use of intraoperative imaging during CI surgery were included. Outcome measures included unsatisfactory placement and change in management. Two independent evaluators reviewed each abstract and article. **Results:** Two hundred and forty-four articles were identified. After review, 15 met inclusion criteria, for a total of 1,006 CIs. There were no randomized controlled trials. Intraoperative x-rays were performed in 843 CIs in six studies. Placement was unsatisfactory in 16 implants (1.9%) and management was changed in 15/16 (93.8%). Sixteen cochleas had abnormal anatomy. Intraoperative CT was performed in 139 CIs in seven studies. Nineteen cochleas had abnormal anatomy. Placement was unsatisfactory in 6 implants (4.3%) and management was changed in 5/6 (83.3%). Nineteen cochleas had abnormal anatomy. Intraoperative real time fluoroscopy was performed in 27 CIs in two studies to help guide correct placement. Twenty-two of these patients had abnormal cochleas. Across all imaging, all but one study found intraoperative imaging useful, especially in cases with challenging anatomy. **Conclusions:** Intraoperative imaging demonstrates unsatisfactory placement of electrodes during CI surgery at a low, but not negligible, rate. Intraoperative imaging changes management in these situations and is most useful with abnormal cochlear anatomy.

**H94. Middle Ear Tuberculosis as the Initial Manifestation of Miliary Tuberculosis in a Non-Endemic Region**

Amy P. Bansal, MD, Newark, NJ; Mark A. Galan, MD, Newark, NJ; Yu-Lan M. Ying, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better characterize the presentation, workup, and pathology of middle ear tuberculosis (TB) to better assist general otolaryngologists and otologists in the recognition of middle ear TB.

**Objectives:** To characterize the presentation, differential diagnosis, and workup of a patient with refractory middle ear disease then diagnosed with middle ear tuberculosis. **Study Design:** Case report and literature review. **Methods:** A case report of a 27 year old male originally from Mexico who presented with unilateral otorrhea and granulation tissue involving the external auditory canal and middle ear space. Tympanomastoidectomy was performed with final pathology positive for AFB organisms. **Results:** A case of middle ear tuberculosis (TB) in a patient with a suspected cholesteatoma who underwent tympanomastoidectomy. Frozen section analysis was negative for granulomatous disease, however, final histopathologic assessment was positive for AFB organisms. Further workup revealed extensive pulmonary infiltrates consistent with miliary tuberculosis. Anti-mycobacterial therapy was initiated. On last exam he was noted to have persistent otorrhea secondary to nonhealing tympanoplasty, which may require revision surgery in the future. **Conclusions:** Middle ear tuberculosis is a rare entity accounting for approximately 0.9% of chronic suppurative otitis media worldwide. It is often overlooked in the differential diagnosis of middle ear disease, especially in developed countries. Patient cohorts with higher migrant populations pose a risk of sporadic cases of tuberculosis. Here we present one of the few cases of middle ear TB as the initial presentation of systemic disease in a non-endemic region. Early consideration and prompt recognition of middle ear tuberculosis is imperative in the implementation of appropriate infection control measures. Timely treatment initiation may help prevent worsening hearing loss and progressive facial paralysis, plus attendant systemic complications.

**H95. Cochlear Implantation Outcomes Evaluated Using Health Related Quality of Life**

Michael J. Bauschard, MD MS, Charleston, SC; Jonathan L. Hatch, MD, Charleston, SC; Shaun A. Nguyen, MD, Charleston, SC; Judy R. Dubno, PhD, Charleston, SC; Craig A. Velozo, PhD, Charleston, SC; Theodore R. McRackan, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should 1) understand the benefit of cochlear implantation (CI) to health related quality of life (HRQOL); 2) understand the relation between HRQOL and speech recognition after CI; and 3) recognize the limitations of HRQOL in quantifying CI benefits.

**Objectives:** To determine the change in HRQOL after CI and its relation to speech recognition. **Study Design:** Meta-analysis. **Methods:** Search was performed following the preferred reporting items for systematic reviews and meta-analyses statement by two independent authors using PubMed, Medline, Scopus, and CINAHL. Studies on adult CI patients mea-



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asuring HRQOL before and after CI were included. Standardized mean difference (SMD) for each measure and pooled effects were determined. A subset analysis of Health Utilities Index (HUI) measures was conducted. A meta-analysis of correlations was also performed between HRQOL and speech recognition. **Results:** Twenty-two articles met initial criteria for outcomes analysis, but 15 (68.1%) were excluded due to incomplete statistical reporting. From the seven articles with 274 CI patients that met inclusion criteria, pooled analyses showed a medium effect of CI on HRQOL (SMD = 0.66). Subset analysis of HUI also showed a medium effect (SMD = 0.73). Eleven articles with 582 CI patients met inclusion criteria for meta-analysis of correlations between HRQOL and speech recognition after CI. A mild positive correlation was observed between HRQOL and word recognition in quiet ( $r = 0.37$ ) and sentence recognition in quiet ( $r = 0.40$ ), but a low correlation ( $r = 0.29$ ) with sentence recognition in noise. **Conclusions:** Although regularly used, HRQOL measures are not intended to nor do they accurately reflect the communication difficulties facing CI patients. Accordingly, only a medium effect of CI on HRQOL was observed and a negligible to mild positive correlation between HRQOL and speech recognition.

## H96. Can Oxidation in the Ear Be Controlled?

Brian W. Blakley, MD PhD, Winnipeg, MB Canada; Stacey M. McPhees, MD, Winnipeg, MB Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of NAC and STS in perilymph.

**Objectives:** The goals of this project were to determine 1) whether the REDOX potential can be affected using powerful antioxidants such as N-acetylcysteine or sodium thiosulfate (STS) in perilymph in dosages that we have previously found to be effective in preventing hearing loss due to cisplatin, and 2) which of the two antioxidants caused the greater change.

**Study Design:** The importance of oxidation reduction (REDOX) chemistry underlies many pathologic processes has become established. The REDOX potential is the major determinant of which chemical reactions will occur in any system, yet it is rarely measured in medicine. It seems plausible that control of the REDOX potential could provide control of pathology in the ear or elsewhere. Animal experiment. **Methods:** Thirty guinea pigs were divided into 3 groups of 10 each: group 1-control received-no treatment; group 2-NAC 400 mg/kg i.p.w; group 3- STS 1600 mg/kg i.p. All animals underwent terminal measurement of the REDOX potential in perilymph by placing a probe through the round window at times up to 20 hours after injection of the antioxidant (NAC or STS). Two commercially available probes were used and data recorded either immediately or up to 30 minutes after opening the round window to assess the possible effect of atmospheric oxidation. **Results:** The REDOX potential (mean +/- 95% CI) was reduced significantly compared to control (-11.11 +/- -30.1 to 7.87) for both NAC (-77.55 +/- -92.5 to -62.6;  $p < 0.001$ ) and STS (-45.5 +/- -62.1 to -28.96;  $p = 0.01$ ). The REDOX potential effect was significantly greater for NAC than STS ( $p = 0.017$ ). The difference in REDOX potential were not significantly affected by the length of time, up to 30 minutes, that the perilymph was exposed to the atmospheric oxygen and did not return to normal by 20 hours after administration of the antioxidant. **Conclusions:** At least over the short term, of 20 hours, the REDOX potential can be controlled to some degree by administration of NAC or STS.

## H97. Inpatient Mastoidectomy: An Analysis of Patient Comorbidities, Complications, Procedure Type, and Diagnosis

Meghan M. Crippen, MS, Newark, NJ; Jacob S. Brady, BA, Newark, NJ; Omar M. Mohamed, BA, Newark, NJ; Soly Baredes, MD, Newark, NJ; Evelyne Kalyoussef, MD, Newark, NJ; Yu-Lan Mary Ying, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand and discuss the differences between mastoidectomies performed in the inpatient and outpatient setting with regard to patient characteristics, procedure type, procedure indication, and complications.

**Objectives:** Characterize inpatient mastoidectomy with respect to patient demographics, comorbidities, procedure type, postoperative diagnosis, and 30 day postoperative complications. **Study Design:** Retrospective analysis using the National Surgical Quality Improvement Program (NSQIP) database. **Methods:** NSQIP was queried for all cases of mastoidectomy from 2005-2013 using current procedural terminology (CPT) codes. Patients were identified as inpatient ( $n = 314$ ) or outpatient ( $n = 1572$ ) and compared via bivariate analyses. **Results:** Of the 1896 mastoidectomies identified, 16.6% were performed as inpatient procedures. Inpatients were more likely to be aged 61-80 ( $p = 0.003$ ), and had significantly higher rates of several comorbidities including hypoalbuminemia, wound infection, systemic sepsis, emergency procedure, and elevated ASA class ( $p < 0.001$ ). Inpatient procedures were associated with higher rates of postoperative complications (8.9% vs. 2.2%,  $p < 0.001$ ), including superficial surgical site infection ( $p = 0.035$ ), bleeding ( $p < 0.001$ ), unplanned readmission ( $p = 0.008$ ), and reoperation ( $p = 0.035$ ). Inpatients were more likely to undergo simple, complete, radical, or modified radical mastoidectomy (23.6% vs. 4.9%,  $p < 0.001$ ), while outpatients more commonly underwent tympanomastoidectomy (61.5% vs. 87.2%,  $p < 0.001$ ). Postoperative diagnoses were distributed differently between groups, with inpatients more frequently diagnosed with malignant neoplasm ( $p < 0.001$ ) and chronic nonsuppurative otitis media ( $p < 0.001$ ) and outpatients more frequently diagnosed with cholesteatoma ( $p < 0.001$ ). **Conclusions:** Mastoidectomy is a relatively safe procedure with minimal morbidity and thus is infrequently performed as an inpatient procedure. Inpatients undergoing this procedure however have significantly higher rates of comorbidities and postoperative complications. Furthermore, the frequency of specific procedure type and postoperative diagnosis varies significantly, which is indicative of differences in disease mechanism between inpatient and outpatient groups.



## H98. Hearing Loss on Social Media: Who is Winning Hearts and Minds?

Matthew G. Crowson, MD, Durham, NC; Debara L. Tucci, MD, Durham, NC; David M. Kaylie, MD, Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe an application of social media network analysis to derive novel insights from the most active users and content pertaining to hearing loss.

**Objectives:** To analyze specific patterns of Twitter usage using common references to hearing loss, and characterize the virtual public that comprises the hearing loss community to inform hearing loss stakeholders for opportunities for engagement and outreach. **Study Design:** Social media network analysis. **Methods:** Twitter tweets were sampled from July to September 2016 using #hearing, #hearingloss, #deaf, #hearingimpairment, #hardofhearing, #deafness, #hearingmatters, #hearinghealth, and #hearingimpaired tags. User and Twitter social community metrics were examined including temporal trends, tweet content, user activity, tweet reach, and an analysis of the tweets' social network. **Results:** We identified and analyzed 49,208 tweets from July to September 2016 with tags relevant to hearing loss. Of the 100 most active Twitter accounts, organizations owned 67% compared to 33% owned by individuals. Commercial/for profit and informational organizations were the most common organization account owners (26% and 16%). Five unique tweets were identified as each having a reach of over 100,000 Twitter users, with the greatest reach exceeding 250,000 users. Temporal analysis identified marked retweet outliers (>300 retweets per hour) that corresponded with a widely publicized event involving the dismissal of a deaf employee from a fast food chain store. **Conclusions:** Twitter accounts owned by organizations outnumbered individual accounts, and commercial/for profit user accounts were the most frequently active organization account type. Tweets pertaining to hearing loss may have a broad reach to a large community base. Analyses of social media use can be helpful in discovering issues of interest to the hearing loss community, as well as determining which users and organizations are dominating social network conversations.

## H99. Osteoblastoma of the Temporal Bone in a Young Child

Micah M. Gibson, BS, Houston, TX; Matthew M. Michalowicz, MD, Bethesda, MD; John Aranake-Chrisinger, MD, Houston, TX; Lawrence E. Ginsberg, MD, Houston, TX; Franco DeMonte, MD, Houston, TX; Paul W. Gidley, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe presenting signs and symptoms of temporal bone osteoblastomas, their appearance on imaging and histology, and the appropriate management of this rare tumor.

**Objectives:** To present a unique case of osteoblastoma of the temporal bone found in an asymptomatic pediatric patient. **Study Design:** Case report and literature review. **Methods:** Case report and literature review. **Results:** Otoscopic examination during a well child visit identified a polypoid mass behind the right tympanic membrane. Referral was made to our center. Audiogram showed a mild, low frequency conductive hearing loss with an air bone gap of 20dB at 500Hz. Computed tomography displayed a 2.4cm expansile, rim calcified lesion with a large epidural component at the junction of the petrous and squamosal temporal bone. The mass encompassed the ossicles, which appeared intact. Intraoperatively, extensive osteoblastoma eroded the middle fossa floor with extension into the epidural space, ear canal, middle ear, and perilyabyrinthine air cells. The ossicles were engulfed by tumor. Gross total tumor resection was achieved through a transtemporal approach. Histologic examination showed characteristic irregularly shaped bone trabeculae surrounded by relatively small osteoblasts. There were also areas of loose stroma with dilated spaces filled with blood indicating a secondary aneurysmal bone cyst. **Conclusions:** Benign osteoblastomas are rare, benign, primary bone tumors that rarely present in the craniofacial skeleton without facial or vestibular deficits. Their presentation can present a challenge considering their rarity and similarity to other primary bony neoplasms. Only 35 temporal bone osteoblastomas have been reported in the literature. Our case is unusual in that it is one of the youngest children described, and it was discovered as an incidental finding on a well child visit in an asymptomatic patient, displaying the importance of these exams.

## H100. Improvement in Tinnitus Handicap Inventory Measures in Patients Participating in a Staged Tinnitus Habituation Therapy Protocol

Saikrishna C. Gourishetti, BS, Baltimore, MD; Chelsea Carter, AuD, Baltimore, MD; Nicole K. Nguyen, AuD, Baltimore, MD; David J. Eisenman, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the benefits of a three stage tinnitus habituation therapy protocol and compare the effectiveness of each individual component.

**Objectives:** To evaluate the effectiveness of individual components of a three stage tinnitus habituation therapy (THT) protocol [1) education and counseling; 2) audiometric testing; 3) sound generator fitting and use] by quantifying changes in self-perceived tinnitus handicap. **Study Design:** Single center retrospective cohort study. **Methods:** 229 charts were reviewed from all patients who underwent THT from January 2013 through July 2016. The education/counseling component of THT was primarily done in a group session. The primary outcome measures were Tinnitus Handicap Inventory (THI) scores before and after each stage of the treatment protocol. **Results:** There was a significant decrease in mean THI from  $56.01 \pm 24.97$  to  $45.06 \pm 22.97$  after stage 1 ( $n=135$ ,  $p<0.001$ ). There was no difference in THI measures follow-

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ing stage 2 (n=33, p= 0.48). There was a significant decrease in mean THI from  $48.35 \pm 20.17$  to  $32.20 \pm 15.97$  after stage 3 (n=20, p<0.001). After successful completion of all stages, there was a 44.19% decrease in THI (n=20, p<0.001). **Conclusions:** Educational/counseling and physiological habituation with sound generators are both independently important components of THT. A staged THT protocol allows more patients to benefit from an affordable group education/counseling session alone, without need for further therapy, while allowing additional efficacious therapy for those requiring further treatment. A staged THT protocol allows for better use of resources while providing effective tinnitus treatment to a larger group of patients.

## H101. An Analysis of Patient Characteristics and 30 Day Postoperative Adverse Events in Adult Oticologic Surgery

Aparna Govindan, BA, Newark, NJ; Kristen A. Echanique, BS, Newark, NJ (Presenter);  
Meghan M. Crippen, MS, Newark, NJ; Soly Baredes, MD FACS, Newark, NJ; Evelyn Kalyoussef, MD FACS,  
Newark, NJ; Yu-Lan Mary Ying, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the patient demographics and comorbidities associated with postoperative outcomes following common otologic procedures.

**Objectives:** To analyze the influence of preoperative patient characteristics on 30 day postoperative sequelae in adults undergoing otologic procedures and identify significant predictors of surgical outcomes. **Study Design:** Retrospective cohort analysis of cases from the American College of Surgeons National Surgical Quality Improvement Program participant user files. **Methods:** CPT codes for tympanoplasty, tympanomastoidectomy, myringoplasty, stapedectomy, and external hardware implantations (defined as bone anchored hearing aid or cochlear implantations) were used to identify patients who underwent otologic surgery between 2005-2013. Patient demographics, comorbidities, and surgical outcomes categorized as complication, readmission, and reoperation were studied using univariate and multivariate analysis. **Results:** 4,847 cases met our inclusion criteria. Complication occurred in 2.1%, readmission in .9%, and reoperation in 0.3% of cases. Univariate analysis revealed increased incidence of complication and reoperation associated with diabetes mellitus (3.6% vs. 1.9%; P=.028) and (1.2% vs. 0.3%; P=0.032) respectively, and increased rates of readmission in obese patients (1.9% vs. 1.0%; P=.035). Multivariate regression analysis revealed that of the preoperative variables studied, significant predictors of readmission include bleeding disorders ([OR] = 4.875; P=0.030) and functional status ([OR] = 6.751; P=0.009), and significant predictors of complication include smoking ([OR] = 2.505; P<0.001), wound infection ([OR] = 3.658; P=0.050), and American Society of Anesthesiology (ASA) class 3 or 4 ([OR] = 1.927; P=0.022). **Conclusions:** Rates of adverse events are low following otologic surgery, however comorbidities including bleeding disorders and functional status significantly increase the odds of readmission, while smoking, preoperative wound infection, and a higher ASA class significantly increase the odds of complication.

## H102. The Role of Computed Tomography Angiography in Temporal Bone Fractures

Yarah M. Haidar, MD, Irvine, CA; Omid Moshtaghi, BS, Irvine, CA; Anadjeet Khaheera, BS, Irvine, CA;  
Afsheen Moshtaghi, BS, Irvine, CA; Harrison W. Lin, MD, Irvine, CA; Hamid R. Djallilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the utility of computed tomography angiography in the workup of temporal bone fractures.

**Objectives:** To characterize patients presenting with petrous temporal bone fractures (TBF) who underwent a computed tomography angiography (CTA). **Study Design:** Retrospective case series. **Methods:** Patients presenting with TBF and underwent CTA at our academic institution from 2014 to 2015 were retrospectively reviewed. CTA was performed for various reasons. Patient characteristics and outcomes were recorded. **Results:** Thirty-six patients were included. The average age of presentation was 41 years old. Twenty-five were males (69%). Nineteen (52%) sustained injury from a fall, seven (19%) from a motor vehicle accident, five (13%) from assault, and five (13%) from other causes. Only two (6%) were otic capsule involving fractures. The most common GCS on presentation was three (25%). Thirty-one (86%) had concomitant subarachnoid hemorrhage and 10 (27%) had spinal injury. Seven (19%) died from their injury. EAC injury was present in 10 (27%) patients and carotid canal injury in 6 (16%) patients. Two of the six patients with carotid canal fractures (CCFx) had internal carotid artery injury, one with a small focal dissection not requiring further treatment and one who died from the sustained injury. Incidental findings on CT included MCA occlusion in one, carotid atherosclerosis in three and sigmoid sinus thrombus in one. **Conclusions:** Of our TBF population with CCFx, two were noted to have carotid artery injury (33%). CTA findings did not change overall management in our small patient cohort. Patients with TBF and CCFx have a high incidence of carotid artery injury.

## H103. Radiographic Variations of Surgically Relevant Middle Cranial Fossa Anatomy in Three Neurotologic Disorders

Kiefer D. Hock, BS, Cincinnati, OH; Shawn M. Stevens, MD, Cincinnati, OH; Myles L. Pensak, MD,  
Cincinnati, OH; Ravi N. Samy, MD, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain surgically rele-

vant variations of the middle cranial fossa anatomy in patients with spontaneous CSF otorrhea, superior canal dehiscence syndrome, and vestibular schwannoma (disorders managed via middle cranial fossa approach).

**Objectives:** 1) Compare radiographic measurements of surgically relevant middle cranial fossa (MCF) anatomy in various patient groups; and 2) determine if age or body mass index (BMI) correlate with these measures. **Study Design:** Retrospective review in a tertiary referral center. **Methods:** Adults with diagnoses of spontaneous cerebrospinal fluid otorrhea (SCSF), superior canal dehiscence syndrome (SCDS), and vestibular schwannoma (VS) were selected if they had temporal bone CTs shot between 2006-2016 and no history of trauma, meningitis, chronic ear disease, radiation, and/or surgery. Coronal CTs were measured at standardized locations. Cranial caudal skull base height (SBH) was assessed overlaying the external auditory canal (EAC), geniculate ganglion (GG), superior semicircular canal (SCC) and internal auditory canal (IAC). Relative SBH (RSBH) was the average of these values. Skull base pneumatization was documented as present/absent at those locations and the temporal squama (TSq). Statistical correlations were performed between SBH, age and BMI. **Results:** 68, 46 and 89 ears were measured in the SCSF, SCDS and VS groups. The groups didn't differ in age, gender or BMI except for the SCSF group (higher BMI,  $p=0.01$ ). The VS group was significantly more likely to pneumatize the TSq (44% vs. 16-20%), GG (60% vs. 26-28%), and SCC (54% vs. 10-28%) compared to both other groups ( $p<0.001$ ). VS patients also had a significantly greater RSBH than both other groups ( $p=0.05$ ). The SBH overlaying the GG did not differ significantly between groups. There were no significant correlations between SBH and age/BMI. **Conclusions:** VS patients had higher and more pneumatized skull bases relative to key MCF anatomy than do SCSF and SCDS patients.

#### H104. Tinnitus Prevalence, Characteristics and Relationship with Cardiometabolic Risk in an African American Cohort

Laura K. House, MD, Jackson, MS; Charles E. Bishop, AuD PhD, Jackson, MS; John M. Schweinfurth, MD, Jackson, MS; Christopher S. Spankovich, AuD PhD, Jackson, MS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss tinnitus prevalence, characteristics and relationship with cardiometabolic risk in an African American cohort.

**Objectives:** To describe the prevalence and characteristics of tinnitus in an African American cohort, with assessment of the relationship between reported tinnitus and cardiometabolic risk. **Study Design:** Prospective cohort study. **Methods:** The hearing, reported tinnitus, and tinnitus handicap were assessed in a sample of 1322 participants of a larger cardiovascular study cohort who also had measured cardiometabolic variables on file. Tinnitus was assessed dichotomously (YES/NO) and with the Tinnitus Handicap Inventory (THI), which yields a score that can be compared to established norms. The prevalence of tinnitus in our study group was compared to the NHANES prevalence data for African Americans, and the statistical relationship of reported tinnitus to various cardiometabolic risks is described. **Results:** Tinnitus was found to be less prevalent in our study sample in comparison to that observed in the NHANES database, which may be due to the lower rate of reported noise exposure of our participants. Tinnitus was found to be age, sex, and noise exposure dependent and, predictably, strongly correlated with hearing level, though less than expected. Tinnitus was found to be predictive of several obesity related cardiometabolic risks, depending on the level of covariate adjustments. **Conclusions:** Tinnitus is less prevalent in our study sample than in the general African American population and was found to be related to cardiometabolic risk depending on the level of covariate adjustment in statistical models.

#### H105. Novel Use of Visual Biofeedback for Binocular Microscopy/Otoscopy in the Otolaryngology Office

Wayne Daniel Hsueh, MD, Bronx, NY; Judd H. Fastenberg, MD, Bronx, NY; Christina H. Fang, MD, Bronx, NY; Howard S. Moskowitz, MD, Bronx, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the use of video glasses as visual biofeedback for enhancing patient satisfaction of in-office binocular microscopy/otoscopy.

**Objectives:** Comprehensive otologic exams and procedures rely on binocular microscopy/otoscopy. By using video glasses for biofeedback, patients can directly visualize their exam in real time. The objective of this pilot study is to test the effects of visual biofeedback on patient satisfaction, comfort, and education during in-office binocular microscopy/otoscopy. **Study Design:** This was conducted as a pilot study with a single treatment group. **Methods:** Patients seen in our otolaryngology clinic who required binocular microscopy/otoscopy for diagnosis and treatment of possible ear disease were recruited for the study. Outcomes were measured using a survey designed to assess comfort and satisfaction along with whether patients believed that the use of video glasses contributed to an improved understanding of their disease. **Results:** A total of 20 patients were recruited for the study. On a 10 point scale, patients found that the video glasses were very comfortable (mean 9.875, SD 0.35), and they were very satisfied with their clinical exam (mean 10, SD 0). Additionally, they reported very slight anxiety with the glasses (mean 2.375, SD 3.11). Patients all agreed that they would use the video glasses again, and that compared to their last visit, the video glasses enhanced their experience. Furthermore, with the video glasses, patients felt they had a better understanding of their ear related concerns. **Conclusions:** In this pilot study we conclude that patients prefer using the video glasses. They are comfortable and satisfied when using video glasses during their otologic exam, and they believe the visualization improves their understanding.



# Posters

## H106. Ear Preference and Interaural Asymmetry

Camille M. Huwyler, BS, San Francisco, CA; Jennifer H. Sabes, AuD, San Francisco, CA;  
Steven W. Cheung, MD, San Francisco, CA; Jolie L. Chang, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the relationship between ear preference and audiometric asymmetry.

**Objectives:** To define the relationship between ear preference strength and interaural asymmetry magnitude. **Study Design:** Prospective, cross-sectional study. **Methods:** 259 subjects completed standard audiometry and survey instruments. Ear preference was assessed using both a visual analog scale and a 7 point categorical rating scheme (no preference and left or right somewhat, strong, or complete ear preference). Audiometric asymmetry was defined as an air conduction interaural threshold difference (ITD) of 15 dB or greater at any 2 frequencies between 0.25 and 4 kHz. Criterion for hearing loss was thresholds greater than or equal to 25 dB from 0.25 to 4 kHz and normal hearing was thresholds less than 25 dB. The maximum average ITD at two adjacent frequencies (ITD<sub>max2</sub>) was calculated to quantify threshold asymmetry. **Results:** The 3 study cohorts were asymmetric hearing (AS, n = 112 (43%)), symmetric hearing loss (SHL, n = 82 (32%)), and normal hearing (NH, n = 65 (25%)). SHL and NH cohorts had indistinguishable ear preference distributions (p = 0.57). The AS cohort had greater unilateral ear preference compared to SHL and NH (Kruskal-Wallis, p < 0.005). There was greater likelihood of ear preference associated with larger interaural asymmetry (30% at ITD<sub>max2</sub> < 15 dB; 65% at ITD<sub>max2</sub> = 15-30 dB; 91% at ITD<sub>max2</sub> = 31-45 dB; 100% at ITD<sub>max2</sub> > 45 dB; all p < 0.005). The relationship between presence of any ear preference and ITD<sub>max2</sub> >15 dB has a positive predictive value (PPV) of 69%. Complete dependence on one ear has a PPV of 100% for ITD<sub>max2</sub> > 30 dB. **Conclusions:** Categorical ear preference can be used to identify and quantify interaural asymmetry.

## H107. Location of Small Intracanalicular Vestibular Schwannomas Based on Magnetic Resonance Imaging

Elliott D. Kozin, MD, Boston, MA; Chandler Shapiro, BA, Boston, MA; Aaron K. Remenschneider, MD MPH, Boston, MA; Mary Beth Cunnane, MD, Boston, MA; Michael J. McKenna, MD, Boston, MA;  
David H. Jung, MD PhD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand common location of vestibular schwannomas based on magnetic resonance imaging.

**Objectives:** The origin of vestibular schwannomas (VS) has long been debated. Historically, VS had been thought to arise from the glial-Schwann cell junction. Recently, otopathology studies indicate that VS may arise anywhere along the course of the vestibular nerve. These studies, however, have largely analyzed tumors of all sizes, which may confound findings. Herein, we aim to quantify position of small intracanalicular VS. **Study Design:** Retrospective chart review. **Methods:** Patients with VS at our institution from 1999 to 2016 were reviewed. Included patients had available magnetic resonance imaging (MRI) studies and tumor size >5mm. Patients previously treated with surgery or radiation were excluded. Using a modified classification by Merchant et al., the length of the IAC was divided into thirds and the segment containing the VS was determined. **Results:** 298 tumors were identified with an average patient age of 59 years. Tumors smaller than 5mm accounted for 12.8% (38/298) of patients. The average age of patients with small tumors was 62 years. Of small tumors, 45% of tumors were close to the fundus, 16% were along the midpoint of the IAC, and 2% were close to the porus. Tumors that spanned more than one segment were predominantly closer to the fundus (34%) than to the porus (3%). **Conclusions:** Data suggest that small tumors may frequently occur near the fundus of the IAC, or that lateral small tumors present with earlier symptoms. Larger intracanalicular tumors may occur through lateral to medial growth. Findings have implications for the pathogenesis of VS and efforts at hearing preservation treatment approaches.

## H108. Assessment of the Prognosis for the Outcome of Delayed Transmastoid Facial Nerve Decompression Surgery

Yoshihiko Kumai, MD PhD, Kumamoto, Japan; Yutaka Toya, MD PhD, Kumamoto, Japan;  
Kohei Nishimoto, MD PhD, Kumamoto, Japan; Haruka Kodama, MD PhD, Kumamoto, Japan;  
Satoru Miyamaru, MD PhD, Kumamoto, Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the efficacy of the delayed transmastoid facial nerve decompression for Bell's palsy or Ramsay Hunt syndrome and the significance of intraoperative evoked electromyography to predict prognosis.

**Objectives:** To elucidate the efficacy of the delayed transmastoid facial nerve decompression for Bell's palsy or Ramsay Hunt syndrome which were performed more than three weeks after the onset of paralysis. **Study Design:** Retrospective case review. **Methods:** Sixteen patients with complete facial nerve paralysis underwent transmastoid facial nerve decompression at later than 3 weeks after the onset of paralysis by single surgeon without any major complications. Average postoperative followup was a minimum of 6 months. The time between the onset of the symptom and surgery ranged from 24-115 days (mean=49). Main outcome measured were pre and postoperative Yanagihara score at 1, 3 and 6 months after surgery, and presence or absence of intraoperative evoked electromyographic response stimulated at the portion



of horizontal segment before decompression procedure. Correlation between each parameter and duration between onset and surgery (within 50 days) was statistically analyzed using chi-square test. **Results:** Average Yanagihara score at preoperative and 6 months postoperatively were  $5.75 \pm 1.97$  and  $29.5 \pm 6.1$  respectively. Yanagihara score at 6 months postoperatively was not correlated significantly with the duration between onset and surgery, moreover, was significantly highly correlated with the presence or absence of intraoperative evoked electromyographic response stimulated at the portion of horizontal segment ( $p=0.0004$ ). **Conclusions:** Delayed transmastoid facial nerve decompression at later than 3 weeks between onset and surgery may not be enhanced by the duration within 50 days. The presence of positive intraoperative evoked electromyographic response stimulated at the portion of horizontal segment can be a good predictor for the postoperative prognosis.

#### H109. Functional Gait Assessment as an Objective Metric for Outcome after Cartilage Cap Surgery for Superior Canal Dehiscence

Larry B. Lundy, MD, Jacksonville, FL; David A. Zapala, PhD, Jacksonville, FL; Samantha J. Kleindienst, PhD, Scottsdale, AZ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to objectively evaluate the ability of patients to walk and ambulate (as a reflection of dizziness) before and after cartilage cap resurfacing surgery for superior canal dehiscence.

**Objectives:** The success of surgery for superior canal dehiscence is currently either 1) subjective patient self-report or, 2) as subsets of audiometric and/or vestibular tests. The Functional Gait Assessment (FGA) is an objective, standardized (age based normed), and validated metric of walking and ambulation. The FGA scale ranges from 0 - 30. The objective of this study is to measure the performance of patients, pre and postop, using an objective metric. **Study Design:** Prospective, controlled, nonrandomized. **Methods:** 21 patients who underwent cartilage cap resurfacing surgery had a preop baseline FGA study and a postop FGA study at 3 months (or later). In addition, 11 patients with superior canal dehiscence who did not undergo surgery had a baseline FGA study. **Results:** For the surgical group, preop, 18 (86%) of 21 had FGA score below their age based norm, with a mean preop FGA score of 23.7 (18.2 - 28.0). For the control group, 5 (45%) of 11 had FGA score below their age based norm, with a mean score of 24.2 (23.2 - 29.6). Postop for 16 patients the FGA score improved to age based norms (76%), 4 remained within age based norm (no change), and 1 remained below age based norm (no improvement). 13 of the 16 who improved topped the FGA scale with a score of 29 or 30. **Conclusions:** The objective assessment of the ability to walk and ambulate, as a reflection of dizziness in patients with superior canal dehiscence, improved significantly after cartilage cap resurfacing surgery.

#### H110. New Bone Formation over Dehiscent Superior Semicircular Canals after Cartilage Cap Resurfacing Surgery

Larry B. Lundy, MD, Jacksonville, FL; Prasanna Vibhute, MD, Jacksonville, FL; Vivek Gupta, MD, Jacksonville, FL; Robert A. Pooley, PhD, Jacksonville, FL; David A. Zapala, PhD, Jacksonville, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss radiographic evidence of new bone formation after placement of a cartilage cap over a dehiscent superior semicircular canal.

**Objectives:** The primary goal of this study was to assess computerized tomography (CT) scan evidence of new bone formation following cartilage cap resurfacing of dehiscent superior semicircular canals. **Study Design:** Blinded, controlled, retrospective review. **Methods:** High resolution CT scans of 20 patients were reviewed by two neuroradiologists. Of these 20 patients, 6 had undergone transmastoid cartilage cap resurfacing surgery for a dehiscent superior canal, with both preop and postop scans. The other 14 patients had undergone high resolution CT scans as part of the evaluation for a dehiscence and were negative. The scans were deidentified. In order to minimize bias in interpretation, all CT scans for all 20 patients were limited to focused Poschl and Stunner views of the superior canal, then cropped to eliminate any evidence of prior surgery. The two neuroradiologists who interpreted the scans were not involved in the process of limiting and cropping of images. The sequence of the sets of images was randomized separately for each neuroradiologist, and the results of the interpretation were blinded to the neuroradiologists. The outcome metric was the presence or absence of a dehiscence. **Results:** There were 4 patients with a dehiscent superior canal preoperatively who had new bone formation postoperatively. One patient who had surgery had evidence of new bone formation adjacent to the dehiscence. There was agreement in all cases, including controls, of the presence or absence of bone formation and dehiscence or no dehiscence. The time interval between surgery and the bone formation on CT scan ranged from 23 - 39 months, average of 31.6 months. **Conclusions:** There is CT evidence of new bone formation covering a previous superior canal dehiscence following transmastoid cartilage cap resurfacing. The average time interval between surgery and bone formation on CT scan averaged 31.6 months.

# Posters

## H111. Overcoming High Frequency Limitations of Air Conduction Hearing Aids Using a Light Driven Contact Hearing Aid; A Comparative Self-Controlled Study

John T. McElveen Jr., MD, Raleigh, NC; Bruce Gantz, MD, Iowa City, IA; Rodney Perkins, MD, Menlo Park, CA; Michael Murray, MD, San Jose, CA; Charles A. Syms, MD, San Antonio, TX; Douglas A. Chen, MD, Pittsburgh, PA

**Educational Objective:** At the end of this presentation, the participants will understand the benefits of high frequency hearing as well as the limitations of traditional air conduction hearing aids. In addition, the participants will be able to discuss currently available technology that circumvents those high frequency limitations.

**Objectives:** To compare the high frequency functional gain of a patient's own air conduction hearing aid with a light driven tympanic membrane contact hearing aid. **Study Design:** Multi-center self-controlled prospective study in adults with mild to severe sensorineural hearing loss. Study measures included unaided and aided sound field thresholds and subjective questionnaires. **Methods:** Sound field thresholds were measured from 125 Hz to 10,000 Hz. Tests included unaided pretreatment, aided pretreatment with own air conduction hearing aids (if worn), and aided with the light driven contact hearing aid to demonstrate functional gain at the 90 day study interval. A subjective benefit questionnaire was administered at the 90 day study interval. **Results:** Mean functional gain was 31 dB across 6-10 kHz for 76 ears with the light driven contact hearing aid and 7.6 dB across 6-10 kHz for the 50 ears with their own air conduction hearing aids. Forty-two (42) patients completed the study, of whom 32 (76%) reported being satisfied or very satisfied with the light driven contact hearing aid regarding overall benefit of hearing. Twenty-three (23) of the 30 (77%) subjects who came into the study with their own hearing aids perceived superiority and elected to continue using the light driven contact hearing aid after the 90 day study period. **Conclusions:** The light driven contact hearing aids delivered substantially more amplification in the high frequencies when compared to air conduction hearing aids. 77% of the patients felt the light activated contact hearing aid was superior to their own air conduction hearing aid.

## H112. Effect of Rituximab on AAV Related Otitis Media Case

Koshi Otsuki, MD PhD, Fukushima, Japan; Takamichi Matsui, MD PhD, Fukushima, Japan;  
Yukio Nomoto, MD PhD, Fukushima, Japan; Mitsuyoshi Imaizumi, MD PhD, Fukushima, Japan;  
Koichi Omori, MD PhD, Fukushima, Japan

**Educational Objective:** Once initial regional AAV progresses systemically to organs, including the lung and kidney, and to the central nervous system in the absence of immunosuppressive therapy, AAV shows high mortality. It is important, therefore, that initial symptoms in the upper airway are considered with the inclusion of AAV in the differential diagnosis, so that treatment can be started in a timely manner.

**Objectives:** The combination of glucocorticoids and cyclophosphamide leads to remission in most patients with anti-neutrophil cytoplasmic antibody (ANCA) associated vasculitis (AAV) related otitis media. However, complete deafness cannot be reversed, and the relapse rate remains high even when maintenance treatment with immunosuppressive drugs is administered. We review the diagnostic features of AAV related otitis media and discuss the effect of rituximab (a molecularly targeted drug) as a substitute for cyclophosphamide. **Study Design:** Retrospective case review. **Methods:** We reviewed the case of myeloperoxidase (MPO) ANCA positive patient who initially complained of otologic symptoms and was referred to our medical university. An 81 year old woman was referred to us with a high MPO-ANCA titer and bilateral hearing loss with middle ear effusions, after 6 months of treatment for otalgia. She had almost complete deafness. **Results:** The following findings were observed: positive MPO-ANCA (279 EU/ml [normal <3.5 EU]), negative proteinase 3 (PR3) ANCA (<10 EU), and bilateral hearing loss (average hearing level: right, 105 dB; left, 103 dB). Following a tapered course of prednisolone (initial dose 50 mg/d) and subsequent initiation of rituximab at 40 mg/d, her MPO-ANCA titer returned to 1.7 EU/ml and her bilateral hearing loss showed marked improvement (right, 56.3 dB; left, 57.5 dB). No relapse occurred. **Conclusions:** This case study showed the effect of rituximab on AAV related otitis media. Further cases should be prospectively examined and reviewed to establish the treatment for AAV related otitis media.

## H113. Improved Autologous Cortical Bone Harvest and Viability with 2Flute Otologic Burs

Adam A. Roth, BS, Indianapolis, IN; Pei Ciao Tang, PhD, Indianapolis, IN; Mohammad S. Khalid, MD PhD, Indianapolis, IN; Rick F. Nelson, MD PhD, Indianapolis, IN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize that autologous bone harvested with 2Flute otologic burs is more viable and likely leads to improved postoperative bone healing.

**Objectives:** To determine if 2Flute otologic burs improve the size, cellular content and bone healing of autologous cortical bone grafts harvested during canal wall reconstruction tympanomastoidectomy with mastoid obliteration. **Study Design:** IRB approved prospective cohort study. **Methods:** Human autologous cortical bone chips were harvested using various burs (4 and 6 mm diameter; multflute and 2Flute) from patients undergoing canal wall reconstruction tympanomastoidectomy for the treatment of chronic otitis media with cholesteatoma. Bone chip size, cell counts, cellular gene expression and new bone formation were quantified. **Results:** Bone chips were significantly larger when harvested with 2Flute bur

compared to multiflute burs at both 6mm diameter (150  $\mu\text{m}^2$  vs. 110  $\mu\text{m}^2$ ;  $P < 0.01$ ) and 4mm diameter (105  $\mu\text{m}^2$  vs. 65  $\mu\text{m}^2$ ;  $P < 0.01$ ). After 2 weeks in culture, cell counts were significantly higher when harvested with 2Flute bur compared to multiflute burs at both 6 mm diameter ( $47.1 \pm 8$  vs.  $31.8 \pm 3$  cells/ $\mu\text{g}$  bone;  $P < 0.01$ ) and 4 mm diameter ( $27.6 \pm 12$  vs.  $17.4 \pm 10$  cells/ $\mu\text{g}$  bone;  $P < 0.01$ ). Bone derived cells express osteoblast markers (alkaline phosphatase, osteocalcin). Cultured cells are able to form new bone in culture and bone formation is facilitated by the presence of bone chips. **Conclusions:** Human autologous cortical bone harvested with 2Flute otologic burs results in larger bone chips which harbor more viable osteoblasts. This has implications for improved healing after tympanomastoidectomy with mastoid obliteration and other surgical procedures that require autologous bone grafts.

## H114. The Effects of Positive Airway Pressure on the Middle Ear: Systematic Review and Meta-Analysis

Douglas S. Ruhl, MD MSPH, Charlottesville, VA; Stephen S. Schoeff, MD, Charlottesville, VA;  
Edward T. Chang, MD, Honolulu, HI; Bradley W. Kesser, MD, Charlottesville, VA; George T. Hashisaki, MD,  
Charlottesville, VA; Macario Camacho, MD, Honolulu, HI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain what the effects of positive airway pressure (PAP) on the middle ear based on current scientific evidence.

**Objectives:** Background: Positive airway pressure (PAP) is thought to increase middle ear pressure (MEP) which is of interest to otolaryngologists. Objective: To systematically review the literature for articles evaluating the effects of PAP on the middle ear and to perform a meta-analysis on the data. **Study Design:** Systematic review and meta-analysis. **Methods:** A search of Medline, OVID, Scopus, Web of Science and the Cochrane Library was performed from inception through October 12, 2016. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement was followed. **Results:** Seven studies reported various effects on the middle ear due to PAP. Patients who used PAP had higher MEP compared to controls. Higher PAP settings are associated with higher MEP ( $R^2=0.9748$ ,  $p<0.0001$ ). Swallowing markedly increases the MEP when using PAP. Two studies assessed PAP in patients with eustachian tube dysfunction (ETD) and retracted tympanic membranes. Both reported improvement in pure tone average (PTA) with an overall improvement of 7.3 dB HL (95% CI 3.45, 11.17,  $p=0.0002$ ). One study reported visual improvements/resolution in attic retraction pockets secondary to PAP. **Conclusions:** PAP seems to increase middle ear pressure which may be of concern to an otologic surgeon. PAP treatments may also help mitigate the effects of ETD in some patients. Better data is needed to more definitively assist surgeons reach management conclusions when caring for otologic patients that use PAP.

## H115. Wegener's Granulomatosis Presenting with Otolological Manifestations

Ronald Sahyouni, BA, Irvine, CA; Yarah M. Haidar, MD, Irvine, CA; Omid Moshtaghi, BS, Irvine, CA;  
Harrison W. Lin, MD, Irvine, CA; Hamid R. Djallilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe what the otological manifestations of granulomatosis with polyangiitis (GPA) are.

**Objectives:** Granulomatosis with polyangiitis (GPA), previously known as Wegener's granulomatosis, is a rare multi-system autoimmune disorder, characterized by necrotizing granulomatous inflammation and pauci immune vasculitis. Common head and neck manifestations include chronic sinusitis, rhinitis, and epistaxis, among others. Notably, 25-40% of patients experience otologic symptoms, with otitis media with effusion occurring in 40-70% of these cases. We report a cohort of GPA patients who presented with otologic findings and discuss the pitfalls in diagnosis. **Study Design:** Retrospective case series. **Methods:** GPA patients presenting to an otology/neurotology clinic in a tertiary care academic center over a 6 year period. **Results:** Nine patients had confirmed GPA. Eight of the 9 patients (89%) presented with hearing loss, half of which was unilateral (50%). The hearing loss was conductive or mixed in six of the eight patients (75%). All patients (9/9; 100%) presented with eustachian tube dysfunction (ETD) or chronic middle ear disease. Patients presenting with unilateral symptoms (7/9; 78%) underwent a nasal endoscopy, and three (43%) were noted to have intranasal pathology, including a nasal septal perforation or granulation tissue on the lateral wall of the nose. **Conclusions:** Nine patients with confirmed GPA presented with otologic symptoms. GPA should be included in the differential diagnosis in patients with mixed hearing loss and new onset serous effusion in the absence of previous ETD history, and in adults with recurrent acute otitis media with no precedent upper respiratory infection or previous history of otologic disease.

## H116. The Transpetrosal/Transtentorial (TPTT) Approach for the Placement of an Auditory Brainstem Implant

Ravi N. Samy, MD, Cincinnati, OH; Mario Zuccarello, MD, Cincinnati, OH; Shawn M. Stevens, MD,  
Cincinnati, OH; Joseph T. Breen, MD, Cincinnati, OH; Myles L. Pensak, MD, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should demonstrate an additional surgical approach for placement of an auditory brainstem implant.

**Objectives:** 1) Compare the novel transpetrosal/transtentorial (TPTT) surgical approach to the translabyrinthine (TL) and retrosigmoid (RS) approaches for the placement of an auditory brainstem implant (ABI); and 2) discuss when the TPTT



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route may be the optimal option in patients with neurofibromatosis type 2 (NF2), particularly if patients have numerous concurrent intracranial tumors (i.e., those of the jugular foramen) and/or a single functional venous outflow tract. **Study Design:** Retrospective case report. **Methods:** In a 30 year old Caucasian female with NF2, prior bilateral posterior fossa surgical approaches, and a single functioning venous outflow tract, a right sided TPTT surgical approach was used to resect a residual/recurrent vestibular schwannoma and for placement of an ABI. As the patient also had tumors of the jugular foramen, the TPTT surgical route allowed the avoidance of not only catastrophic thrombosis of the only venous outflow tract but also avoidance of additional cranial nerve injury, of significant importance in a patient with concurrent, ipsilateral complete facial paralysis and blindness. **Results:** The patient underwent tumor resection and ABI placement without complication with good intraoperative eABR findings. Postoperative CT scan imaging confirmed good placement in the lateral recess of the fourth ventricle. **Conclusions:** While the TL and RS approaches remain the workhorse approaches for placement of the ABI, the TPTT approach may be an option for tumor resection and ABI placement in patients suffering from the devastating effects of hearing loss of NF2 while avoiding injury to the lateral sinus or lower cranial nerves.

## H117. 30 Day Morbidity and Mortality Following Otologic/Neurotologic Surgery: Analysis of the NSQIP

Zachary G. Schwam, MD, New Haven, CT; Elias Michaelides, MD, New Haven, CT; Phoebe Kuo, BA, New Haven, CT; Michael A. Hajek, BA, New Haven, CT; Benjamin L. Judson, MD MGA, New Haven, CT; Christopher Schutt, MD, New Haven, CT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the complication rates for otologic and neurotologic procedures, identify specific risk factors for and time course of particular complications, and demonstrate an increased familiarity with questions answerable with national administrative databases.

**Objectives:** To determine the rate and timing of, as well as risk factors for postoperative morbidity and mortality following otologic and neurotologic surgery. **Study Design:** Retrospective cohort study. **Methods:** 1415 patients were identified in the American College of Surgeons National Surgical Quality Improvement Program, years 2005-2010. Simple summary statistics, chi-square, and multivariable logistic regression were performed. **Results:** Lateral skull base surgery (LSB) was done in 36.5%, and middle ear/mastoid procedures (MEM) were performed in 62.1% of cases. The overall adverse event rate was 11.0%, although it was significantly higher for LSB (25.0%) and lower for MEM (2.8%). The overall mortality rate was 1.5%. Complications occurred post-discharge in 31.1% of cases. The outpatient setting (odds ratio [OR] 0.26, 95% confidence interval [CI] 0.13-0.53) and undergoing MEM procedures (OR 0.27, 95% CI 0.14-0.52) were associated with lower risk of experiencing any complication. Impaired functional status (OR 9.92, 95% CI 3.65-26.94) was associated with postoperative mortality. Presence of a preoperative open wound was associated with multiple causes of postoperative morbidity. **Conclusions:** Patients undergoing approaches to the skull base and neurotologic tumor resections had the highest adverse event rate. Open wounds were predictive of several postoperative complications, and poor functional status was associated with mortality. Patients with significant comorbidities should be counseled appropriately and evaluated early on in their postoperative course to prevent readmission as well as major morbidity and mortality.

## H118. The Effect of Subway Station Noise Exposure on Commuter Hearing

Ravi R. Shah, MD, Philadelphia, PA; Jonathan J. Suen, AuD, Baltimore, MD; Ilana P. Cellum, AuD, New York, NY; Jaclyn B. Spitzer, PhD, New York, NY; Anil K. Lalwani, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the short term effects of subway noise on hearing, discuss the potential long term consequences of chronic exposure to subway noise, and compare possible mechanisms for the observed effects of subway noise on hearing.

**Objectives:** To determine how subway noise exposure affects commuters' hearing. **Study Design:** Randomized cross-over trial. **Methods:** Twenty subjects were exposed to subway platform noise for 15 minutes, either with or without hearing protection. Pre- and post-exposure pure tone audiometry (PTA) and otoacoustic emissions (OAEs) were compared to assess for temporary threshold shift. After a one week washout period with no subway use, subjects switched hearing protection groups and repeated the process for a second exposure. **Results:** A statistically significant improvement in PTA thresholds after subway noise exposure was identified, for subjects with and without hearing protection ( $p < 0.001$ ). For exposure without hearing protection, the mean threshold was 5.19 dB pre-exposure and 3.91 dB post-exposure (decrease of 1.28 dB; 95% CI, 0.82 - 1.74). For exposure with hearing protection, the mean threshold was 4.81 dB pre-exposure and 3.47 dB post-exposure (decrease of 1.34 dB; 95% CI, 0.89 - 1.79). Thresholds returned to baseline during the washout period. **Conclusions:** Interestingly, subjects exposed to subway noise exhibited a temporary increase in hearing acuity. A longitudinal study of subway commuters could provide a clearer picture of long term effects on hearing. Still, due to the potential for hidden hearing loss and other adverse effects associated with excessive noise, designing future stations to mitigate commuter noise exposure remains an important public health goal.



## H119. Relationship of Stroke Risk and Hearing Loss in African Americans

Jonathan E. Sorrel, MD, Jackson, MS; Charles E. Bishop, AuD, Jackson, MS;  
Christopher Spankovich, AuD PhD MPH, Jackson, MS; John M. Schweinfurth, MD, Jackson, MS;  
Samantha R. Seals, PhD, Pensacola, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the relationships between stroke risk and hearing loss.

**Objectives:** To evaluate the relationships among measures of stroke risk and hearing in an African American cardiovascular study cohort. **Study Design:** Prospective cohort study. **Methods:** The relationships between hearing and stroke risk profiles of 498 individuals were assessed. Pure tone averages (PTA's) were constructed representing different frequency regions of hearing (i.e., PTA4 = 500, 1000, 2000 & 4000 Hz; PTA low = 250 & 500 Hz; PTA mid = 1000 and 2000 Hz; and PTA high = 4000 & 8000 Hz). Gamma regression analyses were performed for each PTA given as a continuous variable with change in stroke risk score. Logistic regression analyses, presented as odds ratios, were performed with hearing loss defined as any PTA > 25 dB hearing level. **Results:** Single unit increases of stroke risk were found to be predictive of increases in all PTA threshold levels in gamma regression analyses. The most robust relationship was observed between stroke risk and the PTA low ( $\beta=1.20$ , C.I.=1.14, 1.26,  $p<0.001$ ), such that for every unit increase in stroke risk, PTA low increases by a factor of 1.20, or roughly 20%. Similar relationships were observed between these variables in logistic regression analyses. For every unit increase in stroke risk, the odds of an increase in PTA low was 1.86 (C.I.=1.47, 2.37,  $p<0.001$ ). **Conclusions:** Our study provides evidence that as stroke risk increases the measure of hearing loss also increases, most notably for the low frequency regions of hearing; the clinical significance of this relationship cannot be estimated given the nature of the cross-sectional study design.

## H120. Position of the Vertical Portion of the Facial Nerve in Adult Cranial Specimens with Big versus Small Mastoids

Norman Wendell Todd, MD MPH, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare and contrast the position of the vertical portion of the facial nerve in adults with large and small mastoids.

**Objectives:** In adult cranial specimens to quantitatively describe with axial CT image through the tip of the manubrium mallei, the distance from the extended annular line to the facial nerve. Though the vertical portion of the facial nerve is more lateral in children less than age five years than in older children and adults, lacking is information about the location in adults with clinically normal ears though large versus small mastoid pneumatization. **Study Design:** Postmortem material analysis. **Methods:** From 41 bequeathed anatomically ear normal cadaveric cranial, high resolution computed tomography images, parallel to the Frankfort plane, were obtained for the five crania with the largest and the five with the smallest mastoids. After Bassim et al. (2014), the extended line through tympanic annulus at the tip of the manubrium mallei was drawn, and its perpendicular distance to the midst of the facial nerve measured. **Results:** The distances medial from the extended annular line to the midst of the facial nerve were quite similar (range 2.4 to 5.1 mm) in big and small mastoid specimens. **Conclusions:** The depth of facial nerve from the tympanic annular line was quite similar in large and small mastoid specimens. Generalizing about the location of the vertical portion of the facial nerve from a single axial image of convenience is highly questionable.

## H121. Cochlear Implantation in a Patient with Osteopetrosis

Andrew G. Tritter, MD, Shreveport, LA; Lindsay M. Olinde, BS, Shreveport, LA; Maura K. Cosetti, MD, Shreveport, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate the feasibility and role of cochlear implantation in cases of osteopetrosis.

**Objectives:** Osteopetrosis is a rare and heterogeneous group of hereditary skeletal dysplasia syndromes that are characterized by osteoclast dysfunction and formation of abnormally dense and sclerotic bone. Manifestations of this condition are common in the temporal bone, particularly with regards to hearing loss, which can be conductive due to ossicular fixation, or sensorineural due to compression of the cochlear nerve within the internal auditory canal. **Study Design:** Case report. **Methods:** We present the case of a 41 year old male with a well documented history of osteopetrosis who presented with longstanding, profound, bilateral sensorineural hearing loss. The patient elected to proceed with cochlear implantation after extensive counseling on possible outcomes. **Results:** Surgery was performed using a transcanal approach with creation of a blind sac in the external auditory canal. The entire medial wall of the mesotympanum was found to be ossified, and the round window was not able to be visualized. The implant electrode was inserted through a cochleostomy, and intracochlear placement was confirmed by intraoperative X-ray, as well as electrical impedance measurements and neural response telemetry. The patient tolerated the procedure well, and was found to have significant improvement in his access to speech sounds with an average aided threshold of 20 dB in his implanted ear at his two month followup visit. **Conclusions:** Our case demonstrates that in patients with severe osteopetrosis, cochlear implan-

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tation is safe and effective, but requires appropriate counseling, intraoperative monitoring and a nontraditional surgical approach.

## H122. Exclusive Endoscopic Transcanal Transpromontorial Approach: Defining the Surgical Corridor

Cameron C. Wick, MD, Dallas, TX; Amy M. Moore, BS, Dallas, TX; Jacob B. Hunter, MD, Dallas, TX;  
Carlos L. Perez, MD, Dallas, TX; Alejandro Rivas, MD, Nashville, TN; Brandon Isaacson, MD, Dallas, TX

**Educational Objective:** At the conclusion of this presentation, the participants should have a better appreciation of the indications, contraindications, and anatomical relationships of the exclusive endoscopic transcanal transpromontorial approach.

**Objectives:** To define the anatomical boundaries and working distances of the exclusive endoscopic transcanal transpromontorial approach (EETTA), an emerging option to manage vestibular schwannomas (VS). **Study Design:** Cadaver study with retrospective case series. **Methods:** The EETTA was performed in 5 fresh adult temporal bone specimens. Computed tomography (CT) scans were obtained and compared with scans from 3 patients who underwent EETTAs for VS. **Results:** The EETTA provided access to the internal auditory canal (IAC) porus with facial nerve preservation in all dissections. The approach requires expansion of the external auditory canal (EAC), transpromontorial tract, and porus acusticus. The height and width of that corridor was measured radiographically at three locations. The lateral measurements were at the osseous EAC. The mid-corridor measurements were taken between by the horizontal facial nerve jugular bulb and the vertical facial nerve petrous carotid artery, respectively. The medial measurements were at the porus. The lateral, mid, and medial corridor mean heights were 11.4 mm (SD 2.0), 11.3 mm (SD 2.4), and 11.8 mm (SD 3.4), while the mean widths were 13.4 mm (SD 1.8), 9.8 mm (1.0), and a 7.9 mm (SD 1.8), respectively. The mean length was 34.5 mm (SD 2.2). Only the mid-corridor width differed between the cadaver and patient dissections (12.4 mm versus 8.5 mm;  $p = 0.028$ ) secondary to the residual bone overlying the carotid. **Conclusions:** The EETTA provides a surgical corridor to the IAC porus for resection of intracanalicular VS. Precise identification of surgical landmarks is necessary to preserve neurovascular structures.

## H123. Application of Augmented Reality for Preoperative Planning in Lateral Skull Base Surgery

Kevin Wong, BA, Boston, MA; Brian A. Xavier, BA, Boston, MA; Vivek V. Kanumuri, MD, Boston, MA;  
Maria J. Duarte, BS, Boston, MA; Elliott D. Kozin, MD, Boston, MA; Daniel J. Lee, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the capabilities of current software for converting high resolution medical scans into three dimensional models. Participants will also understand the steps needed to display three dimensional models in augmented reality for use in preoperative planning.

**Objectives:** Recent advances in biomedical software allow the conversion of medical imaging into precise three dimensional (3D) anatomic models. Complex temporal bone and lateral skull base anatomy represent ideal applications with the potential for surgeons to view and manipulate preoperative imaging for operative planning when combined with augmented reality (AR) technology. Herein, we describe our approach to creating a high resolution AR temporal bone. **Study Design:** Virtual anatomical and radiological study. **Methods:** Computed tomography (CT) temporal bone series (0.6mm thickness) in a patient with superior canal dehiscence (SCD) were volume rendered into a 3D model using AMIRA 3D software (Hillsboro, OR). The temporal bone model was incorporated into a 3D game environment (Unity 3D game engine, San Francisco, CA) and projected onto an augmented reality field using Vuforia software development kit (Needham, MA). Data was uploaded onto a smartphone fitted into Google Cardboard viewer (Mountain View, CA). **Results:** Construction of a high resolution temporal bone model was achieved from preoperative scans in a patient with SCD. The surgeon enters an AR environment, views the 3D projection of the temporal bone, and has the ability to zoom, rotate, and clip through layers of the temporal bone in all dimensions and with the viewing resolution of a temporal bone CT. As the AR is based on the optical inputs of a smartphone, the model is highly mobile. **Conclusions:** We successfully exported a 3D model derived from high resolution CT temporal bone scans onto smartphone based augmented reality. This provides a portable tool for skull base surgeons to visualize patient anatomy for preoperative planning.

## H124. Pediatric Auditory Brainstem Implant Surgery: Effect of Anesthesia on Electrically Evoked Auditory Brainstem Responses

Kevin Wong, BA, Boston, MA; Ruwan Kiringoda, MD, Boston, MA; Samuel R. Barber, MS, Boston, MA;  
Barbara S. Herrmann, PhD, Boston, MA; Daniel J. Lee, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants recognize an appropriate anesthetic regimen that does not interfere with electrically evoked auditory brainstem responses (EABRs).

**Objectives:** Intraoperative EABRs are routinely performed under anesthesia to guide and confirm electrode placement during auditory brainstem implant (ABI) surgery. Scant data exists regarding whether particular anesthetic agents interfere with EABRs, and no study has investigated this effect in children. At our institution, ABIs are performed in deaf infants under an FDA device exemption. The purpose of our study was to determine whether the anesthetic agents used

intraoperatively during ABI placement and before sedated device activation impact EABR waveform morphology. **Study Design:** Case series. **Methods:** All children who underwent ABI surgery using the Nucleus ABI 24M or ABI541 devices from 2013 to 2016 were included. Five subjects underwent 7 ABI surgeries (5 primary, 2 revisions) and 7 sedated activation procedures. Anesthetic agent(s) used intraoperatively and before sedated device activations were recorded and compared to respective EABRs (n=14). Patient demographics and operative events were reviewed. EABR waveform morphologies were reviewed and compared to baseline readings. **Results:** Mean age ( $\pm$ SD) at primary ABI surgery was 20.5 ( $\pm$ 6.7) months. Etiology of deafness was cochlear/cochlear nerve hypoplasia or aplasia. Inhaled sevoflurane induction and propofol maintenance were utilized for all 7 intraoperative recordings. Pre-activation recordings were performed between 6 to 15 weeks postoperatively. Intramuscular dexmedetomidine was used in 6 sedated activations; two activations used sevoflurane and propofol (one converted from dexmedetomidine). EABR waveform morphology was similar across all anesthetic regimens for intraoperative and postoperative recordings. **Conclusions:** Sevoflurane, propofol, and dexmedetomidine are viable anesthesia options that do not affect EABR waveform morphologies based on preliminary findings in pediatric ABI patients.

## **PEDIATRIC OTOLARYNGOLOGY**

### **H125. An Analysis of Risk Factors in Unilateral versus Bilateral Hearing Loss Identified through Universal Newborn Hearing Screening**

Eric N. Appelbaum, MD, Richmond, VA; Michael F. Armstrong, BS, Richmond, VA; Derek A. Chapman, PhD, Richmond, VA; Elizabeth Musser, PhD, Richmond, VA; Kelley M. Dodson, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate understanding of the relationship between JCIH risk factors and unilateral and bilateral hearing loss.

**Objectives:** To compare the incidence of Joint Committee on Infant Hearing (JCIH) risk factors in children with unilateral hearing loss (UHL) to bilateral hearing loss (BHL). **Study Design:** Analysis of population based data. **Methods:** Retrospective review of children with confirmed hearing loss identified through universal newborn hearing screening (UNHS) in our state from 2010-2014. **Results:** Over the 5 year study period, 1,075 children (0.21% of all births) developed a confirmed hearing loss, with 544 children (51%) having at least one JCIH risk factor. Overall, 18% of children with confirmed hearing loss initially passed UNHS. Of all children with risk factors, 226 (42%) demonstrated UHL and 318 (58%) had BHL. The most common risk factors for UHL were neonatal indicators (69%), craniofacial anomalies (30%), stigmata of HL syndromes and family history (14% each). The most common risk factors in BHL were neonatal indicators (49%), family history (27%), stigmata of HL syndromes (19%), and craniofacial anomalies (16%). Children with the risk factor of positive family history were more likely to have BHL, while those with craniofacial anomalies were more likely to have UHL ( $p < 0.001$ ). **Conclusions:** Over the 5 year study period, 1,075 children (0.21% of all births) developed a confirmed hearing loss, with 544 children (51%) having at least one JCIH risk factor. Overall, 18% of children with confirmed hearing loss initially passed UNHS. Of all children with risk factors, 226 (42%) demonstrated UHL and 318 (58%) had BHL. The most common risk factors for UHL were neonatal indicators (69%), craniofacial anomalies (30%), stigmata of HL syndromes and family history (14% each). The most common risk factors in BHL were neonatal indicators (49%), family history (27%), stigmata of HL syndromes (19%), and craniofacial anomalies (16%). Children with the risk factor of positive family history were more likely to have BHL, while those with craniofacial anomalies were more likely to have UHL ( $p < 0.001$ ).

### **H126. Case Report: Duodenal Ulcer, an Unusual Presentation of Pediatric Post-Tonsillectomy Hematemesis**

Carolyn A. Brydon, MD, Albany, NY; Kristina Piastro, MD, Albany, NY; John P. Gavin, MD, Albany, NY; Nikki Allmendinger, MD, Albany, NY; Walter E. Edge, MD, Albany, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe an alternative source of post-tonsillectomy hematemesis and reminded to consider stress ulcer prophylaxis for tonsillectomy patients at high risk.

**Objectives:** Post-tonsillectomy hemorrhage has been reported with rates of 2-10% and frequently presents as hematemesis. This is the first reported case of pediatric post-tonsillectomy hematemesis caused by duodenal ulcers. **Study Design:** Case report. **Methods:** The case involves a six year old male with autism spectrum disorder who underwent an adenotonsillectomy for chronic adenotonsillitis and adenotonsillar hypertrophy. After a prolonged postoperative course of dehydration and decreased oral intake treated with intravenous hydration and ketorolac, the patient presented with hematemesis on postoperative day twelve that had resolved by the time of presentation. **Results:** He was admitted for observation and had a repeat episode of hematemesis later that evening. He was taken emergently to the operating room for control of presumed tonsillar fossa hemorrhage. Upon examination, the tonsillar fossa was well healed with no source of bleeding. He subsequently underwent an esophagogastroduodenoscopy where three actively bleeding duodenal ulcers were identified. The bleeding was controlled with local epinephrine injection. He was transferred to the pediatric ICU, treated with proton pump inhibitors and blood transfusions and ultimately had no recurrence of bleeding. **Conclusions:** This case highlights the importance of necessary oral hydration/nutrition postoperatively and of considering alternate sources of post-tonsillectomy hematemesis when no source of bleeding is found in the oropharynx. Our patient had numerous risk factors for gastrointestinal hemorrhage including oral aversion to medications, prolonged periods of



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decreased oral intake, and multiple doses of ketorolac. In post-tonsillectomy patients with multiple risk factors as above we now advocate for stress ulcer prophylaxis.

## H127. The Role of the Otolaryngologist in the Zika Epidemic

Si Chen, MD, Miami, FL; Ramzi T. Younis, MD, Miami, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand swallow dysfunction and hearing loss associated with congenital Zika syndrome.

**Objectives:** The otolaryngologic symptoms associated with congenital Zika syndrome (CZS) is not well described. We aimed to review the literature and evaluate the swallow dysfunction and hearing loss in infants with congenital Zika syndrome. **Study Design:** Retrospective and prospective case series. **Methods:** We reviewed the literature describing congenital Zika syndrome (CZS). In addition, charts were analyzed for all infants with laboratory tests or clinical suspicion for CZS at a tertiary children's hospital from January to October 2016. Main outcome measures were feeding milestone, swallow function, and hearing results. Feeding milestones included first oral feeding, full oral feeding, feeding tube status at the time of discharge. Hearing results were otoacoustic emission and auditory brainstem tests. **Results:** Recent literature showed that CZS infants are at increased risk of swallow disorders due to brainstem and cortical dysfunction. The reported rate of hearing loss in CZS infants is 7-10%. At our institution, three infants were diagnosed with CZS according World Health Organization case definition. All three have delayed feeding milestones and feeding difficulties, including poor sustained suck and oromotor coordination, frequent vomiting after feed, or irritation with oral feed. All three have passed newborn hearing screening tests but pending followup hearing evaluation. **Conclusions:** Swallow dysfunction is a major concern in CZS infants. The incidence, mechanism, and natural course of hearing loss associated with CZS remain unknown. The role of the otolaryngologist in the current Zika epidemic is to advocate for early swallow and hearing evaluation, to facilitate long term followup and rehabilitation, and to study the otolaryngologic pathology associated with CZS.

## H128. Comprehensive Pediatric Vestibular Testing: Identifying Factors Predictive of Successful Testing

Peter J. Ciolek, MD, Cleveland, OH; Elise M. Kang, BA, Cleveland, OH; Erika A. Woodson, MD, Cleveland, OH; Samantha Anne, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify factors predictive of successful pediatric vestibular testing.

**Objectives:** Define rates of successful completion and identify factors predictive of cooperation with vestibular testing in pediatric patients. **Study Design:** Retrospective chart review. **Methods:** Retrospective review of vestibular battery tests performed on patients less than 18 years old, at a tertiary care center from 2004-2015. Vestibular battery was composed of 12 components. Testing success was defined as completion of all attempted components. Testing was considered incomplete if patient didn't cooperate with 1 or more attempted components. Testing was performed following a set algorithm and interpreted by single reviewer. **Results:** 188 patients that underwent testing were identified. Patients unable to complete the full battery could still complete an average of 7.9 components. When grouped by age, there was a statistical difference in ability to complete testing ( $p < 0.0001$ ). 17/30 (56.6%) of patients less than 10 years old, 60/70 (85.7%) ages 10-15, and 84/88 (95.5%) more than 15 years completed full testing. Patients that were uncooperative were significantly younger than those that were cooperative (10.7 years vs. 14.5,  $p < 0.001$ ). Diathermal caloric testing was the most common component that was unable to be completed (12/188, 6.7%). Failure to cooperate during the vestibular battery limited full interpretation of results in 8 of 27 (29.6%) encounters. **Conclusions:** Vestibular testing can be successfully completed in pediatric patients; however certain components have limited tolerability in younger children. In younger patients, an abbreviated battery omitting poorly tolerated components can be adopted with higher likelihood of attaining useful diagnostic information.

## H129. Peritonsillar Abscesses in Children

Christine M. Clark, BA, Hershey, PA; Michele M. Carr, DDS MD PhD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the morbidity after peritonsillar abscess drainage in children.

**Objectives:** To describe morbidity after peritonsillar abscess (PTA) drainage in children. **Study Design:** Multicenter retrospective cohort study of children undergoing PTA drainage in the 2012-2014 ACS NSQIP Pediatric database. **Methods:** Current procedural terminology (CPT) code 42700 was used to identify eligible children. Targeted variables included patient demographics and 30 day postoperative events (reoperation, readmission, and complications). Multivariate logistic regression was performed to identify predictive factors for major adverse events. **Results:** 314 children ages 23 days to 18 years were identified. 52.5% were female, and the average age was 10.7 years. 82.5% were admitted through an ER, and 81.5% were inpatients. 90.8% had 1 day or less in hospital prior to surgery. Average length of stay was 2 days. Six patients required reoperation and seven were readmitted for related reasons. 41.6% were underweight, and 21.4% were overweight or obese; the only significant difference based on BMI was anesthesia time. Children younger than 10



years were compared with those over age 10, and no significant differences were encountered by age for the targeted variables. 41.7% were diagnosed with sepsis syndrome or SIRS prior to surgery. Patients with sepsis were significantly more likely to require longer hospital stays, readmissions, and reoperations. **Conclusions:** A subset of patients with PTA met criteria for sepsis or SIRS and required additional care and interventions in the postoperative period.

## H130. Salivary Cotinine Levels in Children with Otolaryngological Disorders

Christine M. Clark, BA, Hershey, PA; Jillian N. Printz, BS, Hershey, PA; Lauren E. Stahl, BS, Hershey, PA; Brett E. Phillips, PhD, Hershey, PA; Michele M. Carr, DDS MD PhD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate knowledge of secondhand smoke exposure as a potential risk factor for tonsillectomy and/or ventilation tube insertion and apply this knowledge when counseling patients and their parents and in caring for patients perioperatively.

**Objectives:** To determine if salivary cotinine is elevated more often or to a higher degree in children meeting criteria for tonsillectomy or ventilation tube insertion. **Study Design:** Prospective cohort study. **Methods:** Saliva samples were obtained from 3 groups of children. Salivary cotinine levels were measured. Group 1 served as healthy controls. Group 2 consisted of subjects with recurrent otitis media meeting ventilation tube criteria. Group 3 consisted of patients with recurrent tonsillitis or obstructive sleep apnea meeting tonsillectomy criteria. Environmental tobacco smoke (ETS) exposure was defined as salivary cotinine concentrations of 1.0 ng/mL or above. Demographic data, smoke exposure history, and comorbidities were also determined. **Results:** 330 patients were included, with 112 in group 1, 111 in group 2, and 108 in group 3. No differences were encountered for smoke exposure by history or smoker's identity, salivary cotinine level, or frequency of positive cotinine results. 42.6% of group 1 had positive salivary cotinine compared to 51.8% of group 2 and 47.7% of group 3. Group 1 had a mean salivary cotinine level of 2.42 ng/mL compared to 2.54 ng/mL in Group 2 and 2.60 ng/mL in group 3. The frequency of positive cotinine levels was higher than expected based on parental history. Among the subjects with positive cotinine levels, 93 had no ETS exposure, and 64 had ETS exposure by history. **Conclusions:** Approximately 50% of children who undergo tonsillectomy and ventilation tube insertion have objective evidence of ETS exposure. Parental history underestimates passive smoke exposure, which can impact perioperative care.

## H131. Type 1 Laryngeal Cleft Repair through a Novel Transoral, Non-Endoscopic Approach

Austin N. DeHart, MD, Richmond, VA; Rajanya S. Petersson, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a novel surgical technique for the repair of type 1 laryngeal cleft.

**Objectives:** 1) Summarize indications and methods of repair for type 1 laryngeal clefts (T1LC); 2) describe a novel transoral surgical technique for repair of T1LC; and 3) compare this method of repair with those previously described. **Study Design:** Case report and literature review. **Methods:** PubMed literature review of T1LC repair techniques and description of novel surgical technique. **Results:** A 19 month old male was diagnosed with T1LC on direct laryngoscopy. During adenoidectomy under the same anesthetic, excellent visualization of the posterior supraglottis and interarytenoid space was noted, with the gag pushing the oral RAE endotracheal tube forward. As it was difficult to maintain an adequate plane of anesthesia under spontaneous ventilation, the T1LC was repaired transorally via exposure through the McIvor mouth gag. Electrocautery was used to create appropriate raw surfaces within the cleft margins, and sutures were placed using a long handled needle driver. This resulted in appropriate repair. **Conclusions:** Type 1 laryngeal cleft repair can be difficult in patients with poor pulmonary status who cannot tolerate laryngoscopy for an adequate time while maintaining spontaneous ventilation. Intubation can make visualization of the posterior supraglottis and interarytenoid space challenging during an endoscopic repair. As an alternative technique, if the anatomy is favorable, a transoral approach via suspension with a McIvor mouth gag can be utilized to perform the repair while the patient is intubated. In some patients, this provides excellent visualization and a larger working field with equipment readily available to any otolaryngologist. To our knowledge, this approach has not been previously described.

## H132. Modified Minerva Cervical Thoracic Orthosis for the Postoperative Management of Cricotracheal Resection: A Single Institutional Review

Jennifer F. Ha, MBBS FRACS, Ann Arbor, MI; Timothy Baerg, BS, Ann Arbor, MI; Megan Christ, BS, Ann Arbor, MI; Glenn E. Green, MD, Ann Arbor, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate the understanding of the use of a modified Minerva cervical thoracic orthosis as an adjunct in the postoperative management of children following cricotracheal or tracheal resection. This knowledge will allow them to explain and discuss its use with family, as well as the risks and benefits.

**Objectives:** The most devastating complication of cricotracheal resection (CTR) is anastomotic dehiscence. Postoperative management in our institution included the use of a modified Minerva cervical thoracic orthosis (MMCTO). To date there has been no analysis of the risks and benefits of the brace's use following CTR. We aim to analyze this with our

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retrospective study. **Study Design:** Retrospective study. **Methods:** A search with the keywords cricotracheal resection and laryngotracheal reconstruction was performed in Electronic Medical Record Search Engine to identify the patients retrospectively. The statistical package for social sciences was used. **Results:** There were 18 males and 13 females with a median age of 3.5 years. Almost 2/3 had release performed. Postoperatively, 20 had Grillo stitch and MMCTO for a mean of 7 days. Most (n=20) had no complications. The most common complications were agitation due to the discomfort of the brace and skin irritation or break down. The single most devastating complication was a stroke. Our MMCTO's design allowed for better head and neck control, wide range and ease of adjustability. Majority of the patients had no or minor complications with its short term. **Conclusions:** Our novel modification of the brace is a useful adjunct in the postoperative management. However, it is important to be aware of these complications in order to prevent them.

## H133. Consulting Dr. Google: Quality of Online Resources about Tympanostomy Tube Placement

Vandra C. Harris, MD, Baltimore, MD; Emily F. Boss, MD MPH, Baltimore, MD; Paul Hong, MD, Halifax, NS Canada; Anne R. Links, MS MHS, Baltimore, MD; Desi P. Schoo, MD, Baltimore, MD; David E. Tunkel, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss evaluation of online resources for patient education materials.

**Objectives:** Tympanostomy tube (TT) placement is the most common pediatric surgical procedure. Usefulness of online information about TT placement for family centered decision making and understanding is unknown. We evaluated quality of internet sources describing TT placement. **Study Design:** Descriptive study. **Methods:** We performed a Google search for terms related to TT. We defined quality using scaled readability measures, (Flesch Reading Ease and Flesch-Kincaid Grade-Level), understandability and actionability, (Patient Education Materials Assessment Tool), and shared decision making centrality, (Center for Medicare and Medicaid Services informed consent guidelines). We assessed clinical practice guidelines (CPG) compatibility. Three reviewers coded each measure. Fleiss K interrater reliability analysis was performed. **Results:** Ten most frequented websites were analyzed. 1/10 complied with National Institute of Health guidelines for health literacy (mean 10th grade level reading, median 9th, range 6-15th). Most sites were understandable, (mean understandability score 93.5%, range 81.3-100%). Most had low actionability scores (7/10, median 60%, mean 54%, range 0-100). SDM centrality was high (mean 5, range 4-6), but most sites failed to list alternative treatment options. CPG compatibility was high (mean 3.4, range 1-4) with inconsistent recommendations about tube duration, followup, and water precautions. There was inter-rater agreement (K=5). **Conclusions:** Internet resources about TT placement vary in quality, where most sites are written above recommended grade levels, no sites are adequate at meeting all SDM principles, and content corresponding to CPG recommendations were inconsistent. As healthcare emphasizes patient/family centered outcomes and shared decisions making, standardization of content and improved usability of education materials for common elective surgery in children, like TT placement, is a public health priority.

## H134. Pediatric Outpatient Tonsillectomy: Safe in Children under Three

Claire M. Lawlor, MD, New Orleans, LA; C. Alexander Riley, MD, New Orleans, LA; J. Lindhe Guarisco, MD, New Orleans, LA; Kimsey H. Rodriguez, MD, New Orleans, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain that pediatric outpatient tonsillectomy complications are not related to the age or weight of the child.

**Objectives:** To determine if there is a statistically significant relationship between tonsillectomy complication rates and the age and/or weight of children at the time of surgery. **Study Design:** Multi-institutional retrospective case series. **Methods:** We reviewed 2139 consecutive children aged 12-72 months that underwent tonsillectomy at one tertiary care academic center and five acute care centers between 2005 and 2015. Children with moderate/severe developmental delay, bleeding disorders, and other major medical comorbidities were excluded. Complications included respiratory distress, dehydration requiring IV fluids, and bleeding. **Results:** Of the 2139 patients, 1960 met inclusion criteria. The average age at surgery was  $46.5 \pm 14.2$  months. The average weight at surgery was  $17.5 \pm 5.1$  kg. For those children meeting criteria, 1382 were over 36 months and 480 were under 36 months of age. 97 children (5%) had a postoperative complication: hemorrhage (54), dehydration (10), respiratory distress (32), and other (1). Of those patients that had complications, 65 were over 36 months and 32 were under 36 months. There was no significant difference in the incidence of complications between children aged 0-35 months and 36-71 months (chi-square analysis, Fisher's exact test,  $p=0.1234$ , RR= 0.7182, CI 0.4761-1.0861). When each complication (bleeding, dehydration requiring IV fluids, and bleeding) was analyzed by age <36 months or >36 months individually, again there was no statistically significant difference in complication rates ( $p=0.1185$ ). The rate of complication was then analyzed by weight <10kg and >10kg; again, there was no statistical significance in rate of complications in each group (chi-square analysis, Fisher's exact test,  $p=0.2376$ , RR= 1.8823, CI 0.7017-5.0492). Complications were not related to weight on a logistic regression analysis. Power analysis confirmed our sample size was large enough to detect a statistical significance in the null hypothesis (Pearson chi-squared test actual power 0.8, N=1864). **Conclusions:** There is no significant difference in outpatient tonsillectomy complication rates for children <3 years as compared to children >3 years in our cohort. Weight does not appear to be related to complication rates.

### H135. Efficacy of a Decision Aid Prototype for Treatment of Pediatric Sleep Disordered Breathing: A Pilot Study

Jeremy D. Meier, MD, Salt Lake City, UT; Jill M. Chorney, PhD, Halifax, NS Canada; Samuel D. Fox, BS, Salt Lake City, UT; Paul S. Hong, MD, Halifax, NS Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the use of a decision aid prototype for pediatric sleep disordered breathing on impacting parents' level of decisional conflict and perception of involvement in the shared decision making process.

**Objectives:** Examine the usability and efficacy of a decision aid prototype (DA) for pediatric sleep disordered breathing (SDB) on parents' decisional conflict and involvement in shared decision making. **Study Design:** Multicenter randomized pilot trial. **Methods:** Ninety-nine parents of children (< 6 years) undergoing consultation for adenotonsillectomy for SDB were prospectively enrolled and randomly assigned to receive the DA or follow standard procedures. The DA was developed using the International Patient Decision Aids Standards guideline. Consultations were video recorded and coded with the OPTION instrument. Following the consultation parents completed the Decisional Conflict Scale (DCS) and Shared Decision Making Questionnaire (SDM-Q-9) while otolaryngologists completed the physician version (SDM-Q-Doc). A subset of parents and surgeons were interviewed to assess the DA's usability. **Results:** A significantly negative correlation between DCS and SDM-Q-9 was observed ( $p < 0.001$ ). In parents receiving the DA, the mean total OPTION score was 13.83 out of 40 (SD 5.24), compared to 11.95 (SD 5.21) in those not receiving the DA ( $p = 0.11$ ). Similarly, the DCS ( $p = 0.775$ ), SDM-Q-9 ( $p = 0.845$ ), and SDM-Q-Doc ( $p = 0.369$ ) scores were not impacted by using the DA. Interviews showed that parents found the DA helpful but wanted more time to read and contemplate the information. Both parents and surgeons indicated that direction on how to use the DA would be beneficial. **Conclusions:** There were no significant differences in decisional conflict or SDM when using a DA for pediatric OSA. However, the need for improvement in SDM techniques was suggested. Studies training otolaryngologists on effective SDM techniques and how to appropriately utilize decision aids may improve SDM for pediatric OSA.

### H136. Congenital Nasal Obstruction in Infants

Vijay A. Patel, MD, Hershey, PA; Michele M. Carr, MD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the various etiologies of congenital nasal obstruction and management paradigm of symptomatic infants.

**Objectives:** To identify etiologies of congenital nasal obstruction and describe clinical practice patterns in the evaluation, diagnosis, and treatment of symptomatic infants. **Study Design:** Retrospective analysis. **Methods:** An electronic chart review from 1/1/2006-10/1/2016 for all patients with a diagnosis of nasal obstruction within the first six months of life using ICD-9 and 10 codes 478.19 and J34.89. **Results:** A total of 35 patients were found and evaluated by the division of otolaryngology for this chief complaint. 41.18% of neonates were born premature and 36.36% were admitted to the NICU at birth, with a female-to-male ratio of 1:1.50. Presenting signs and symptoms included: stertor (42.86%), cyanosis (28.57%), stridor (22.86%), retractions (20.00%), rhinorrhea (20.00%), apnea (11.43%), and epistaxis (11.43%). 45.71% of patients received ancillary radiographic imaging (CT or MRI). Diagnoses observed included: midnasal stenosis (37.14%), pyriform aperture stenosis (20.00%), choanal stenosis (11.43%), dacryocystocele (5.71%), microrhinia (5.71%), septal deviation (5.71%), nasal vestibular stenosis (2.86%), nasopharyngeal reflux (2.86%), nasopharyngeal teratoma (2.86%), neonatal rhinitis (2.86%), and pharyngeal wall collapse (2.86%). 74.29% of patients were noted to have bilateral nasal obstruction. 40.00% of infants were also found to have an associated ear, nose, and throat anomaly. 17.14% of patients received surgical intervention. The mean time to resolution for all patients was 240.11 days. **Conclusions:** Congenital nasal obstruction has a broad differential diagnosis; the timing, onset, and laterality of symptoms can provide insights into the source of upper airway compromise. Most infants improve through conservative management (i.e., suctioning, humidification) and medical therapies (i.e., intranasal drops, nasal sprays).

### H137. Pediatric Tracheostomy Knowledge among Pediatric Residents

Vijay A. Patel, MD, Hershey, PA; Robert S. Saadi, MD, Hershey, PA; Hetal H. Patel, MD, Hershey, PA; Michele M. Carr, MD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the knowledge base of pediatric tracheostomy among pediatric residents.

**Objectives:** The purpose of this study was to assess pediatric tracheostomy knowledge among pediatric residents via an electronic questionnaire. **Study Design:** Electronic survey. **Methods:** An anonymous questionnaire was submitted via e-mail to resident delegates of the American Academy of Pediatrics from March 1, 2016, to May 31, 2016. Participants were asked to complete a seventeen question survey which determined a resident's competency in airway anatomy, surgical indications, tracheostomy maintenance, and response to emergency scenarios. **Results:** A total of 33 residents completed the electronic questionnaire. There were no differences in competency between PGY levels; 33.3% were PGY-1, 54.5% were PGY-2, 9.1% were PGY-3, and 3.0% were PGY-4. 66.7% of respondents could identify how tightly to affix



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tracheostomy ties; however, only 12.1% understood the purpose of stay sutures. 72.7% knew that they could bag-mask ventilate a child with a dislodged tracheotomy tube when there was no known upper airway obstruction, 60.6% could identify the function of an obturator, 60.6% could identify that a chest x-ray was appropriate ancillary study for a child with postoperative chest crepitus, and 51.5% identified the indications for a Passy-Muir valve. Finally, 87.8% could not identify when a cuff should be inflated and 84.8% did not identify stomal bleeding as an emergency. **Conclusions:** Pediatric residents were found to have knowledge gaps in the perioperative management of pediatric tracheostomies. Greater clinical exposure through formal didactics and training provided by otolaryngologists could provide practical educational experiences in understanding the care of a surgical airway.

## H138. Morbidity of Thyroglossal Duct Cyst Excision in Children under Two Years: Analysis of NSQIP 30 Day Outcomes

Christopher D. Pool, MD, Hershey, PA; Shivani Shah, MD, Hershey, PA; Michelle Carr, DDS MD PhD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify risk factors, perioperative morbidity, and feasibility of thyroglossal duct cyst (TGDC) removal in children less than two years old.

**Objectives:** To identify risk factors, perioperative morbidity, and feasibility of thyroglossal duct cyst (TGDC) removal in children less than two years old. **Study Design:** Retrospective cohort study of the American College of Surgeons National Surgery Quality Improvement Program - Pediatric (NSQIP-P) database. **Methods:** Pediatric TGDC removal was identified using current procedural terminology (CPT Code 60280). Demographic information was collected and patients were categorized by age (>2 year and <2 year). Outcomes measured included 30 day morbidity, readmission, and reoperation. Event rates were determined and compared with non-parametric statistics and multivariate logistic regression. **Results:** 367 cases of pediatric TGDC removal were reported via NSQIP of which 61 (16.6%) were under the age of two at the time of operation. 47.3% were female. There was no significant difference ( $p>0.05$ ) in ASA classification, asthma, bleeding disorders, gender, or operative time between patients older than 2 years and those younger than 2. Superficial surgical site infection was the most common complication (2.7%). Eight patients (2.2%) required readmission and nine (2.4%) required reoperation for related reasons. No difference was noted between the age groups with regard to superficial wound infection, reoperations, readmissions, or postoperative length of stay. **Conclusions:** Although the timing of TGDC removal remains controversial, TGDC removal in patients less than 2 years of age appears to be safe, with complication, reoperation, and readmission rates similar to children older than 2 years of age.

## H139. Decisional Regret Following Ventilation Tube Insertion

Jillian A. Printz, BS, Hershey, PA; Michele M. Carr, DDS MD PhD, Hershey, PA (Presenter); Shreya Thakur, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss factors related to parental decisional regret following ventilation tube insertion in their children.

**Objectives:** The purpose of this study was to see if parental regret following ventilation tube (VT) insertion was related to non-resolution of ear infections and thus ongoing otolaryngological care and repeated VT insertions. **Study Design:** Survey, chart review. **Methods:** This study involved all consenting consecutive guardians presenting in an otolaryngology clinic with children who had VT in place. We used a validated decisional regret scale and chart review. **Results:** 210 respondents were included. 83.3% were mothers. The children involved had a mean age of 5.2 years and 63.3% were male. Mean number of years since first VT insertion was 1.12 with a range of 0.04-9.28 years. 70.5% had a regret score of 0, with mean score 6.98 (95% CI 5.11-8.85). Scores were significantly higher for parents who presented their child on the day of the survey with an ear complaint such as otorrhea (15.52, 95% CI 7.67-23.37,  $p=0.004$ ). Parents whose children had a history of reflux had significantly lower regret scores than parents whose children did not have a reflux history (3.33 versus 7.89,  $p=0.007$ ). **Conclusions:** Transient factors may influence decisional regret. For parents whose children receive VT, regret is not related to prolonged specialized ear care and need for VT reinsertion.

## H140. Examining Outcomes and Costs in the Management of Pediatric Lateral Neck Infections

Nicholas A. Quinn, MD, Salt Lake City, UT; Jeremy D. Meier, MD, Salt Lake City, UT; Laura N. Hodo, MD, Salt Lake City, UT; Jared A. Olson, PharmD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the cost burden and common outcomes of pediatric lateral neck infections.

**Objectives:** Review outcomes and costs for pediatric patients hospitalized with deep lateral neck infections. **Study Design:** Retrospective case series. **Methods:** Patients were reviewed to measure outcomes and determine hospital costs for children 18 years old or younger treated for lateral neck infections between January 2014 and May 2016. Demographics, length of stay, type and number of imaging studies obtained, number of procedures, hospital readmission, and hospital cost were determined. **Results:** The study screened 307 patients; 167 of these met inclusion criteria. Inpatient



admission occurred in 100 patients (60%) and discharge from the emergency department in 67 patients (40%). For those patients admitted, the median length of stay was 63 hours (IQR: 38;93). A total of 28 (17%) patients did not receive imaging. For those patients who received imaging, 75 (54%) received ultrasound on initial evaluation and 64 (46%) underwent CT as the primary imaging modality. For those patients receiving imaging, drainage was performed in 52 patients (37%), additional imaging was performed in 36 patients (26%), and readmission was required in 9 patients (6%). A secondary retropharyngeal abscess or infection was encountered in 11 patients (8%). The median cost per hospitalized patient was \$5,800 (IQR: 3,500;8,600) and was \$519 (IQR:210;632) for patients discharged from the ED. **Conclusions:** Lateral neck infections are a common cause for hospital admissions in the pediatric population and this study demonstrates a significant financial impact on the healthcare system. Identifying ways to reduce unnecessary costs and improve efficiency would improve the value of care for these patients.

## H141. Invasive Fungal Pharyngitis in a Pediatric Bone Marrow Transplant Patient

Andrew J. Redmann, MD, Cincinnati, OH; Charles M. Myer IV, MD, Cincinnati, OH (Presenter);  
Lara A. Danziger-Isakov, MD, Cincinnati, OH; Pooja Khandelwal, MD, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) describe atypical presentation of invasive fungal disease; and 2) discuss treatment for invasive fungal pharyngitis.

**Objectives:** 1) Describe atypical presentation of invasive fungal disease; and 2) discuss treatment for invasive fungal pharyngitis. **Study Design:** Case report. **Methods:** Review of the first successfully treated pediatric case of invasive fungal disease of the pharynx. **Results:** A 10 year old female with severe aplastic anemia developed throat pain 14 days after matched sibling bone marrow transplant, and CT neck showed a rim enhancing parapharyngeal mass. The patient was taken to the OR for evaluation and I&D of peritonsillar abscess, without return of purulence. Cultures grew *Rhizopus arrhizus* on postoperative day 2 and pathology confirmed angioinvasion. Amphotericin B and posaconazole were initiated, and serial extensive debridement and tracheotomy was performed. Intraoperatively, extensive necrosis of the palate, tongue base, and pharyngeal wall was observed, without invasion of the prevertebral fascia. This patient had achieved successful neutrophil engraftment and all additional immunosuppressive medications were discontinued to allow for faster immune recovery. After a 4.5 month ICU and 2 month inpatient floor course of intravenous antifungal therapy and repeated negative biopsies, the patient was discharged without evidence of disease. **Conclusions:** Invasive fungal disease is most common in the sinonasal region, but alternative sites of disease must be considered in immunocompromised patients. A multidisciplinary team approach and immediate aggressive treatment may be lifesaving in this population.

## H142. Outcome Predictors for Cervical Abscesses in the Pediatric Population

Christopher A. Roberts, BS, Hershey, PA; Erik B. Lehman, MS, Hershey, PA; Michele M. Carr, DDS MD PhD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss factors that influence outcomes of cervical abscesses in the pediatric population.

**Objectives:** To identify factors predictive of outcomes in pediatric cervical abscesses. **Study Design:** Pediatric patients with cervical abscesses were identified based on CPT codes in the American College of Surgeons National Surgical Quality Improvement Program from 2012-2014. **Methods:** Patients were compared based on demographics, history of asthma, recent steroid use, abscess signs/symptoms, management by an otolaryngologist or non-otolaryngologist, and outcomes. Hospital length of stay and time to surgical drainage were analyzed using quantile regression. Readmission and reoperation related to cervical abscess were analyzed using linear regression. **Results:** 1,443 cases of pediatric cervical abscesses were identified. Elevated preoperative WBC count was related to prolonged hospitalization ( $P = 0.0008$ ) and decreased time to surgical drainage ( $P = 0.0009$ ). Patients were monitored longer prior to surgery when managed by an otolaryngologist (1.2 days vs 0.61 days,  $P < 0.0001$ ), and these patients spent more time in the hospital (3.7 days vs 2.3 days,  $P < 0.0001$ ). Other factors related to prolonged hospitalization were history of asthma ( $P < 0.0001$ ), ASA classification ( $P < 0.0001$ ), and abscess location ( $P < 0.0001$ ). Age correlated with time to surgical intervention ( $P < 0.0001$ ). There was no statistical significance between any of the analyzed factors and readmission or reoperation related to cervical abscesses. **Conclusions:** Patients who spend more time in the hospital prior to surgical intervention have similar outcomes to patients who received surgical intervention earlier. Earlier intervention is associated with decreased length of hospitalization in this patient population.

## H143. Conservative Management of a Trans-Spatial Infantile Subglottic Hemangioma

Marissa A. Schwartz, MD, Farmington, CT; Amy L. Hughes, MD, Boston, MA; Tulio A. Valdez, MD MSc, Hartford, CT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the diagnosis and medical treatment of infantile hemangiomas affecting the airway.

**Objectives:** The purpose of this presentation is to discuss the role of propranolol in treatment of a severe infantile heman-

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gioma affecting the airway. **Study Design:** Case report and literature review. **Methods:** This is a case report describing a five week old patient with subglottic hemangioma presenting with stridor and respiratory distress. **Results:** The diagnosis was made based on history, exam, direct laryngoscopy, and imaging studies. Direct laryngoscopy demonstrated approximately 90% subglottic stenosis, prompting intubation for airway management. Imaging demonstrated large vascular mass extending from skull base to superior mediastinum. The patient responded well to standard therapy with propranolol and is now asymptomatic. **Conclusions:** Infantile hemangiomas are the most common benign tumor of childhood. While the prevalence of infantile hemangiomas may be as high as 10%, airway hemangiomas are significantly less common. Subglottic hemangioma may be suspected when patients manifest cutaneous hemangiomas in the beard distribution. However, without obvious external manifestations, otolaryngologists must have a high index of suspicion for subglottic hemangiomas due to high risk of airway compromise and death if left untreated. Previous treatment modalities include propranolol, steroids, CO2 laser or surgery depending on the extent of the tumor. This case demonstrates that a large subglottic hemangioma extending into multiple deep neck spaces may still be managed successfully with propranolol.

## H144. Hemoptysis in Pediatric Tracheostomy Patients

Rishabh Sethia, BS, Columbus, OH; Joseph J. Lopez, MD, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate hemoptysis and its sequelae following tracheostomy in the pediatric population.

**Objectives:** To discuss outcomes of pediatric tracheostomy patients who presented with hemoptysis at a large academic center. **Study Design:** Retrospective cohort study. **Methods:** Medical records were reviewed for all pediatric patients who received a tracheostomy at a tertiary pediatric referral center from November 2014 to September 2016. Patients who were found to have a tracheostomy complication or present with hemoptysis were identified. Demographic information as well as diagnostic, therapeutic, and mortality data were collected. **Results:** Of the 74 patients who received a tracheostomy, only 2 (2.7%) were found to develop hemoptysis. Mean presentation was 148 days status post-tracheostomy. Of these 2 patients, 1 received a chest x-ray and neither received a chest CT. Both underwent tracheoscopy. In one of the patients, the trachea appeared healthy and a source for hemoptysis could not be identified. The other patient was found to have a brisk bleed complicated by cardiac arrest which ultimately resulted in fatality before the patient could be taken to the OR for emergency surgery. Mean followup for all tracheostomy patients was 325 days. **Conclusions:** Hemoptysis following tracheostomy is a rare, but potentially lethal complication that could suggest an underlying tracheoinnominate fistula. Early evaluation of hemoptysis is crucial to ensure proper intervention can be implemented in a timely manner. A retrospective review allowing for quantification of tracheostomy associated hemoptysis in the pediatric population is useful as previous reports have largely been limited to individual case studies.

## H145. Pediatric Facial Kaposiform Hemangioendothelioma: A Case Report and Review of the Literature

Rishabh Sethia, BS, Columbus, OH; Kris R. Jatana, MD, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss facial kaposiform hemangioendothelioma in the pediatric population by reviewing a unique case.

**Objectives:** To discuss facial kaposiform hemangioendothelioma (KH) and compare KH to tufted angioma (TA) by illustrating a rare pediatric case. **Study Design:** Case report and literature review. **Methods:** We report a unique case of a pediatric patient presenting with facial kaposiform hemangioendothelioma. **Results:** An 11 month old male with a history of spontaneously resolved nasolacrimal duct stenosis presented for evaluation of left facial swelling for 9 months. Six months prior to admission, a mass was identified on the left cheek which had progressively increased in size over the past 2 months. On exam, he was found to have a firm, mobile, non-tender mass just inferior to the left zygomatic arch. Ultrasound revealed a vascularized solid lesion measuring 12 mm x 15 mm x 16 mm limited to the superficial soft tissues. MRI showed a multi-lobular mass centered within the left masseter with increased T2 signal infiltrating into surrounding subcutaneous tissue. The patient subsequently underwent ultrasound guided core biopsy. Initial histology was consistent with TA; however, upon further review, a diagnosis of KH was favored. The tumor was managed with low dose aspirin and observation. **Conclusions:** Cutaneous KH most commonly presents in the extremities and rarely in the cervicofacial region. This is one of the first reports of facial presentation reported in the pediatric population. KH and TA lie on the same spectrum, and differentiating between the two can be difficult as demonstrated in this case. Early and proper identification of this tumor is crucial given the concern for complication with Kasabach-Merritt phenomenon.

## H146. Current Management and Referral Patterns of Pediatricians for Acute Otitis Media

Shivani U. Shah-Becker, MD, Hershey, PA; Michele M. Carr, MD PhD DDS, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand trends in the current treatment and referral patterns of acute otitis media and how they compare to national published guidelines.

**Objectives:** The American Academy of Pediatrics (AAP) has published an evidence based clinical practice guideline for the management of acute otitis media (AOM), most recently revised in 2013. This study aims to assess current practice patterns and how they compare to the published guideline. **Study Design:** Survey of practicing pediatricians. **Methods:** An 11 question survey addressing topics included in the 2013 AAP AOM guidelines was mailed to 196 practicing pediatricians. Statistical analysis was performed using chi square and ANOVA testing. **Results:** 76 (38%) completed surveys were returned. 75% of respondents were in group practice (non-academic) and 83% were in practice 11 years or more. 93% were members of the AAP. 46% of responding pediatricians use pneumatic otoscopy and/or tympanometry at least once a day to aid in the diagnosis of AOM, while 28% never do. 15% of respondents would choose close observation over antibiotics in a child under the age of 2 years with unilateral non-severe AOM while 50% would choose close observation in a child over age 2. 70% would make an appropriate referral to otolaryngology for recurrent AOM. No significant differences were noted in responses based on practice type, years in practice, or otolaryngology experience during residency training. **Conclusions:** Current pediatrician practice and referral patterns for AOM are not consistent with 2013 guidelines from the AAP. As consulting surgeons, otolaryngologists should have knowledge of management protocols in related specialties that can have an impact on their practice.

#### H147. Tracheocutaneous Fistula Closure: Outcomes and Complications in the Pediatric Population

Blaine D. Smith, BS, Houston, TX; Sancak D. Yuksel, MD, Houston, TX; Farrukh R. Virani, BS, Houston, TX; Kevin J. Caceres, MD, Houston, TX; Soham Roy, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the potential serious complications of tracheocutaneous fistula closure and compare the outcomes of various surgical techniques.

**Objectives:** To review the outcomes and complications of tracheocutaneous fistula closures over a 6 year period. **Study Design:** Historical cohort study. **Methods:** Retrospective review of patient data and review of literature. **Results:** Over a 6 year period 20 children underwent tracheocutaneous fistula closure by 3 surgeons. 17 underwent primary excision and closure of the fistula, while 3 were closed through secondary closure by excising the tract and replacing the tracheostomy temporarily. All patients closed satisfactorily. Two complications were noted; one patient developed subcutaneous emphysema which resolved without complication or intervention, and one developed severe subcutaneous emphysema and bilateral pneumothoraces in the postoperative recovery unit necessitating a return to the operating room with temporary replacement of the tracheostomy. All patients closed their fistula with satisfactory cosmetic outcomes. No long term complications were noted. **Conclusions:** While tracheocutaneous fistula remains a seemingly minor complication of long term tracheostomy placement, closure of the fistula can result in potentially catastrophic complications. Our series confirms that closure can be satisfactorily and safely performed by either primary or secondary technique, but may still result in potentially life threatening complications. Careful attention should be paid to meticulous technique in primary closure to prevent acute complications. Relevant literature will be reviewed.

#### H148. The Effect of Strontium Citrate on Bone Consolidation during Mandibular Distraction Osteogenesis in a Rabbit Model

Benjamin A. Taylor, MD, Halifax, NS Canada; Michael B. Bezuhly, MD MSc, Halifax, NS Canada; Michael C. Carter, MD PhD, Halifax, NS Canada; Paul H. Hong, MD MSc, Halifax, NS Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the effects of strontium citrate on bone consolidation during distraction osteogenesis in a rabbit model. Participants should also be able to explain the clinical implications of faster bone healing during distraction osteogenesis.

**Objectives:** Mandibular distraction osteogenesis (MDO) involves a lengthy consolidation phase. Strontium is an element that has been shown to improve bone healing. The objective of this study was to determine if strontium citrate can be used enhance bone healing during MDO in a rabbit model. **Study Design:** Prospective animal model study. **Methods:** Custom made MDO devices were placed on 20 New Zealand white rabbits. After a 7 day of latency period, distraction was performed at 1 mm/day for 5 days. The study group rabbits received oral strontium citrate; the other 10 rabbits served as controls. Mandibles were removed at the end of the consolidation period (4 weeks). Formation of new bone was evaluated with microcomputed tomography, histology, and three point bending mechanical test. **Results:** New bone formed in all rabbits, but the consolidation process was enhanced in rabbits that received strontium. The histological analysis showed that study group rabbits had more mature bone. Microcomputed tomography images demonstrated significantly higher bone density for study group animals, and the three point bending test results demonstrated that the maximum load of the study group specimens was significantly greater than the control group mandibles. **Conclusions:** Strontium citrate improved the formation of new bone in the current rabbit model of MDO. The prolonged consolidation period may be shortened with strontium citrate and has the potential to reduce complications.

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## H149. Effect of Race and Ethnicity on Pediatric Adenotonsillectomy Outcomes for OSA: A Systematic Review

Justin M. Wei, MD, Honolulu, HI; Macario Camacho, MD, Honolulu, HI; Erika Ho, BS, Honolulu, HI; Brandy Dunn, MD MPH, Irvine, CA; Bryant Giles, BS, Suwanee, GA; Lauren K. Reckley, MD, Honolulu, HI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate that race and ethnicity may play a factor in pediatric adenotonsillectomy outcomes. Participants should also be able to demonstrate a basic understanding for need of adenotonsillectomy in pediatric patient with obstructive sleep apnea.

**Objectives:** The primary objective was to determine whether race and ethnicity have an effect on recurrence or persistence of sleep disordered breathing in children who underwent adenotonsillectomy. **Study Design:** Systematic review. **Methods:** Three coauthors searched the international literature independently. Five databases, including PubMed, were searched through October 12, 2016. **Results:** Upon review of the literature, 811 patients from 3 studies showed that black children are at increased risk for residual sleep disordered breathing and recurrence of sleep disordered breathing when compared to Caucasian counterparts, as evidenced by statistically significant odds ratios (OR 3.5-15). Despite strong evidence that black children are at increased risk for continued sleep disordered breathing after adenotonsillectomy, 1,826 patients from 4 other studies who also underwent adenotonsillectomy did not show statistically or clinically significant differences in recurrence or persistence of sleep disordered breathing. **Conclusions:** Adenotonsillectomy in children with sleep disordered breathing, specifically pediatric obstructive sleep apnea as defined by AHI (Apnea-Hypopnea Index) > 1.0, is not always curative. While the persistence and recurrence of sleep disordered breathing remains relatively low in all comers, black children are more likely to have residual sleep disordered breathing.





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## Laryngoscope Investigative Otolaryngology

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# Triological Society National Awards

## **The Triological Society Gold Medal**

1933.....Max. A. Goldstein, MD  
2001.....Byron J. Bailey, MD  
2005.....Michael M.E. Johns, MD

2009..... Patrick E. Brookhouser, MD  
2013..... Harold C. Pillsbury, MD

## **Patrick E. Brookhouser, MD Award for Excellence**

2013..... Gerald B. Healy, MD FACS  
2014..... H. Bryan Neel III, MD PhD FACS  
2015..... Robert H. Miller, MD MBA FACS

2016..... Frank E. Lucente, MD FACS  
2017..... Charles M. Luetje, MD FACS

## Executive Secretaries

1896 to 1900..... Robert C. Myles, MD  
1901 to 1906..... Wendell C. Phillips, MD  
1907 to 1916..... Thomas J. Harris, MD  
1917 to 1924..... William H. Haskins, MD  
1925 to 1936..... Robert L. Loughran, MD  
1936 to 1962..... C. Stewart Nash, MD  
1962 to 1968..... Victor R. Alfaro, MD  
1968 to 1974..... Louis E. Silcox, MD  
1974 to 1980..... Richard R. Ruggles, MD

1980 to 1984.....William M. Tribble, MD  
1984 to 1988.....Frank N. Ritter, MD  
1989 to 1992.....Michael M.E. Johns, MD  
1993 to 1996..... Robert H. Miller, MD  
1997 to 2004..... Patrick E. Brookhouser, MD  
2005..... Gerald B. Healy, MD  
2006 to 2011..... Patrick E. Brookhouser, MD  
2011 to 2013..... Gerald B. Healy, MD

## Executive Vice President

2013 to 2017.....Myles L. Pensak, MD

## Presidents

\* 1896..... Edward B. Dench, MD  
\* 1897..... Frank Hyatt, MD  
\* 1898..... William H. Daley, MD  
\* 1899..... S.E. Solly, MD  
\* 1900..... D. Brayden Kyle, MD  
\* 1901..... Robert C. Myles, MD  
\* 1902..... Charles W. Richardson, MD  
\* 1903..... J.A. Stuckey, MD  
\* 1904..... Norval H. Pierce, MD  
\* 1905..... Frederick F. Cobb, MD  
\* 1906..... James E. Logan, MD  
\* 1907..... Wendel C. Phillips, MD  
\* 1908..... Ewing W. Day, MD  
\* 1909..... Christian R. Holmes, MD  
\* 1910..... James F. McKenna, MD  
\* 1911..... Chevalier Jackson, MD  
\* 1912..... G. Hudson Jakuen, MD  
\* 1913..... H. Holbrook Curtis, MD  
\* 1914..... Joseph A. White, MD  
\* 1915..... Robert Levy, MD  
\* 1916..... S. MacCuen Smith, MD  
\* 1917..... Thomas J. Harris, MD  
\* 1918..... George L. Richards, MD  
\* 1919..... Herbert S. Birkett, MD  
\* 1920..... Harris P. Mosher, MD  
\* 1921..... Lee Wallace Dean, MD  
\* 1922..... Lewis A. Coffin, MD

\* 1923..... Dunbar Roy, MD  
\* 1924..... Hanau W. Loeb, MD  
\* 1925..... William H. Haskin, MD  
\* 1926..... John M. Ingersoll, MD  
\* 1927..... Burt R. Shurly, MD  
\* 1928..... John F. Barnhill, MD  
\* 1929..... Hill Hastings, MD  
\* 1930..... Ross Hall Skillern, MD  
\* 1931..... Max A. Goldstein, MD  
\* 1932..... Edmund Prince Fowler, MD  
\* 1933..... Joseph C. Beck, MD  
\* 1934..... J.W. Jervy, MD  
\* 1935..... Perry G. Goldsmith, MD  
\* 1936..... Thomas E. Carmody, MD  
\* 1937..... George M. Coates, MD  
\* 1938..... Samuel J. Kopetzky, MD  
\* 1939..... Harold I. Lillie, MD  
\* 1940..... Lee M. Hurd, MD  
\* 1941..... J. Mackenzie Brown, MD  
\* 1942..... James A. Babbitt, MD  
\* 1943..... James G. Dwyer, MD  
\* 1944..... H. Marshall Taylor, MD  
\* 1945..... Albert C. Furstenberg, MD  
\* 1946..... Albert C. Furstenberg, MD  
\* 1947..... Harry W. Lyman, MD  
\* 1948..... Lyman G. Richards, MD  
\* 1949..... John J. Shea, MD



## Presidents (cont'd)

* 1950.....	Robert C. Martin, MD	* 1984.....	Carl N. Patterson, MD
* 1951.....	Louis H. Clerf, MD	1985.....	William H. Saunders, MD
* 1952.....	C. Steward Nash, MD	* 1986.....	Wesley H. Bradley, MD
* 1953.....	Francis E. LeJeune, MD	* 1987.....	Roger Boles, MD
* 1954.....	Leroy A. Schall, MD	* 1988.....	Harold G. Tabb, MD
* 1955.....	Kenneth M. Day, MD	* 1989.....	Malcolm H. Stroud, MD
* 1956.....	Dean M. Lierle, MD	1990.....	M. Stuart Strong, MD
* 1957.....	Percy E. Ireland, MD	* 1991.....	Paul H. Ward, MD
* 1958.....	Lawrence R. Boies, MD	* 1992.....	A. Paul Keller, Jr., MD
* 1959.....	Gordon D. Hoople, MD	* 1993.....	Frank N. Ritter, MD
* 1960.....	Theodore E. Walsh, MD	1994.....	Richard R. Gacek, MD
* 1961.....	Fletcher D. Woodward, MD	* 1995.....	Patrick J. Doyle, MD
* 1962.....	John R. Lindsay, MD	* 1996.....	William R. Hudson, MD
* 1963.....	Howard P. House, MD	1997.....	H. Bryan Neel, MD
* 1964.....	John E. Bordley, MD	1998.....	Stanley M. Blaugrund, MD
* 1965.....	George E. Shambaugh, Jr., MD	* 1999.....	Mansfield F. W. Smith, MD
* 1966.....	Francis W. Davison, MD	2000.....	Charles W. Gross, MD
* 1967.....	Shirley H. Baron, MD	2001.....	Edward L. Applebaum, MD
* 1968.....	G. Slaughter Fitz-Hugh, MD	2002.....	Gerald B. Healy, MD
* 1969.....	Jerome A. Hilger, MD	2003.....	Roger L. Crumley, MD
* 1970.....	Joseph L. Goldman, MD	* 2004.....	Robert A. Jahrsdoerfer, MD
* 1971.....	Victor Goodhill, MD	* 2005.....	Patrick E. Brookhouser, MD
* 1972.....	Victor R. Alfaro, MD	2006.....	Stanley M. Shapshay, MD
* 1973.....	Walter P. Work, MD	2007.....	David F. Wilson, MD
* 1974.....	Raymond E. Jordan, MD	2008.....	Harold C. Pillsbury, MD
* 1974.....	Louis E. Silcox, MD	2009.....	Myles L. Pensak, MD
* 1975.....	David D. DeWeese, MD	2010.....	Frank E. Lucente, MD
* 1976.....	James A. Harrill, MD	2011.....	Gerald S. Berke, MD
* 1977.....	Joseph H. Ogura, MD	2012.....	Robert H. Ossoff, DMD MD
* 1978.....	Daniel Miller, MD	2013.....	Jesus E. Medina, MD
* 1979.....	Francis A. Sooy, MD	2014.....	Jonas T. Johnson, MD FACS
* 1980.....	Beverly W. Armstrong, MD	2015.....	Derald E. Brackmann, MD
* 1981.....	G. O'Neill Proud, MD	* 2016.....	Fred D. Owens, MD
* 1982.....	John A. Kirchner, MD	2017.....	Charles W. Beatty, MD FACS
* 1983.....	Robin Michelson, MD		

\* deceased

## Guests of Honor

1947.....	J. McKenzie Brown, MD	1966.....	Gordon D. Hoople, MD
1948.....	Harold Walker, MD	1967.....	Albery C. Furstenberg, MD
1949.....	Claude C. Cody, Jr., MD	1968.....	Francis E. LeJeune, MD
1950.....	Harris P. Mosher, MD	1969.....	Lawrence R. Boies, MD
1951.....	Duncan McPherson, MD	1970.....	Victor Alfaro, MD
1952.....	D.C. Jarvis, MD	1971.....	Vern O. Knudsen, PhD
1953.....	Charles A. Thigpan, MD	1972.....	Carlos Munoz-MacCormick, MD
1954.....	J. Parsons Schaeffer, MD	1973.....	Dean Lierle, MD
1955.....	Edward P. Fowler, MD	1974.....	Raymond Jordon, MD
1956.....	Harold L. Lillie, MD	1975.....	Frank Lathrop, MD
1957.....	Not Available	1976.....	John Bordley, MD
1958.....	Arnold S. Diehl, MD	1977.....	Max Soni, MD
1959.....	Frederick T. Hill, MD		W.E.N. Harrison, MD
1960.....	Terence Cawthorne, MD	1978.....	Moses Lurie, MD
1961.....	Milton J. Robb, MD	1979.....	Shirley Baron, MD
1962.....	Thomas C. Galloway, MD	1980.....	Frank Lathrop, MD
1963.....	Robert C. Martin, MD		Harry Rosen-Wasser, MD
1964.....	C. Stewart Nash, MD	1981.....	Ben Senturia, MD
1965.....	Georges Portmann, MD		

## Guests of Honor (cont'd)

1982.	Harold Schuknecht, MD	1999.	Richard L. Goode, MD
	Ugo Fisch, MD	2000.	A. Paul Keller, MD
1983.	Walter Work, MD	2001.	Charles W. Cummings, MD
	Roy B. Cohn, MD	2002.	Stanley M. Shapshay, MD
1984.	Beverly Armstrong, MD	2003.	Brian F. McCabe, MD
1985.	G.O. Proud, MD	2004.	Byron J. Bailey, MD
1986.	Daniel Miller, MD	2005.	Robert H. Miller, MD MBA
1987.	Paul Ebert, MD	2006.	Gerald B. Healy, MD
1988.	Robert W. Brown, MD	2007.	William F. House, MD
1989.	Hallowell Davis, MD	2008.	Patrick E. Brookhouser, MD
1990.	George Reed, MD	2009.	Harry R. van Loveren, MD
1991.	Victor Goodhill, MD	2010.	Gady Har-El, MD
1992.	Roger Boles, MD	2011.	Harold C. Pillsbury, MD
1993.	C. Ryan Chandler, MD	2012.	Paul A. Levine, MD
1994.	John Conley, MD	2013.	Robert H. Mathog, MD
1995.	Paul H. Ward, MD	2014.	Michael M.E. Johns, MD
1996.	Bobby Ray Alford, MD	2015.	Gerald S. Berke, MD FACS
1997.	Robert Cantrell, MD	2016.	William H. Owens
1998.	Patrick J. Doyle, MD	2017.	H. Bryan Neel, III, MD PhD FACS

## Joseph H. Ogura, MD Lecturers

1986.	Hugh F. Biller, MD	2002.	David G. Nathan, MD
1987.	Paul H. Ward, MD	2003.	Arnold G. D. Maran, MD
1988.	John Conley, MD	2004.	Ernest A. Weymuller, Jr., MD
1989.	George A. Sisson, MD	2005.	Gerald B. Healy, MD
1990.	Sir Donald F.N. Harrison	2006.	Jonas T. Johnson, MD
1991.	Robert W. Cantrell, MD	2007.	Byron J. Bailey, MD
1992.	Michael E. Johns, MD	2008.	Paul A. Levine, MD
1993.	John A. Kirchner, MD	2009.	Robin T. Cotton, MD
1994.	John Lewis, MD	2010.	Marvin P. Fried, MD
1995.	Eugene Myers, MD	2011.	Lord Bernard Ribeiro Kt CBE FRCS FACS (Hon.)
1996.	Charles W. Cummings, MD	2012.	James L. Netteville, MD
1997.	Harold C. Pillsbury III, MD	2013.	Randal S. Weber, MD
1998.	Frank E. Lucente, MD	2014.	David E. Eibling, MD FACS
1999.	Haskins Kashima, MD	2015.	Uttam K. Sinha, MD FACS
2000.	Christopher Perry, MD	2016.	Jonas T. Johnson, MD FACS
2001.	Richard R. Gacek, MD	2017.	Eric J. Moore, MD FACS

## Fifty Year Club

### **1949**

Ernest R.V. Anderson, MD . . . . . Camarillo, CA  
Julio Quevedo, MD . . . . . Guatemala City

### **1950**

Arthur L. Juers, MD . . . . . Ivins, UT

### **1951**

Howard C. High, Jr., MD . . . . . Milwaukee, WI

### **1953**

Bert A. De Bord, Jr., MD . . . . . Temple, TX

### **1955**

G. Dekle Taylor, MD . . . . . Jacksonville, FL

### **1956**

J.H. Thomas Rambo, MD . . . . . New York, NY

### **1957**

William Skokan, MD . . . . . Fort Worth, TX

### **1958**

Hershel H. Burston, MD . . . . . Studio City, CA  
James F. Gardner, MD . . . . . Pittsford, NY

## Fifty Year Club (cont'd)

### 1959

Seymour J. Brockman, MD . . . . . Pacific Palisades, CA  
 Peter A. Wallenborn Jr., MD . . . . . Huntsville, AL  
 Warren E. Wiesinger, MD . . . . . Oakland, CA

### 1960

John T. Bickmore, MD . . . . . Bonita Springs, FL  
 James M. Cole, MD . . . . . Danville, PA  
 James M. Timmons, MD . . . . . Lexington, SC

### 1961

Richard A. Buckingham, MD . . . . . Wilmette, IL  
 Richard T. Farrow, MD FACS . . . . . Tampa, FL  
 Irwin Harris, MD FACS . . . . . Los Angeles, CA  
 Fred H. Linthicum Jr., MD . . . . . Los Angeles, CA  
 Ludwig A. Michael, MD FACS . . . . . Dallas, TX  
 William F. Robbett, MD . . . . . Manhasset, NY  
 William H. Saunders, MD . . . . . Columbus, OH

### 1962

Irving M. Blatt, MD FACS . . . . . Schriever, LA  
 Harry R. Morse, MD . . . . . West Lebanon, NH  
 M. Stuart Strong, MD . . . . . Bedford, MA  
 John H. Webb Jr., MD . . . . . Orlando, FL

### 1963

H.A. Ted Bailey, Jr., MD . . . . . Little Rock, AR  
 Arthur J. Gorney, MD . . . . . Sarasota, FL  
 William C. Livingood, MD . . . . . Orlando, FL  
 George T. Nager, MD . . . . . Baltimore, MD  
 Michael M. Paparella, MD . . . . . Minneapolis, MN

### 1964

Ned I. Chalut, MD FACS . . . . . Grosse Pointe, MI  
 Daniel J. Fahey, MD FACS . . . . . Williamsville, NY  
 Sidney S. Feuerstein, MD FACS . . . . . Palm Beach, FL  
 Merrill Goodman, MD FACS . . . . . Port Washington, NY  
 John C. Lillie, MD . . . . . Rochester, MN

### 1965

Sidney N. Busis, MD FACS . . . . . Pittsburgh, PA  
 George D. Lyons Jr., MD . . . . . New Orleans, LA  
 Francis L. McNelis, MD FACS . . . . . Warren, RI  
 Richard C. Parsons, MD . . . . . Hartwell, GA

### 1966

William J. Follette, MD FACS . . . . . North Palm Beach, FL  
 Arthur J. Kuhn, MD . . . . . Naples, FL  
 Harry W. McCurdy, MD FACS . . . . . Bethesda, MD

### 1967

William P. Beatrous, MD . . . . . New Orleans, LA  
 Gordon R. Freeman, MD FACS . . . . . Dyersburg, TN  
 George T. Singleton, MD . . . . . Gainesville, FL  
 Ted N. Steffen, MD . . . . . Louisville, KY  
 White M. Wallenborn, MD . . . . . Charlottesville, VA  
 Harold H. Wanamaker, MD . . . . . Syracuse, NY

**Please report discrepancies to the Triological  
 Administrative Office**

## In Memoriam

The following deaths have been reported to the Administrative Office since the publication of the 2016 Annual Program.

	<b>Elected</b>	<b>Died</b>
John W. Cavo Jr., MD FACS . . . . . Farmington, CT . . . . .	1984 . . . . .	2015
Berrylin J. Ferguson, MD FACS . . . . . Pittsburgh, PA . . . . .	2000 . . . . .	2016
David A. Hilding, MD FACS . . . . . Salt Lake City, UT . . . . .	1969 . . . . .	2016
Fernando R. Kirchner, MD . . . . . Tucson, AZ . . . . .	1968 . . . . .	2017
PerG Lundquist, MD . . . . . Linkoping, Sweden . . . . .	1997 . . . . .	2015
Robert C. Newell, MD . . . . . Bellingham, WA . . . . .	1970 . . . . .	2016
John Kim Niparko, MD . . . . . Los Angeles, CA . . . . .	1998 . . . . .	2016
Fred D. Owens, MD . . . . . Plano, TX . . . . .	1994 . . . . .	2016
Mark A. Richardson, MD FACS . . . . . Portland, OR . . . . .	2005 . . . . .	2016
Wallace Rubin, MD . . . . . Metairie, LA . . . . .	1961 . . . . .	2017





Active Fellows

Mona M. Abaza, MD  
 Elliot Abemayor, MD PhD FACS  
 Oliver F. Adunka, MD  
 Kenneth W. Altman, MD PhD FACS  
 Ronald G. Amedee, MD FACS  
 Vijay K. Anand, MD FACS  
 Vinod K. Anand, MD FACS  
 Brian Thomas Andrews, MD MA  
 Simon I. Angeli, MD  
 Jack B. Anon, MD FACS  
 Justin L. Antisdell, MD FACS  
 Patrick J. Antonelli, MD FACS  
 William B. Armstrong, MD FACS  
 Moises A. Arriaga, MD FACS  
 Jonathan E. Aviv, MD FACS  
 Douglas D. Backous, MD FACS  
 Manohar Bance, MD  
 Stephen F. Bansberg, MD  
 Soly Baredes, MD FACS  
 Jose E. Barrera, MD FACS  
 David M. Barrs, MD FACS  
 Loren J. Bartels, MD FACS  
 Pete S. Batra, MD FACS  
 Carol A. Bauer, MD FACS  
 Charles W. Beatty, MD FACS  
 Peter C. Belafsky, MD PhD MPH  
 James E. Benecke Jr., MD FACS  
 Michael S. Benninger, MD FACS  
 John P. Bent III, MD  
 Leonard P. Berenholz, MD  
 Gerald S. Berke, MD FACS  
 Wayne E. Berryhill, MD  
 Neil Bhattacharyya, MD FACS  
 Nasir I. Bhatti, MD FACS  
 Michael J. Biavati, MD FACS  
 Merrill A. Biel, MD FACS  
 Steven A. Bielamowicz, MD FACS  
 Brian W. Blakley, MD PhD FACS  
 Joel H. Blumin, MD FACS  
 Emily Frances Boss, MD  
 Carol R. Bradford, MD FACS  
 Joseph A. Brennan, MD FACS  
 Dale H. Brown, MD  
 Jimmy J. Brown, MD FACS  
 J. Dale Browne, MD FACS  
 Craig Alan Buchman, MD FACS  
 Robert Arthur Buckmire, MD  
 Jeffrey M. Bumpous, MD FACS  
 Lawrence P. A. Burgess, MD FACS  
 James A. Burns, MD FACS  
 Nicolas Y. BuSaba, MD FACS  
 Karen H. Calhoun, MD FACS  
 Bruce H. Campbell, MD FACS  
 Paolo Campisi, MD  
 C. Ron Cannon, MD FACS  
 Ricardo L. Carrau, MD FACS  
 Roy R. Casiano, MD FACS  
 John D. Casler, MD FACS  
 Paul F. Castellanos, MD  
 Kenny H. Chan, MD FACS  
 Sujana S. Chandrasekhar, MD  
 Kay W. Chang, MD  
 Amy Y. Chen, MD FACS  
 Douglas A. Chen, MD FACS  
 Eunice Yuzu Chen, MD PhD  
 Joseph M. Chen, MD  
 Steven W. Cheung, MD FACS  
 Dinesh K. Chhetri, MD  
 Wade WeiDe Chien, MD  
 Alexander GuangYu Chiu, MD  
 Sukgi S. Choi, MD FACS  
 Daniel I. Choo, MD FACS  
 Francisco J. Civantos, MD FACS  
 Keith F. Clark, MD PhD FACS  
 Lanny Garth Close, MD FACS  
 Shelagh Ann Cofer, MD  
 Noam Aryeh Cohen, MD PhD  
 Seth M. Cohen, MD  
 Stephen F. Conley, MD FACS  
 Steven P. Cook, MD FACS  
 Susan Rachele Cordes, MD FACS  
 Peter D. Costantino, MD FACS  
 Mark S. Courey, MD  
 Roberto A. Cueva, MD FACS  
 Michael J. Cunningham, MD FACS  
 Seth H. Dailey, MD  
 Edward J. Damrose, MD FACS  
 Sam Joseph Daniel, MD MSC  
 Subinoy Das, MD FACS  
 Louise Davies, MD MS  
 John M. DeGaudio, MD FACS  
 M. Jennifer Derebery, MD FACS  
 Daniel G. Deschler, MD FACS  
 Ellen S. Deutsch, MD  
 Anand Devaiah, MD FACS  
 Laurence J. DiNardo, MD FACS  
 Elizabeth A. Dinces, MD  
 Hamid R. Djalilian, MD  
 H. Peter Doble II, MD FACS  
 Joni Kristin Doherty, MD PhD FACS  
 Donald T. Donovan, MD FACS  
 John L. Dornhoffer, MD FACS  
 Amelia F. Drake, MD FACS  
 Colin L.W. Driscoll, MD  
 Sigsbee Walter Duck, MD FACS  
 Larry G. Duckert, MD PhD FACS  
 Robert K. Dyer Jr., MD  
 Roland D. Eavey, MD FACS  
 Thomas L. Eby, MD FACS  
 David R. Edelman, MD FACS  
 Charles V. Edmond Jr., MD FACS  
 David E. Eibling, MD FACS  
 David W. Eisele, MD FACS  
 Ravindra G. Elluru, MD PhD FACS  
 Karen J. Enright, MD PhD  
 Joel A. Ernster, MD FACS  
 Adrien Eshraghi, MD  
 Carole Fakhry, MD MPH  
 Joseph B. Farrior III  
 Jose N. Fayad, MD  
 Joseph G. Feghali, MD FACS  
 Robert L. Ferris, MD PhD FACS  
 Bruce L. Fetterman, MD FACS  
 Cynthia B. Fisher, MD  
 Valerie A. Flanary, MD FACS  
 Paul W. Flint, MD  
 L. Arick Forrest, MD  
 David Oliver Francis, MD MS  
 Howard W. Francis, MD  
 Ramon A. Franco Jr., MD  
 David R. Friedland, MD PhD  
 Ellen M. Friedman, MD FACS  
 Michael Friedman, MD FACS  
 Rick A. Friedman, MD PhD  
 Michael H. Fritsch, MD FACS  
 Kevin Fung, MD FRCS(C) FACS  
 Arun K. Gadre, MD MS FACS  
 Thomas J. Gal, MD FACS  
 Bruce J. Gantz, MD FACS  
 Glendon M. Gardner, MD  
 C. Gaelyn Garrett, MD MMHC  
 Eric M. Genden, MD FACS  
 Soha Nadim Ghossaini, MD FACS  
 Gerard J. Gianoli, MD FACS  
 Paul W. Gidley, MD FACS  
 William Giles, MD  
 M. Boyd Gillespie, MD MSc FACS  
 Douglas A. Girod, MD FACS  
 Lyon L. Gleich, MD FACS  
 George Goding Jr., MD FACS  
 Joel A. Goebel, MD  
 Andrew N. Goldberg, MD MSCE FACS  
 Nira A. Goldstein, MD  
 Carlos Gonzalez, MD FACS  
 Steven Lawrence Goudy, MD FACS  
 Christine G. Gourin, MD FACS  
 Jennifer Rubin Grandis, MD FACS  
 Stacey Tutt Gray, MD FACS  
 J. Douglas Green Jr., MD FACS  
 John Herman Greinwald Jr., MD  
 Gregory A. Grillone, MD FACS  
 Samuel Paul Gubbels, MD  
 Thomas J. Haberkamp, MD FACS  
 Joseph Haddad Jr., MD FACS  
 Theresa A. Hadlock, MD  
 Stacey L. Halum, MD  
 Joseph K. Han, MD  
 Matthew M. Hanasono, MD FACS  
 Marlan R. Hansen, MD  
 Gady HarEl, MD FACS  
 Earl Herberto Harley, MD FACS  
 Willard C. Harrill, MD FACS  
 Christopher J. Hartnick, MD FACS  
 George T. Hashisaki, MD FACS  
 Bruce H. Haughey, MBChB FACS  
 David S. Haynes, MD  
 Gerald B. Healy, MD FACS  
 Yolanda D. HemanAckah, MD FACS  
 Robert A. Hendrix, MD FACS  
 Douglas G. Hetzler, MD FACS  
 Wesley Hicks Jr., MD FACS  
 Kevin M. Higgins, MD  
 Allen D. Hillel, MD FACS  
 Michael L. Hinni, MD FACS  
 Keiko Hirose, MD  
 Michael Hoa, MD  
 Michael E. Hoffer, MD FACS  
 Henry T. Hoffman, MD FACS  
 Norman D. Hogikyan, MD FACS  
 Eric H. Holbrook, MD  
 David B. Hom, MD FACS  
 Paul Hong, MD FRCSC  
 Karl L. Horn, MD

# Member Directory

## Active Fellows (cont'd)

Steven M. Houser, MD FACS  
Amanda ChiaMing Hu, MD FRCSC  
Charles Anthony Hughes, MD FACS  
Gordon B. Hughes, MD FACS  
Timothy E. Hullar, MD FACS  
Peter H. Hwang, MD FACS  
Glenn C. Isaacson, MD FACS  
Lisa E. Ishii, MD MHS  
Stacey L. Ishman, MD MPH  
Robert K. Jackler, MD FACS  
Carol A. Jackson, MD  
Abraham Jacob, MD  
Ian Neal Jacobs, MD FACS  
John R. Jacobs, MD FACS  
Scharukh Jalisi, MD FACS  
Adrian L. James, MD  
Herman A. Jenkins, MD FACS  
Michael M. Johns III, MD  
Jonas T. Johnson, MD FACS  
Lamont RandallDesean Jones, MD  
Raleigh Olson Jones, MD MBA FACS  
Gary D. Josephson, MD FACS  
Ashutosh Kacker, MD FACS  
Jan L. Kasperbauer, MD FACS  
David M. Kaylie, MD FACS  
Robert M. Kellman, MD FACS  
Margaret A. Kenna, MD FACS  
David W. Kennedy, MD FACS  
Robert C. Kern, MD FACS  
Joseph E. Kerschner, MD FACS  
Bradley W. Kesser, MD  
Eric J. Kezirian, MD  
Samir Suresh Khariwala, MD  
Sid Khosla, MD  
Harold H. Kim, MD  
Hung Jeffrey Kim, MD  
Jean Kim, MD PhD FACS  
Barry P. Kimberley, MD  
Charles P. Kimmelman, MD MBA FACS  
Todd T. Kingdom, MD FACS  
Adam Matthew Klein, MD FACS  
Glenn Knox, MD FACS  
Wayne M. Koch, MD FACS  
Darius Kohan, MD  
Richard D. Kopke, MD FACS  
Alan D. Kornblut, MD FACS  
Karen M. Kost, MD  
Jamie Koufman, MD FACS  
Stilianos E. Kountakis, MD PhD FACS  
Dennis H. Kraus, MD FACS  
Greg A. Krempel, MD FACS  
Yosef P. Krespi, MD FACS  
John H. Krouse, MD PhD FACS  
Ronald B. Kuppersmith, MD FACS  
David I. Kutler, MD FACS  
John F. Kveton, MD FACS  
Robert F. Labadie, MD PhD  
Anil K. Lalwani, MD FACS  
Paul R. Lambert, MD FACS  
Andrew P. Lane, MD  
Pierre Lavertu, MD FACS  
Joseph L. Leach, MD FACS  
Richard A. Lebowitz, MD FACS

Kenneth H. Lee, MD PhD  
Scott Lungchi Lee, MD BA FACS  
John P. Leonetti, MD  
Mark J. Levenson, MD FACS  
Roger J. Levin, MD FACS  
Samuel C. Levine, MD  
Kasey K. Li, MD FACS  
Judith E.C. Lieu, MD MSPH  
HoSheng Lin, MD FACS  
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