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## Message from the President, Derald E. Brackmann, MD

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Welcome to Boston! Thank you for attending our 118th Annual Meeting at COSM. It has been a pleasure to serve the membership as President this year and I am very proud of the outstanding program that has been assembled by our Program Chair, Marilene Wang, MD and our Program Committee. Some of the highlights include a presentation on “Creativity in Head and Neck Surgery” which will be given by my Guest of Honor, Gerald S. Berke, MD FACS and Dr. Uttam Sinha’s Ogura Lecture “Rethinking Head and Neck Cancer in the Era of Quantum Biology”. Our Friday panels include “Contemporary Neuroradiological Imaging in Evaluation and Management of Otologic Disease”; “Rehabilitation of Children with Unilateral Hearing Loss”; “Endoscopic Management of Pediatric and Adult Airway Issues”; “Revision Rhinoplasty: Trends, Technology, Avoiding Litigation”. Our Saturday panels include “Tumor Board: Multidisciplinary Care of Head and Neck Cancer Patients”; “Optimizing Use of EMR”; “Multidisciplinary Approach to OSA”; and two video sessions “Masters of Rhinology Video Panel-Point/Counterpoint”; and “How I Do It: Experts Demonstrate Their Techniques”. We are confident that you will find this meeting to be of great value in assisting you with the care of

your patients, your research endeavors, and your teaching. I look forward to renewing old friendships and meeting new colleagues.

# SCHEDULE AT A GLANCE

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## Friday - Hynes Convention Center - Ballroom A

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7:00	Triological Business Meeting and New Fellows Ceremonies/Reception (members only)
8:00	Welcome and Presidential Citations
8:10	Introduction of Guest of Honor and Guest of Honor Address <i>Creativity in Head and Neck Surgery</i>
8:25	Presidential Address <i>Vestibular Schwannoma Management Then and Now</i>
8:45	Mosher and Fowler Thesis Award Papers

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## Friday - Concurrent Session 1 - Hynes Convention Center - Ballroom A

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9:05 - 12:00	Pediatrics and Otology Session
9:05 - 9:45	Guest Panel Presentation: <i>Contemporary Neuroradiological Imaging in Evaluation and Management of Otologic Disease</i>
9:45 - 10:10	Break/View Posters
10:10 - 11:20	Papers
11:20 - 12:00	Panel: <i>Rehabilitation of Children with Unilateral Hearing Loss</i>
Noon	Adjourn

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## **Friday - Concurrent Session 2 - Hynes Convention Center - Room 302**

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9:05 - 12:00 Laryngology and Facial Plastic/Reconstructive Surgery Session  
9:05 - 9:45 Panel: *Endoscopic Management of Pediatric and Adult Airway Issues*  
9:45 - 10:10 Break/View Posters  
10:10 - 11:20 Papers  
11:20 - 12:00 Panel: *Revision Rhinoplasty: Trends, Technology, Avoiding Litigation*  
Noon Adjourn

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## **Friday - Hynes Convention Center Exhibit Hall D**

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5:30 - 7:00 Meet the Authors Poster Reception - Triological Society, ANS, AOS, ARS and ASPO

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## **Saturday - Hynes Convention Center - Ballroom A**

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7:00 Triological Business Meeting (Fellows Only)  
8:05 - 8:25 Ogura Lecture  
*Rethinking Head and Neck Cancer in the Era of Quantum Biology*  
8:25 - 10:30 Head and Neck Session  
8:25 - 9:10 Panel: *Tumor Board: Multidisciplinary Care of Head and Neck Cancer Patients*  
9:10 - 10:05 Papers  
10:05 - 10:30 Break/View Posters  
10:30 - 12:00 General Session  
10:30 - 11:15 Panel: *Optimizing Use of EMR*  
11:15 - 12:00 Papers  
12:00 - 1:00 Lunch Break/Visit Posters  
1:00 - 2:25 Sleep Medicine Session  
1:00 - 1:40 Panel: *Multidisciplinary Approach to OSA*  
1:45 - 2:25 Papers  
2:25 - 4:15 Rhinology Session  
2:25 - 3:10 Video Session: *Masters of Rhinology Video Panel-Point/Counterpoint*  
3:10 - 3:35 Break/View Posters  
3:35 - 4:15 Papers  
4:15 - 5:00 Video Session: *How I Do It: Experts Demonstrate Their Techniques*  
5:00 Adjourn

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# **118TH ANNUAL MEETING HYNES CONVENTION CENTER AND SHERATON BOSTON BOSTON, MASSACHUSETTS APRIL 24-25, 2015**

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## **About the Triological Society**

The American Laryngological, Rhinological and Otological Society, Inc., aka The Triological Society, was founded in 1895 in New York, NY. In the 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 journal, The Laryngoscope. 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 Statement**

The mission of the Triological Society is to assist physicians and other health care professionals in maintaining and enhancing their knowledge of and skills in otolaryngology-head and neck surgery in pursuit of improved patient care.

## **Goals**

- To disseminate the latest basic and evidence based clinical research findings pertaining to the diagnosis, treatment and prevention of the full spectrum of disorders of the head and neck and related structures in pursuit of improved patient care.
- To provide a forum 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 otolaryngologists-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 requirements.
- To ensure the continuation of the noble legacy of the Triological Society by mentoring young otolaryngologists to become scholars and leaders.

To facilitate the above goals, the Society sponsors educational meetings. The Society's journal, The Laryngoscope, serves as a means of disseminating the latest basic and clinical research results. The Society encourages clinical and basic research by providing research grants and awards on a competitive basis.

## **Educational Objectives for Program**

After attending this meeting, participants will be able to:

- Utilize radiographic imaging to perform surgery more effectively and safely in otologic diseases
- Evaluate and manage a child with unilateral hearing loss
- Manage selected pediatric and adult airway issues using endoscopic techniques
- Learn more effective techniques for revision rhinoplasty
- Optimize management of head and neck cancer patients utilizing a multidisciplinary approach
- Utilize electronic medical records in an effective manner, to maximize efficiency and minimize frustration
- Manage patients with obstructive sleep apnea with multidisciplinary methods
- Learn about the latest techniques in endoscopic sinus and skull base surgery, from video demonstrations by expert surgeons
- Learn techniques in sialendoscopy, transoral robotic surgery, and flap reconstruction from presentations by expert surgeons

### **Accreditation Statement**

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint providership of the American College of Surgeons and the 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 10.25 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.



American College of Surgeons  
Division of Education

### **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 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 • 402-346-5500

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## **Program Planning and Advisory Committee**

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**President - Derald E. Brackmann, MD**  
Los Angeles, CA

**Program Chair - Marilene B. Wang, MD FACS**  
Los Angeles, CA

Neil Bhattacharyya, MD FACS  
Boston, MA

Joel H. Blumin, MD FACS  
Milwaukee, WI

Emily Frances Boss, MD  
Baltimore, MD

Dinesh K. Chhetri, MD  
Los Angeles, CA

Alexander Guang-Yu Chiu, MD  
Tucson, AZ

Anil K. Lalwani, MD FACS  
New York, NY

Carol J. MacArthur, MD FACS  
Portland, OR

David Myssiorek, MD FACS  
New York, NY

Cherie-Ann Nathan, MD FACS  
Shreveport, LA

Brian Nussenbaum, MD FACS  
St. Louis, MO

Richard R. Orlandi, MD FACS  
Salt Lake City, UT

Wm. Russell Ries, MD FACS  
Nashville, TN

Michael D. Seidman, MD FACS  
West Bloomfield, MI

Maie A. St. John, MD  
Los Angeles, CA

Erica Robb Thaler, MD FACS  
Philadelphia, PA

Debara Lyn Tucci, MD FACS  
Durham, NC

Eric P. Wilkinson, MD FACS  
Los Angeles, CA

Brian J.F. Wong, MD PhD  
Irvine, CA

Adam M. Zanation, MD  
Chapel Hill, NC

**AMERICAN COLLEGE OF SURGEONS | DIVISION OF EDUCATION**  
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**JOINT PROVIDERSHIP PROGRAM**

**Disclosure Information**  
**Triological Society 118th Annual Meeting**  
**April 24-25, 2015**  
**Boston, Massachusetts**

In accordance 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. Therefore, it is mandatory that both the program planning committee and speakers complete disclosure forms. Members of the program committee were required to disclose **all** financial relationships and speakers were required to disclose any financial relationship **as it pertains to the content of the presentations**. The ACCME defines a ‘commercial interest’ as “any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients”. It does not consider providers of clinical service directly to patients to be commercial interests. The ACCME considers “relevant” financial relationships as financial transactions (in any amount) that may create a conflict of interest and occur within the 12 months preceding the time that the individual is being asked to assume a role controlling content of the educational activity.

ACS is also required, through our joint providership partners, to manage any reported conflict and eliminate the potential for bias during the activity. All program committee members and speakers were contacted and the conflicts listed below have been managed to our satisfaction. However, if you perceive a bias during a session, please report the circumstances on the session evaluation form.

**Please note we have advised the speakers that it is their responsibility to disclose at the start of their presentation if they will be describing the use of a device, product, or drug that is not FDA approved or the off-label use of an approved device, product, or drug or unapproved usage.**

The requirement for disclosure is not intended to imply any impropriety of such relationships, but simply to identify such relationships through full disclosure and to allow the audience to form its own judgments regarding the presentation.

SPEAKERS / MODERATORS/ CHAIRS / DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Annie K. Ahn, MD	X	
Andrew B. Baker, BS	X	
Pete S. Batra, MD FACS		Merck (speakers advisory board)
Gerald S. Berke, MD FACS	X	
Joel H. Blumin, MD FACS	X	
Emily Frances Boss, MD	X	
Derald E. Brackmann, MD	X	
Carol R. Bradford, MD FACS	X	
Jason A. Brant, MD	X	
Jacob R. Brodsky, MD	X	
Craig Alan Buchman, MD FACS		Advanced Bionics (honoraria--surgical advisory board); Cochlear Corp (honoraria--surgical advisory board)
Fung Michael Chan, MD	X	
Sujana S. Chandrasekhar, MD	X	
Dinesh K. Chhetri, MD	X	
Alexander Guang-Yu Chiu, MD	X	
Seiyeon Chung, BS	X	
David S. Cohen, MD	X	
Vittorio V. Colletti, MD	X	
Susan Rachelle Cordes, MD FACS	X	
Mark S. Courey, MD	X	
Hugh Curtin, MD	X	
David W. Cuthbertson, MD	X	
Francesca del Bon, MD	X	
Jacob K. Dey, BS	X	
Karen J. Enright, MD PhD	X	

<b>SPEAKERS / MODERATORS/ CHAIRS / DISCUSSANTS</b>	<b>NOTHING TO DISCLOSE</b>	<b>DISCLOSURE (As it pertains to the content of the presentation)</b>
Ramon A. Franco Jr., MD	X	
Kevin Fung, MD FRCS(C) FACS	X	
Tiffany A. Glazer, MD	X	
Andrew N. Goldberg, MD MSCE FACS		ApniCure Medical (minor stockholder, consultant); Siesta Medical (minor stockholder, consultant)
Christopher J. Hartnick, MD FACS	X	
Chantal E. Holy, PhD		Acclarent (salary-- employee of Acclarent)
Wayne D. Hsueh, MD	X	
Timothy E. Hullar, MD FACS		Advanced Bionics (honorarium \$2000; Medical Advisory Board)
Phillip A. Huyett, MD	X	
Peter H. Hwang, MD FACS		Intersect (options--consultant); Medtronic (honorarium--consultant); Sinuwave (honorarium--consultant)
Lisa E. Ishii, MD MHS	X	
Stacey L. Ishman, MD MPH	X	
Jonas T. Johnson, MD FACS	X	
Robert M. Kellman, MD FACS	X	
Adam J. Kimple, MD PhD	X	
Anil K. Lalwani, MD FACS	X	
Jennifer M. Lavin, MD	X	
Judith E.C. Lieu, MD MSPH	X	
Jessyka G. Lighthall, MD	X	
Ho-Sheng Lin, MD FACS		Intuitive Surgical (honorarium--consultant)
Sandra Y. Lin, MD	X	
Robin W. Lindsay, MD	X	
Patricia A. Loftus, MD	X	
Carol J. MacArthur, MD FACS	X	
Rachel S. Mandelbaum, BA	X	
Tanya K. Meyer, MD	X	
Natasha Mirza, MD FACS	X	
Alexander Walker Murphey, BS	X	
David Myssiorek, MD FACS	X	
Cherie-Ann Nathan, MD FACS	X	
Brian Nussenbaum, MD FACS	X	
Matthew C. Ochsner, BS	X	
Satoshi Ohno, MD PhD	X	
Richard R. Orlandi, MD FACS		Medtronic (salary--consultant)
Ryan K. Orosco, MD	X	
Randal C. Paniello, MD PhD	X	
Arjun K. Parasher, MD	X	
Sanjay Rajendra Parikh, MD BSc FACS	X	
Virginia M. Plauché, MD	X	
Max A. Plitt, BA	X	
Dennis S. Poe, MD PhD FACS		Acclarent Corp (reimbursement of expenses, no equity interest-- consultant)
Diego Alfonso Preciado, MD PhD	X	
Wm. Russell Ries, MD FACS	X	
Caroline D. Robson, MB ChB		Amirsys, Inc. (royalties--editor and content author)
Brian William Rotenberg, MD MPH	X	
Charles Khalil Saadeh, BS	X	
Ghassan J. Samara, MD FACS	X	
Richard L. Scher, MD FACS	X	
Anthony P. Sclafani, MD FACS	X	
Michael D. Seidman, MD FACS	X	

<b>SPEAKERS / MODERATORS/ CHAIRS / DISCUSSANTS</b>	<b>NOTHING TO DISCLOSE</b>	<b>DISCLOSURE (As it pertains to the content of the presentation)</b>
Brent A. Senior, MD FACS		ENTVantage (consulting fee/stockholder); Laurimed (consultant, stockholder); Olympus (consulting fee); Sinuwave (consulting fee); Spirox (consulting fee/stockholder)
Jaecel O. Shah, MD	X	
Uttam K. Sinha, MD FACS	X	
Phayvanh P. Sjogren, MD	X	
Del R. Sloneker, MD	X	
Lindsay B. Sobin, MD	X	
Jeffrey H. Spiegel, MD FACS	X	
Maie A. St. John, MD	X	
Hinrich Staecker, MD PhD	X	
Erica Robb Thaler, MD FACS	X	
William S. Tierney, MS	X	
Brittney N. Tillman, MD	X	
Debara Lyn Tucci, MD FACS	X	
Kadriye Serife Ugur	X	
Tom D. Wang, MD FACS	X	
Todd J. Wannemuehler, MD	X	
Randal S. Weber, MD FACS	X	
Ashley E. Wenaas, MD	X	
James R. White, MD	X	
Eric P. Wilkinson, MD FACS		Cochlear Americas (research support); Med-EL US (research support)
Brian J.F. Wong, MD PhD	X	
Bradford A. Woodworth, MD		Cook Medical (consulting fee); Olympus (consulting fee)
Kathleen L. Yaremchuk, MD MSA	X	
Linda X. Yin, BA	X	
Adam M. Zanation, MD	X	
<b>PLANNING COMMITTEE</b>	<b>NOTHING TO DISCLOSE</b>	<b>DISCLOSURE (All commercial relationships)</b>
Neil Bhattacharyya, MD FACS		Entellus, Inc (fees-consultant); IntersectENT (fees-consultant)
Joel H. Blumin, MD FACS	X	
Emily Frances Boss, MD	X	
Derald E. Brackmann, MD	X	
Dinesh K. Chhetri, MD	X	
Alexander Guang-Yu Chiu, MD		Meda Pharmaceuticals (honorarium-speaker); Olympus Gyru (honorarium-consultant); Teva (honorarium-speaker)
Anil K. Lalwani, MD FACS		Advanced Bionics Corporation (travel expenses, honorarium-medical advisory board); Oticon (travel expenses, honorarium-consultant)
Carol J. MacArthur, MD FACS		13Therapeutics (stockholder-consultant)
David Myssiorek, MD FACS	X	
Cherie-Ann Nathan, MD FACS	X	
Brian Nussenbaum, MD FACS	X	
Richard R. Orlandi, MD FACS		Medtronic (salary-consultant)
Wm. Russell Ries, MD FACS	X	
Michael D. Seidman, MD FACS		AAO-HNS (board of directors leadership role); Body Language Vitamins (founder of company leadership role); Henry Ford Health System (employment salary-physician/director of skull base surgery, medical director of wellness); NIH (3 grants-research funding); ViSalus Sciences (royalty-several off label products I developed); patents (7 patents and more pending, intellectual property rights)
Maie A. St. John, MD	X	



SPEAKERS / MODERATORS/ CHAIRS / DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Erica Robb Thaler, MD FACS	X	
Debara Lyn Tucci, MD FACS		GlaxoSmithKline (salary-spouse employee); MedEI (grant funding-PI international health; funding-attended international symposium); Otonomy Inc. (consultant fees-chair DSMB)
Marilene Wang, MD FACS	X	
Eric P. Wilkinson, MD FACS		Cochlear Corporation (funding-researcher); MedEI Corporation (funding-researcher)
Brian J.F. Wong, MD PhD		Aerin Medical Inc. (royalties-intellectual property holder); Allergan (grant support-contracted research); Anthony Products Inc. (product sales-OEM); Lockheed-Martin Corporation (grant support-contracted research); OCT Medical Imaging Inc. (grant support-contracted research); Praxis BioSciences Inc.(equity-board)
Adam M. Zanation, MD		Medtronic (fee-consultant); Stryker (fee-consultant)



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## Honorees

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### GUEST OF HONOR

#### Gerald S. Berke, MD FACS



Dr. Gerald Berke is professor of surgery, and chair of the Department of UCLA Head and Neck Surgery in the David Geffen School of Medicine and the UCLA Health System. Dr. Berke, who is a highly respected researcher and clinician, has served as chief of the department since 2012 and prior chair of the division since 1992. He also is the director of the UCLA Voice Center for Medicine and the Arts, which he founded.

Dr. Berke has authored over 200 manuscripts based on laryngeal physiology and voice disorders and mentored numerous research fellows. He performed the first functioning larynx transplant in animals and developed the only surgical treatment for adductor spasmodic dysphonia. Dr. Berke has also pioneered many of the techniques now used by laryngologists to treat patients in an office setting.

Born and raised in Southern California, he began developing his interest in the voice and ultimately his medical specialty, as a rock musician and song writer. Dr. Berke came to UCLA in 1979 to complete his surgical residency, after graduating from both undergraduate and medical school at the University of Southern California, and became an assistant professor in 1984, then advanced to become professor and chair of head and neck surgery in 1992.

Outside of UCLA, Dr. Berke is the past president of both the American Laryngological Association and the Triological Society. He is currently one of 16 directors of the American Board of Otolaryngology and former member of the ACGME RRC for Otolaryngology. In addition, he recently completed his term as member of the Advisory Council of the National Institute of Deafness and other Communication Disorders and is currently the Chair of the National Spasmodic Dysphonia Association (NSDA) Scientific Advisory Board. Dr. Berke serves as the Research Liaison on the Triological Society Council.

### PRESIDENTIAL CITATION AWARDEE

#### John L. Go, MD



Dr. John L. Go graduated from the University of Tennessee Center for the Health Sciences Medical School in 1989. He completed an Internal Medicine Internship at Roosevelt Hospital in New York from 1989-90, and completed a diagnostic radiology residency at Mount Sinai Medical Center in New York in 1994. He then completed a two year diagnostic Neuroradiology fellowship at the University of Southern California where he has remained and is currently the Director of Head and Neck Imaging. For the past nine years, Dr. Go has been the consulting Otoradiologist for the House Ear Institute. He has been an active participant in radiology at the local, regional, and national level. He was prior President for the Los Angeles Radiological Society, 2009-2010 and was past president of the Western Neuroradiological Society, 2013. As a senior member of the American Society of Neuroradiology since 1996, he currently chairs the Technical Exhibits and Computer, Science and Informatics Committee as well as a Member of the Executive and Program Committees.

He currently reviews the American Journal of Roentgenology, the Radiology, and the Editorial Board for the American Journal of Neuroradiology (AJNR). He is also an Associate Editor for Otolaryngology & Neurotology, and has been an invited author for multiple textbooks and journals.

## PRESIDENTIAL CITATION AWARDEE

**Michael R. Stefan, MD**



Dr. Michael Stefan was raised in southern California. He attended medical school at the University of Southern California, internal medicine residency was at Los Angeles County-University of Southern California Medical Center. Dr. Stefan has been an assistant clinical professor of medicine at the USC School of Medicine involved in undergraduate medical education. He is married with two children and two grandchildren. He has been affiliated with the House Clinic for 32 years as an internal medicine consultant. It has been a professionally exciting and rewarding relationship working with the excellent physicians and surgeons of the House Clinic.

## PRESIDENTIAL CITATION AWARDEE

**Marilene B. Wang, MD**



Dr. Marilene B. Wang is a Professor in the Department of Head and Neck Surgery at the UCLA David Geffen School of Medicine, where she is Director of the UCLA Nasal and Sinus Disease Center and co-director of the Endoscopic Skull Base program. She received her BA in mathematics from La Sierra University, Riverside, CA, and her MD from Loma Linda University School of Medicine. She completed her residency in Head and Neck Surgery at UCLA and was recruited afterward to serve on the faculty. Her practice is focused on head and neck cancer and endoscopic skull base surgery. She has an active cancer research laboratory, studying cell cycle regulation and curcumin suppression of head and neck cancer, which has received NIH and other extramural funding. She has mentored numerous students and residents in her laboratory, many of whom have gone on to distinguished professional careers. She has published over 130 peer-reviewed scientific articles, 12 book chapters, and presented over 200 abstracts or lectures at meetings all over the world. She is on the Editorial Review

Board for The Laryngoscope and is a reviewer for numerous other academic journals. She has been named to the Best Doctors of America database, Best Doctors in Southern California, and Best Doctors in Los Angeles. She is Chair of the Complementary/Integrative Medicine Committee for the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS), Chair of the Awards Committee for the American Rhinologic Society (ARS), and is an active member of multiple other committees for the AAO-HNS, ARS, American Head and Neck Society, and American Thyroid Association. She received a Distinguished Service Award from the AAO-HNS in 2013 and was named a Cochrane Scholar in 2014. She is on the Board of Trustees for La Sierra University and on the Board of Directors for Project RISHI, a non-profit organization focused on improving rural health conditions in India. She is married to her medical school classmate Dr. James Watson, a plastic surgeon, and they have two daughters, WayAnne and Whitney. In her spare time she enjoys music, skiing, and biking with her family.

**JOSEPH H. OGURA, MD, LECTURER**  
**Uttam K. Sinha, MD FACS**



Uttam K. Sinha, MD FACS is Director of Head and Neck Surgery and Associate Dean of Surgical Simulation and Innovation at the Keck School of Medicine of the University of Southern California (USC). Several years ago, the university established an Endowed Chair in his honor and he is the first Chair holder of the Watt Chair in Head and Neck Cancer Research. Uttam graduated from Calcutta University in India and came to the House Ear Institute in Los Angeles with a Rupley Fellowship in Neuro-oncology. After completion of a 4-year Research Fellowship in basic science, he then went on to complete his residency training at USC. His first Clinical Fellowship was in Microvascular, Plastic and Reconstructive Surgery at the Mount Sinai Hospital, New York. Uttam then went on to do a second Clinical Fellowship in Laryngology in Leon, France. He joined the Department of Head & Neck Surgery at USC in 1996 and has focused on head and neck surgery as his specialty. He is not only an outstanding surgeon with national and international reputation, he maintains an equally keen interest in translational research in molecular biology, nanotechnology and cancer stem cell. Uttam dedicated his life to improve survival and quality of life of head and neck cancer patients through his clinical, research and educational endeavors. He holds various executive posts and memberships in academic societies, and member of the editorial boards of multiple journals. He has authored over 80 publications and has given over 200 presentations and lectures nationally and internationally including multiple prestigious orations.

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## **2015 Thesis Award Winners**

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### **Edmund Prince Fowler Award**

**Bradford Alan Woodworth, MD, Birmingham, AL**

*Resveratrol Ameliorates Abnormalities of Fluid and Electrolyte Secretion in a Hypoxia-Induced Model of Acquired CFTR Deficiency*

### **Harris P. Mosher Award**

**Lisa E. Ishii, MD MHS, Baltimore, MD**

*The Social Distraction of Facial Paralysis: Objective Measurement of Social Attention Using Eye Tracking*

### **Honorable Mention for Basic Science Award**

**Eunice Yuzu Chen, MD PhD, Lebanon, NH**

*Tissue Oxygen Profiling Using Electron Paramagnetic Resonance Oximetry to Improve Wound Healing after Radiation*

### **Honorable Mention for Basic Science Award**

**Ian Neal Jacobs, MD FACS, Philadelphia, PA**

*The Development of an In Vitro and In Vivo Derived Tissue-Engineered Cartilage for Pediatric Laryngotracheal Reconstruction in a Rabbit Model*

### **Honorable Mention for Clinical Research Award**

**Oliver F. Adunka, MD, Columbus, OH**

*Round Window Electrocochleography before and after Cochlear Implant Electrode Insertion*

### **Honorable Mention for Clinical Research Award**

**Hamid R. Djalilian, MD, Irvine, CA**

*Development of a Novel Completely In-The-Canal Direct-Drive Hearing Device*

### **Honorable Mention for Clinical Research Award**

**Brett A. Miles, MD DDS FACS, New York, NY**

*Feasibility of Intraoperative Margin Control Utilizing High Resolution Microendoscopy Optical Imaging for Head and Neck Squamous Cell Carcinoma*

### **With Distinction Award**

**Wade Wei-De Chien, MD, Baltimore, MD**

*Cochlear Gene Transfer Mediated by Adeno-Associated Virus: Comparison of Two Surgical Approaches*

### **With Distinction Award**

**Noam Aryeh Cohen, MD PhD, Philadelphia, PA**

*The Genetics of the Bitter Taste Receptor T2R38 in Upper Airway Innate Immunity and Implications for Chronic Rhinosinusitis*

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## **New Fellows to Be Inducted**

New Fellow Ceremonies followed by the reception with Triological Fellows is scheduled on Friday, April 24th from 7:00 - 7:50 in Hynes - Ballroom A

<b>Oliver F. Adunka, MD</b> .....	Columbus, OH
<b>Brian Thomas Andrews, MD MA</b> .....	Kansas City, KS
<b>Justin L. Antisdell, MD FACS</b> .....	St. Louis, MO
<b>Nasir I. Bhatti, MD FACS</b> .....	Baltimore, MD
<b>Eunice Yuzu Chen, MD PhD</b> .....	Lebanon, NH
<b>Wade WeiDe Chien, MD</b> .....	Baltimore, MD
<b>Shelagh Ann Cofer, MD</b> .....	Rochester, MN
<b>Noam Aryeh Cohen, MD PhD</b> .....	Philadelphia, PA
<b>Daniel G. Deschler, MD FACS</b> .....	Boston, MA
<b>Hamid R. Djalilian, MD</b> .....	Irvine, CA
<b>David Oliver Francis, MD MS</b> .....	Nashville, TN
<b>Kevin Fung, MD FRCS(C) FACS</b> .....	London, ON Canada
<b>Arun K. Gadre, MD MS FACS</b> .....	Louisville, KY
<b>Stacey Tutt Gray, MD FACS</b> .....	Boston, MA
<b>Earl Herberto Harley, MD FACS</b> .....	Washington, DC
<b>Michael Hoa, MD</b> .....	Washington, DC
<b>Charles Anthony Hughes, MD FACS</b> .....	Augusta, GA
<b>Lisa E. Ishii, MD MHS</b> .....	Baltimore, MD
<b>Robert K. Jackler, MD FACS</b> .....	Stanford, CA
<b>Ian Neal Jacobs, MD FACS</b> .....	Philadelphia, PA
<b>Samir Suresh Khariwala, MD</b> .....	Minneapolis, MN
<b>Jean Kim, MD PhD FACS</b> .....	Baltimore, MD
<b>Todd T. Kingdom, MD FACS</b> .....	Aurora, CO
<b>Lawrence R. Lustig, MD FACS</b> .....	New York, NY
<b>Brett A. Miles, MD DDS FACS</b> .....	New York, NY
<b>Vikash K. Modi, MD BS</b> .....	New York, NY
<b>Vishad Nabili, MD FACS</b> .....	Los Angeles, CA
<b>Peggyann Nowak, MD</b> .....	West Bloomfield, MI
<b>Melissa A. Pynnonen, MD Msc</b> .....	Ann Arbor, MI
<b>Yael Raz, MD</b> .....	Pittsburgh, PA
<b>Alejandro Rivas, MD</b> .....	Nashville, TN
<b>Kristina W. Rosbe, MD FACS</b> .....	San Francisco, CA
<b>Maroun T. Semaan, MD</b> .....	Cleveland, OH
<b>Richard V. Smith, MD FACS</b> .....	Bronx, NY
<b>Mark A. Varvares, MD FACS</b> .....	Saint Louis, MO
<b>Deborah Watson, MD FACS</b> .....	San Diego, CA
<b>Bradford Alan Woodworth, MD</b> .....	Birmingham, AL
<b>Karen Bracha Zur, MD BS</b> .....	Philadelphia, PA





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## **Edmund Prince Fowler Award Citation**

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In recognition of the excellence of his/her Candidate's Thesis in Basic Research, the Society confers upon \_\_\_\_\_ the Edmund Prince Fowler Award.

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.

In witness whereof the Society has caused this certificate to be signed and its seal affixed on the \_\_\_\_\_ day of \_\_\_\_\_, Two Thousand and Fifteen.

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## **Recipients**

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

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## **Edmund Prince Fowler • 1872-1966**

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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.

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## **Harris P. Mosher Award Citation**

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In recognition of the excellence of his/her Candidate's Thesis in Clinical Research, the Society confers upon \_\_\_\_\_ the Harris P. Mosher Award.

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.

In witness whereof the Society has caused this certificate to be signed and its seal affixed on the \_\_\_\_\_ day of \_\_\_\_\_, Two Thousand and Fifteen.

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## **Recipients**

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

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## **Harris P. Mosher · 1867-1954**

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Highly respected, feared yet 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 associated with the Massachusetts Eye and Ear Infirmary and the Harvard Medical School as an instructor in the department of anatomy.

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.



**TRIOLOGICAL SOCIETY  
118TH ANNUAL MEETING AT COSM  
HYNES CONVENTION CENTER & SHERATON  
BOSTON  
BOSTON, MASSACHUSETTS**

**FRIDAY, APRIL 24  
HYNES CONVENTION CENTER - BALLROOM A**

- 7:00**                    Triological Business Meeting and New Fellows Ceremonies/Reception (members only)
- 8:00**                    **WELCOME/OPENING REMARKS BY PRESIDENT**  
Derald E. Brackmann, MD, Los Angeles, CA
- PRESIDENTIAL CITATION AWARDEES INTRODUCTIONS**  
John L. Go, MD, Los Angeles, CA  
Michael R. Stefan, MD, Los Angeles, CA  
Marilene B. Wang, MD, Los Angeles, CA
- 8:10**                    **GUEST OF HONOR INTRODUCTION/PRESENTATION**  
**Creativity in Head and Neck Surgery**  
Gerald S. Berke, MD FACS, Los Angeles, CA
- 8:25**                    **PRESIDENT'S ADDRESS**  
**Vestibular Schwannoma Management Then and Now**  
Derald E. Brackmann, MD, Los Angeles
- 8:45**                    **MOSHER AWARD FOR 2015 TRIOLOGICAL SOCIETY THESIS**  
**The Social Distraction of Facial Paralysis: Objective Measurement of Social Attention Using Eye Tracking**  
Lisa E. Ishii, MD MHS, Baltimore, MD

**Educational Objective:** At the conclusion of the presentation participants should be able to 1) describe the measurable differences in observers gazing on normal faces as compared to paralyzed faces, 2) understand areas of priority for reconstructive surgery for facial paralysis.

**Objectives:** To measure the attentional distraction to the facial paralysis deformity using eye-tracking, and to distinguish between attention paid to the upper and lower facial divisions in patients with complete paralysis. Our hypothesis was that features affected by the paralysis deformity would distract the casual observer leading to an altered pattern of facial attention as compared to normals. **Study Design:** Randomized controlled experiment. **Methods:** Sixty casual observers viewed images of paralyzed faces (House-Brackmann grades IV-VI) and normal faces smiling and in repose. The SMI iView X RED (SensoMotoric, Inc., Boston, MA) eye gaze tracker was used to record the eye movements of observers gazing on the faces for 10 seconds each. Fixation durations for all predefined areas of interest were analyzed using three separate multivariate analyses. **Results:** Casual observers gazing on both paralyzed and normal faces directed the majority of their attention to the central triangle region. However, significant differences were measured in the distribution of attention among individual features in the central triangle and to individual sides of the face. Observers directed more attention to the mouth of paralyzed faces, smiling (ANOVA > F 0.0001) and in repose (ANOVA > F 0.0000), than on normal faces. Attention was asymmetrically distributed between the two halves of paralyzed faces with more faces where there was equal attention to the two sides (paralyzed smiling minus normal smiling  $P > |z| 0.000$ ). **Conclusions:** Casual observers directed attention in a measurably different way when gazing on paralyzed faces as compared to normal faces, a finding exacerbated with smiling. These findings help to explain society's perceptions of attractiveness and affect display that differ for paralyzed and normal faces, and can be used to direct our reconstructive efforts.

# Friday

8:55

## FOWLER AWARD FOR 2015 TRIOLOGICAL SOCIETY THESIS

### Resveratrol Ameliorates Abnormalities of Fluid and Electrolyte Secretion in a Hypoxia-Induced Model of Acquired CFTR Deficiency

Bradford A. Woodworth, MD, Birmingham, AL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand new treatment strategies for sinus disease predicated on the use of chloride secretagogues.

**Objectives:** Ineffective mucociliary clearance (MCC) is a common pathophysiologic process that underlies airway inflammation and infection. A dominant fluid and electrolyte secretory pathway in the nasal airways is governed by the cystic fibrosis transmembrane conductance regulator (CFTR). Decreased transepithelial Cl<sup>-</sup> transport secondary to an acquired CFTR deficiency may exacerbate respiratory epithelial dysfunction by diminishing MCC and increasing mucus viscosity. The objectives of the present study are to 1) develop a model of acquired CFTR deficiency in sinonasal epithelium using hypoxia, 2) investigate whether the polyphenol resveratrol promotes CFTR-mediated anion transport, 3) explore resveratrol mechanism of action and determine therapeutic suitability for overcoming acquired CFTR defects, and 4) test the drug in the hypoxic model of acquired CFTR deficiency in preparation for a clinical trial in human sinus disease. We hypothesize that hypoxia will induce depletion of airway surface liquid (ASL) secondary to acquired CFTR deficiency and that resveratrol will restore transepithelial Cl<sup>-</sup> secretion and recover ASL hydration. **Study Design:** Basic science. **Methods:** Murine nasal septal (MNSE) and human sinonasal epithelial (HSNE) cultures were incubated under hypoxic conditions (1% O<sub>2</sub>, 5% CO<sub>2</sub>) and transepithelial ion transport (change in short-circuit current= $\Delta I_{sc}$ ) evaluated in Ussing chambers. Resveratrol was tested using primary cells and HEK293 cells expressing human CFTR by Ussing chamber and patch clamp techniques under both phosphorylating and non-phosphorylating conditions. CFTR activation was evaluated in human explants and by murine *in vivo* (nasal potential difference) assessment. Cellular cAMP (ELISA) and subsequent CFTR regulatory domain (R-D) phosphorylation (gel-shift assay) were also evaluated. Effects of hypoxia and resveratrol on ASL were tested using confocal laser scanning microscopy (CLSM) and micro-optical coherence tomography ( $\mu$ OCT). **Results:** Hypoxia significantly decreased  $\Delta I_{sc}$  (in  $\mu$ A/cm<sup>2</sup>) attributable to CFTR at 12 and 24 hours of exposure in both MNSE [13.55 $\pm$ 0.46 (12 hours); 12.75 $\pm$ 0.07(24 hours) vs. 19.23 $\pm$ 0.18(control); p<0.05] and HSNE [19.55 $\pm$ 0.56(12 hours); 17.67 $\pm$ 1.13(24 hours) vs. 25.49 $\pm$ 1.48(control); p<0.05]. We have shown that resveratrol (100 $\mu$ M) enhanced CFTR-dependent Cl<sup>-</sup> secretion in HSNE to an extent comparable to the recently FDA-approved CFTR potentiator, ivacaftor. Cl<sup>-</sup> transport across human sinonasal explants [78.42 $\pm$ 1.75 vs. 1.75 $\pm$ 1.5(control); p<0.05] and *in vivo* murine nasal epithelium [-4 $\pm$ 1.8 vs. -0.8 $\pm$ 1.7 mV(control); p<0.05] was also significantly increased by the drug. No increase in cellular cAMP or CFTR R-domain phosphorylation was detected. Inside out patches showed increased CFTR open probability [(NPo/N(N=channel number))] compared to controls in both MNSE [(0.329 $\pm$ 0.116 vs. 0.119 $\pm$ 0.059(control); p<0.05)] and HEK293 cells [(0.22 $\pm$ 0.048 vs. 0.125 $\pm$ 0.07(control); p<0.05)]. ASL thickness was decreased under hypoxic conditions when measured by CLSM [4.19 $\pm$ 0.44 vs. 6.88 $\pm$ 0.67(control); p<0.05]. A 30 minute apical application of resveratrol increased ASL depth in normal epithelium [8.08 $\pm$ 1.68 vs. 6.11 $\pm$ 0.47(control); p<0.05]. Furthermore, hypoxia-induced abnormalities of fluid and electrolyte secretion in sinonasal epithelium were restored with resveratrol treatment [5.55 $\pm$ 0.74 vs. 3.13 $\pm$ 0.17(control); p<0.05]. **Conclusions:** CFTR activation with a leading edge Cl<sup>-</sup> secretagogue such as resveratrol represents an innovative approach to overcoming acquired CFTR defects in sinus and nasal airway disease. This exciting new strategy bears further testing in non-CF individuals with CRS.

## CONCURRENT 1 - PEDIATRICS AND OTOTOLOGY HYNES CONVENTION CENTER - BALLROOM A

9:05 - 9:45

**Guest Panel Presentation: Contemporary Neuroradiological Imaging in Evaluation and Management of Otologic Disease**

**Moderators:** Debara Lyn Tucci, MD FACS, Durham, NC  
Anil K. Lalwani, MD FACS, New York, NY

**Guest Speakers:** **Adult Neuroradiology** - Hugh Curtin, MD, Boston, MA  
**Pediatric Neuroradiology** - Caroline D. Robson, MB ChB, Boston, MA

9:45 - 10:10

**Break/View Posters - Hynes Convention Center Exhibit Hall D**



**Moderators: Hinrich Staecker, MD PhD, Kansas City, KS  
Eric P. Wilkinson, MD FACS, Los Angeles, CA**

**10:10**

**Fifteen Years of Auditory Brainstem Implants in Children**

Giacomo G. Colletti, MD, Verona, Italy; Vittorio V. Colletti, MD, Verona, Italy (Presenter); Marco M. Mandalà, MD PhD, Siena, Italy; Liliana L. Colletti, PhD, Verona, Italy

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the role and efficacy of auditory brainstem implantation (ABI) in the treatment of children and infants with profound hearing loss from severe cochlear or cochlear nerve malformations that cannot be fitted with cochlear implantation.

**Objectives:** To evaluate the safety and efficacy of the retrosigmoid approach for reaching the foramen of Luschka and fit the auditory brainstem implant (ABI) on the cochlear nucleus of the floor of the fourth ventricle in this cohort of infants and determine predictors of success as a function of age at implantation and type of associated disabilities. **Study Design:** Case series. **Methods:** Between January 2000 and September 2014, ABI was fitted in 103 children. Patients were excluded if data was incomplete or if surgery was performed at outside institution. **Results:** Sixty-seven patients who underwent ABI at our institution were included in the study. The mean age was 3.30 ( $\pm 1.61$ ). There were 37 males and 30 females. There was a statistically significant decrease in performance as a function of severity of the associated disabilities ( $p < 0.05$ ). Statistically significant improvements were attained in children as a function of age at implantation with children under 2 years performing better than the older ones ( $p < 0.05$ ). Perceptual and speech performances significantly decreased in performance in children implanted after 5 years of age. There were no intraoperative or perioperative complications. Success was defined as final CAP scores reaching level 5. By this definition, 37.31% patients were treated successfully. **Conclusions:** This represents the largest series of ABIs performed by a single institution providing a high success rate with minimal complications and warrants a prominent position in the spectrum of the treatment modalities for profoundly deaf children caused by significant malformation of the cochlear and cochlear nerve.

**10:17**

**Normative Data for Rotational Chair Stratified by Age**

Fung Michael Chan, MD, New York, NY; Jessica Galatioto, AuD, New York, NY; Michael Amato, BS, New York, NY; Ana Hae-ok Kim, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the need for age stratified, normative rotary chair gain data.

**Objectives:** To compile RC gains from patients without vestibular issues stratified by age. **Study Design:** Prospective. **Methods:** Subjects without history of inner ear disease were included. RC data was stratified into the following age groups: 4-12 years, 13-17 years, 18-30 years, 31-50 years, and > 50 years. Vestibuloocular response (VOR) gains were calculated for these groups  $\pm$  standard deviation (SD). **Results:** Fifty healthy subjects were recruited (46% male; 54% female). Mean VOR gains for the 4-12 group is  $0.67 \pm 0.22$ ,  $0.76 \pm 0.17$ ,  $0.80 \pm 0.16$ ,  $0.83 \pm 0.13$ ,  $0.80 \pm 0.13$ ,  $0.86 \pm 0.20$ , and  $0.95 \pm 0.14$  at 0.01, 0.02, 0.04, 0.08, 0.16, 0.32, and 0.64 Hz, respectively. In the 13-17 group,  $0.37 \pm 0.08$ ,  $0.44 \pm 0.04$ ,  $0.45 \pm 0.08$ ,  $0.5 \pm 0.08$ ,  $0.52 \pm 0.09$ ,  $0.48 \pm 0.09$ , and  $0.52 \pm 0.1$ . In the 18-30 group,  $0.38 \pm 0.11$ ,  $0.45 \pm 0.14$ ,  $0.50 \pm 0.13$ ,  $0.49 \pm 0.14$ ,  $0.51 \pm 0.16$ ,  $0.54 \pm 0.13$ , and  $0.55 \pm 0.15$ . In the 31-50 group,  $0.34 \pm 0.09$ ,  $0.41 \pm 0.08$ ,  $0.43 \pm 0.11$ ,  $0.45 \pm 0.13$ ,  $0.46 \pm 0.15$ ,  $0.49 \pm 0.16$ , and  $0.43 \pm 0.2$ . For the > 50 group,  $0.47 \pm 0.16$ ,  $0.48 \pm 0.15$ ,  $0.49 \pm 0.22$ ,  $0.52 \pm 0.25$ ,  $0.57 \pm 0.23$ ,  $0.64 \pm 0.29$ , and  $0.58 \pm 0.22$ . The overall mean VOR gains are  $0.41 \pm 0.15$ ,  $0.48 \pm 0.1$ ,  $0.5 \pm 0.17$ ,  $0.53 \pm 0.18$ ,  $0.54 \pm 0.17$ ,  $0.56 \pm 0.19$ , and  $0.55 \pm 0.23$ . VOR gains in the 4-12 group diagnosed with peripheral vertigo were considered normal under the manufacture normative reference, whereas abnormal when compared to our gains. **Conclusions:** The current manufacturer provided normative data does not serve as an accurate reference, especially for the preadolescent group. A larger population of all age groups should be compared to the current RC manufacture normative values to ensure that it accurately reflects the true normative data.

**10:24**

**Spontaneous Alterations in Impedances in Patients with the Nucleus CI422 Electrode May Result in Auditory and Vestibular Complaints**

Kelly H. Barninger, AuD, Philadelphia, PA; Jason A. Brant, MD, Philadelphia, PA; Michelle M. Montes, AuD, Philadelphia, PA; Douglas C. Bigelow, MD, Philadelphia, PA; Michael J. Ruckenstein, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify spontaneous fluctuations in impedance in Nucleus CI422 electrode recipients resulting in auditory and vestibular complaints and should be able to treat these complications.

# Friday

**Objectives:** We conducted a retrospective review of patients who underwent cochlear implantation with the Nucleus CI 422 electrode with emphasis on identification of patients who demonstrated spontaneous fluctuations in electrode impedance that may have resulted in alterations in implant performance. **Study Design:** Retrospective review. **Methods:** Charts of all patients receiving Nucleus CI422 electrodes were reviewed and compared to data obtained for patients with Nucleus Contour Advance electrodes. **Results:** Of 100 patients who received the CI 422 electrodes, 25% presented with significant fluctuations in the electrode impedances at three months post implantation. 50% of these patients required reprogramming to address complaints of decreases in stimulus clarity, intensity, and/or a decrease in battery life. No differences were seen in these results when analyzed for surgeon performing the surgery or audiologist programming the device. These complaints were not encountered in patients receiving the Nucleus Contour Advance perimodiolar electrode. Management included increasing the pulse width of the stimulus to restore the system compliance. In the subpopulation of these patients, impedance changes were recurrent. **Conclusions:** These findings may reflect evolving intracochlear fibrosis that may affect the function of a small diameter lateral wall electrode. A charge based coding strategy that automatically alters pulse width in response to increased impedance may resolve these issues. In the interim cochlear implant centers should consider the high incidence of these complications when choosing an implant.

**10:31**                      **Management and Complications of Tympanostomy Tubes in Head and Neck Cancer Patients**  
Jaecel O. Shah, MD, Houston, TX; Paul W. Gidley, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the benefits and sequelae of treatment of otitis media with tympanostomy tubes in head and neck cancer patients.

**Objectives:** To assess complication rates for tympanostomy tubes in head and neck cancer patients. **Study Design:** Retrospective review. **Methods:** The records of 182 head and neck cancer patients with otitis media from 2000 to 2007 were reviewed for complications related to tympanostomy tube placement. Demographic data, tumor type, stage, audiometric function and outcomes were tabulated. **Results:** We identified 35 nasopharyngeal (NP), 34 paranasal sinus (PNS), and 24 larynx cancer ears with OM. A tympanostomy tube was placed in 29 (82.8%) ears with NP cancer of which 13 (44.8%) were placed prior to radiotherapy. In NP cancer patients, tympanostomy complications included 11 (37.9%) otorrhea, 3 (10.3%) otorrhea with perforation and 1 (3.4%) cholesteatoma. Of those patients with PNS cancer, 31 (91.2%) ears had a tympanostomy tube placed with 17 (54.8%) tubes placed prior to radiotherapy. Tympanostomy complications included 10 (32.3%) otorrhea and 3 (9.7%) otorrhea with perforation. All 15 patients with laryngeal cancer received radiotherapy after otologic intervention with 22 (91.67%) ears treated with tympanostomy tubes; 5 (22.7%) ears developed chronic otorrhea. **Conclusions:** Treatment of OM in the setting of NP or PNS cancer had similar rates of complications regardless of intervention timing in relation to radiotherapy. Laryngectomy patients also had a high rate of post radiation tympanostomy sequelae. Tympanostomy tube placement, while initially effective for OM was shown in our review to have a high rate of complications in head and neck cancer patients.

**10:38**                      **Q&A**

**10:41**                      **Prevalence of Cochlear Facial Dehiscence in a Study of 1,020 Temporal Bone Specimens**  
Seiyeon Chung, BS, Newark, NJ; Christina H. Fang, BS, Newark, NJ; Danielle Blake, MD, Farmingdale, CT; John P. Carey, MD, Baltimore, MD; Howard W. Francis, MD, Baltimore, MD; Robert W. Jyung, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the prevalence of cochlear facial dehiscence and the possible developmental and demographic factors that affect cochlear facial partition width.

**Objectives:** To determine the prevalence of cochlear facial dehiscence (CFD) in a human temporal bone collection and examine the influence of otic capsule area, age, gender, and race on CFD. **Study Design:** Descriptive study of archived temporal bone specimens. **Methods:** Targeted sections from 1,020 temporal bone specimens were scanned and examined for CFD. Cochlear facial partition width (CFPW) and otic capsule area (OCA), a marker of bone thickness were measured using image analysis software. Demographic data were analyzed. **Results:** The mean CFPW was 0.23 mm (range, 0--0.92 mm; SD, 0.15 mm). CFPW was measured to be less than 0.03 mm in 4.71% (n = 48) of cases, with 0.59%, (n = 6) completely dehiscent. Specimens with very thin CFPW (< 0.03 mm) had OCA ranging from 6.6 to 14.7 mm<sup>2</sup>, values significantly less than specimens with greater CFPW (> 0.03 mm), ranging from 7.4 to 21.9 mm<sup>2</sup> (P < 0.001). CFPW positively correlated with OCA (R<sup>2</sup> = 0.12) but negatively correlated with patient age (R<sup>2</sup> = -0.01). Males had sig-

nificantly thicker CFPW than females ( $P = 0.02$ ). Caucasians had significantly thinner CFPW than non-Caucasians ( $P = 0.02$ ). **Conclusions:** CFD occurs in nearly 0.6% of specimens in this temporal bone collection. Close to 5% of cases are sufficiently thin ( $< 0.03$  mm) to probably appear dehiscent on CT scanning. Smaller OCA correlated with thinner CFPW, suggesting a developmental factor. Older, female, and Caucasian patients may have a greater risk for CFD and its associated symptoms.

## 10:48 Vestibular Migraine in the Pediatric Population

Jacob R. Brodsky, MD, Boston, MA; Brandon Alexander Cusick, MBA, Boston, MA; Guangwei Zhou, ScD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the typical presentation, diagnostic features, and response to medical therapy of vestibular migraine in children and adolescents.

**Objectives:** Epidemiologic studies have shown vestibular migraine (VM) to be the most common cause of vertigo in children, but little is known about the typical presentation and response to treatment of this disorder in the pediatric population. The aim of this study was to evaluate the clinical features and response to therapy of VM in children and adolescents.

**Study Design:** Retrospective chart review. **Methods:** Forty patients with a diagnosis of VM were identified from the records of 208 children evaluated at our children's hospital's balance and vestibular program from July 2012 through July 2014. Patients with a history of major otologic or neurologic surgery, recent concussion, or additional vestibular disorders were excluded. Medical records of the remaining 28 patients were reviewed. All subjects met criteria for definite ( $n=25$ ) or probable ( $n=3$ ) vestibular migraine as defined by the 2012 consensus of the Barany and International Headache Societies. **Results:** Subject mean age was 14.48 years (range 9-18). Rotation ( $n=25$ ), caloric ( $n=8$ ), and cervical vestibular evoked myogenic potential ( $n=24$ ) testing were normal. Medications effectively reduced vestibular symptoms in 88% of those treated with tricyclics ( $n=8$ ), 86% of those treated with cyproheptadine ( $n=7$ ), 80% of those treated with topiramate ( $n=5$ ), 80% of those treated with triptans ( $n=10$ ), and 25% of those treated with gabapentin ( $n=4$ ). No improvement was seen with benzodiazepines ( $n=3$ ), lamotrigine ( $n=2$ ), propranolol ( $n=2$ ), acetazolamide ( $n=2$ ), or valproate ( $n=1$ ). **Conclusions:** Vestibular migraine is a common cause of vertigo in children and adolescents that is frequently responsive to medical therapy.

## 10:55 The Utility of Fine Needle Aspiration Biopsy in the Evaluation of Pediatric Head and Neck Masses

Phillip A. Huyett, MD, Pittsburgh, PA; Sara E. Monaco, MD, Pittsburgh, PA; Sukgi S. Choi, MD, Pittsburgh, PA; Jeffrey P. Simons, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the role of fine needle aspiration biopsy in the workup of pediatric head and neck masses.

**Objectives:** To assess the clinical application, diagnostic utility, and safety profile of fine needle aspiration biopsy (FNAB) of head and neck (H&N) masses in the pediatric population. **Study Design:** Historical chart review. **Methods:** The records of all patients with H&N masses at a tertiary children's hospital who underwent FNAB from July 2007 to July 2014 were reviewed. **Results:** There were 257 patients and 338 FNABs. Patients ranged in age from 0 to 20 years (mean 9.3 years); lesions ranged in size from 0.3cm to 12.5cm (mean 2.4cm). Most common clinical indications included lymphadenopathy and thyroid nodule. FNABs were performed in the interventional radiology suite ( $n=132$ , 47%), operating room ( $n=80$ , 28%), outpatient clinic ( $n=66$ , 23%), and inpatient ward ( $n=6$ , 2%). No major complications were reported. The most common FNAB final diagnoses included reactive lymphadenopathy ( $n=99$ , 33.3%), benign colloid nodule ( $n=31$ , 10.4%), malignancies ( $n=27$ , 9.1%) and atypical mycobacterial infection ( $n=15$ , 5%). Ancillary studies were performed in 150 cases (44%), including flow cytometry, special stains, microbiology and thyroid mutational analysis. When rapid on-site interpretation yielded a preliminary diagnosis, it correlated with final cytopathology 99.1% of the time ( $n=106$ ) and final surgical histopathology 93.3% of the time ( $n=30$ ). On surgical histopathologic and clinical followup, sensitivity of FNAB was 94.5% and specificity was 97.9%. Surgery following benign FNAB occurred only 14 times in 7 years (7.2%). **Conclusions:** FNAB is a safe and accurate diagnostic tool for guiding management of persistent lymphadenopathy, thyroid nodules, and other H&N masses in pediatric patients. Benign FNAB can often obviate the need for surgical intervention.

# Friday

11:02

## Voice Quality of Life Outcomes after Velopharyngeal Insufficiency Surgery

Stephen R. Larson, BS, Washington, DC; Jennifer M. Lavin, MD, Washington, DC (Presenter); Anne M. Hardy, MSCCC-SLP, Washington, DC; Pamela A. Mudd, MD, Washington, DC; Diego A. Preciado, MD PhD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss factors that are associated with improved voice quality of life outcomes after velopharyngeal insufficiency surgeries. They may use this data to aid in surgical patient selection and preoperative counseling of patients.

**Objectives:** Velopharyngeal insufficiency (VPI) alters the volume and intelligibility of speech and can compromise the ability to communicate. Currently there is no consensus on which patients demonstrate the greatest improvement in speech after VPI repair. This study aims to identify preoperative factors that are associated with improved speech after surgery. **Study Design:** Retrospective case series. **Methods:** Charts from 30 patients undergoing surgical intervention for VPI between 2007 and 2014 were reviewed. Data, including the presence or absence of submucous cleft and genetic syndrome, was compared to performance on the validated questionnaire, the Pediatric Voice Handicap Index (pVHI). Both the postoperative pVHI and difference between pre and postoperative scores were compared to preoperative demographic data. **Results:** Of the patients identified, 17 had pVHI scores recorded in the chart. Average age was 8.5 years. Surgeries performed were posterior pharyngeal flap (12), sphincter pharyngoplasty (3) and Furlow pharyngoplasty (2). Overall pVHI scores improved postoperatively from  $35\pm 18$  to  $18\pm 11$ , ( $p=.002$ ). This improvement is isolated to the subgroup of patients with submucous cleft ( $n=9$ ) ( $40\pm 20$  to  $17\pm 11$ ,  $p=.008$ ), and patients without an identified genetic syndrome ( $n=11$ ) ( $38\pm 19$  to  $16\pm 10$ ,  $p=.002$ ). No significant improvement in postoperative pVHI score was observed in patients lacking submucous cleft ( $30\pm 14$  to  $20\pm 12$ ,  $p=.14$ ) and in those with identified genetic syndromes ( $30\pm 14$  to  $20\pm 12$ ,  $p=.14$ ). **Conclusions:** Surgical therapy as a treatment for velopharyngeal insufficiency is associated with improvement in voice related quality of life. Surgery appears to have a greater impact on patients with submucous cleft and those without identified genetic syndromes.

11:09

## Variation in Costs among Surgeons and Hospitals in Pediatric Tympanostomy Tube Placement

Phayvanh P. Sjogren, MD, Salt Lake City, UT; Jake Henrichsen, BS, Murray, UT; Griffin Olsen, BS, Murray, UT; Mark Ott, MD, Murray, UT; Rajendu Srivastava, MD MPH, Murray, UT; Jeremy D. Meier, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the major expenses for outpatient pediatric tympanostomy tube placement and site differences for cost variations among hospitals and surgeons.

**Objectives:** 1) Identify the major expenses for outpatient pediatric tympanostomy tube placement in a multi-hospital network; and 2) compare differences for variations in costs among hospitals and surgeons. **Study Design:** Observational cohort study. **Methods:** An observational cohort study was performed in a multi-hospital network using a standardized activity based accounting system to determine hospital costs for tympanostomy tube placement from February 2011 to March 2014. Children 6 months to 3 years old who underwent same day surgery for tympanostomy tubes at 14 hospitals were included. Subjects with additional procedures were excluded. Hospital costs were subdivided into categories including operating room (OR), same day surgery (SDS) pre-op, SDS post-op, post-anesthesia care unit (PACU), anesthesia, pharmacy and OR supplies. **Results:** The study cohort included 3,550 patients. There were a total of 65 surgeons who performed tympanostomy tube placement at 14 hospitals. Mean cost per surgery was \$789 (780-798). OR and SDS pre-op were the greatest expenditures, with each category accounting for 30% of the overall costs. Costs of the procedure varied among hospitals, with a mean of \$510 to \$1245. Variation was also found among surgeons with a range of \$465 to \$1170 per case. Pharmacy costs and operative time were the major drivers of cost variation among surgeons. **Conclusions:** This study demonstrates that OR and SDS pre-op costs accounted for the greatest expenditure in tympanostomy tube placement and significant variation exists among surgeons and hospitals within a multi-hospital network. Further research is needed to elucidate factors accounting for such variation in cost and physician practice and the overall impact on patient outcomes.

11:16

Q&A

- 11:20 - 12:00**      **Panel: Rehabilitation of Children with Unilateral Hearing Loss**  
**Moderator:**      Carol J. MacArthur, MD FACS, Portland, OR  
**Panelists:**      Karen J. Enright, MD PhD, Detroit, MI  
                         Timothy E. Hullar, MD FACS, St. Louis, MO  
                         Judith E.C. Lieu, MD MSPH, St. Louis, MO  
                         Diego Alfonso Preciado, MD PhD, Washington, DC
- Noon**              **Adjourn**
- 5:30 - 7:00**      **Meet the Authors Poster Reception - Triological Society, ANS, AOS, ARS and ASPO**  
**Hynes Convention Center Exhibit Hall D**

## CONCURRENT 2 - LARYNGOLOGY AND FACIAL PLASTIC/RECONSTRUCTIVE SURGERY HYNES CONVENTION CENTER - ROOM 302

9:05 - 9:45

**Panel: Endoscopic Management of Pediatric and Adult Airway Issues**

**Moderators:** Emily Frances Boss, MD, Baltimore, MD  
Dinesh K. Chhetri, MD, Los Angeles, CA

**Panelists:** **Adult Airway**

Dinesh K. Chhetri, MD, Los Angeles, CA  
Ramon A. Franco Jr., MD, Boston, MA

**Pediatric Airway**

Sanjay Rajendra Parikh, MD BSc FACS, Seattle, WA  
Christopher J. Hartnick, MD FACS, Boston, MA

9:45 - 10:10

**Break/View Posters - Hynes Convention Center Exhibit Hall D**

**Moderators:** Joel H. Blumin, MD FACS, Milwaukee, WI  
Wm. Russell Ries, MD FACS, Nashville, TN

10:10

**Outcomes of Serial Microflap Excisions for Vocal Fold Dysplasia**

Annie K. Ahn, MD, Houston, TX; Li Wang, MS, Nashville, TN; James C. Slaughter, PhD, Nashville, TN; Robert H. Ossoff, MD DMD, Nashville, TN; David O. Francis, MD MS, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participant should be able to discuss the impact of serial full thickness microflap excision in the management of laryngeal dysplasia.

**Objectives:** It has been hypothesized that serial full thickness microflap type excision of laryngeal dysplasia leads to reduced dysplasia grade. Fifteen years of experience using this approach was analyzed to elucidate the effect of serial excision on dysplasia severity. **Study Design:** Retrospective review. **Methods:** A retrospective chart review (1994 - 2013) was performed on patients treated for vocal fold dysplasia with serial full thickness microflap type excisions. Patients with one excision, invasive cancer at initial excision, laryngeal cancer history, or history of radiation therapy were excluded. Data from surgical procedures, associated pathology, and patient characteristics were recorded. Weighted repeated measures ordinal logistic regression measured associations with pathology findings. **Results:** Of 56 patients [median age 64 (interquartile range 55 - 73), 89% male, 64% smoking history, 26% alcohol users, 87% gastroesophageal reflux disease], 21 met inclusion criteria. During the study period, patients had between 2 and 54 excisions with a median time between excisions of 4.1 months. A transition model tested if previous pathology was associated with subsequent pathology grade. Patients with moderate, severe, or carcinoma in situ on a prior biopsy had 2.5, 5.47, and 8.6 times increased odds, respectively, of having a higher score relative to a lower score at the next excision. Each additional excision increased odds of higher grade pathology by 4% (odds ratio 1.04, confidence interval 1.01 - 1.07; p=0.003). **Conclusions:** Data does not support the hypothesis that serial full thickness excision decreases dysplasia grade. Care must be taken when performing pre- and post-assessment of dysplasia in this population, as there is significant within person variability in pathology over time.

10:17

**Thyroplasty in the Previously Irradiated Neck: A Case Series and Assessment on Safety and Voice Outcomes**

James R. White, MD, Rochester, MN; Daniel B. Noel, MD, Rochester, MN; Diana M. Orbelo, PhD, Rochester, MN; Nicolas E. Maragos, MD, Rochester, MN; Dale C. Ekbohm, MD, Rochester, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to gain insight into the safety and success of thyroplasties conducted on patients with prior neck radiation.

**Objectives:** External beam radiation to the neck has been widely considered a contraindication for thyroplasty due to the concern of infection and implant extrusion. We present, to our knowledge, the first case series published on thyroplasties performed in a previously radiated field. **Study Design:** Retrospective case series. **Methods:** Using the institution's clinical notes search tool, all charts documenting thyroplasty and radiation were reviewed. Those patients who received

external beam radiation to the operative field prior to thyroplasty were included. Data including details and duration of radiation, timing and specifics of the procedure, postoperative complications and risk factors, voice outcomes, and length of followup were collected. **Results:** Between 1999 and 2014, 14 patients were identified who met criteria. Of the thyroplasties performed, 12 were Netterville silastic implants, 2 were Gore-Tex implants, 6 had a concurrent arytenoid adduction, and 1 was a midline type II thyroplasty. In terms of risk factors for postoperative complications, 2 were diabetic, none were active smokers, and 1 had a splenectomy. All patients were given postoperative antibiotics. The mean duration of followup after surgery was 2.6 years. No patients were found to have postoperative complications. Pre and postoperative VHI data (3 of 14 patients) and V-QROL data (5 of 14 patients) was accessible. Overall, there was a substantial improvement in voice outcomes. **Conclusions:** Thyroplasty in an irradiated field is feasible and safe. In our series, we had no postoperative complications and significant improvement in voice outcomes.

**10:24**                      **Synkinesis following Recurrent Laryngeal Nerve Injury: A Computer Simulation**  
Randal C. Paniello, MD PhD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate the range of potential recurrent laryngeal nerve recovery patterns that may occur based on the random nature of the recovery process.

**Objectives:** When the recurrent laryngeal nerve (RLN) is injured, functional recovery may be limited by the number of axons that regrow across the site of injury, and by the proportions of these axons that reinnervate the antagonistic muscle (synkinesis). This process was investigated in a computer model of RLN recovery, based on the fundamental assumption that the alignment of the recovering axons occurs randomly. **Study Design:** Computer simulation. **Methods:** A computer program was developed that accepted as inputs: number of axons in the RLN; proportions of axons originally innervating the adductor group, the posterior cricoarytenoid muscle (PCA), and the sensory bundle; fraction of axons transected; number of axons that reform connections across the injury site; and the width of one standard deviation about the mean. The program employed random sampling from a normal distribution to model various degrees of recovery, using random numbers to assign each axon to either the correct muscle, an incorrect muscle, or no recovery. Each simulation was run 2000 times and the mean, highest and lowest degrees of synkinesis were determined. **Results:** More severe injuries were associated with greater degrees of synkinesis. Extremes of synkinesis were possible, but were rare. One example result, for a partial injury involving 50% of RLN axons with a recovery rate of 50%, found: in the adductor muscles, 75% of axons will be innervated, of which 50% are the original uninjured axons, 19% are recovered adductor axons, and 6% are misdirected abductor axons. In the PCA, 75% of axons will be innervated, including 50% uninjured, 6% recovered abductors, and 19% misdirected adductor axons. Results of many such simulations are plotted. **Conclusions:** The process of laryngeal synkinesis can be anticipated based on known anatomic ratios and estimated recovery rates. The PCA is invariably much more affected by synkinetic reinnervation than are the adductor muscles.

**10:31**                      **Outcome of Regenerative Therapy for Age Related Vocal Fold Atrophy with Basic Fibroblast Growth Factor**  
Satoshi Ohno, MD PhD, Wakayama, Japan; Shigeru Hirano, MD PhD, Kyoto, Japan; Shinji Takebayashi, MD PhD, Wakayama, Japan; Hiroki Ikeda, MD PhD, Wakayama, Japan; Makoto Miura, MD PhD, Wakayama, Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the efficacy of basic fibroblast growth factor for the treatment of age related vocal fold atrophy.

**Objectives:** Age related vocal fold atrophy has become a significant voice disorder as the population of elderly is growing. However, several therapeutic challenges have limited effects to improve the quality of voice. We reported that basic fibroblast growth factor (bFGF) stimulates fibroblasts to produce extracellular matrices such as hyaluronic acid in the lamina propria, leading to a regeneration of pliable vocal folds in animal models. This study aimed to determine the efficacy of bFGF for the treatment of age related vocal fold atrophy. **Study Design:** Prospective study. **Methods:** Six patients with age related vocal fold atrophy underwent injection of bFGF in vocal folds. Vocal outcomes and stroboscopic examinations were evaluated 1, 3 and 6 months after the injection. Outcome measures included voice handicap index 10 (VHI-10), GRBAS scale, maximum phonation time (MPT), amplitude perturbation quotient (APQ) and pitch perturbation quotient (PPQ). **Results:** VHI-10 and GRBAS scale were significantly improved six months after the injection (15.8 vs 4.0, and 3.67 vs 0.67, respectively,  $p < 0.05$ ). MPT, APQ and PPQ were improved, however they did not reach statistical significance. Stroboscopic examinations showed improvement of glottic closure and better mucosal wave. **Conclusions:** This is the first study to evaluate regenerative effects of bFGF injection for the treatment of age related vocal fold atrophy using VHI-10. Injection of bFGF significantly improved VHI-10 and glottal insufficiency for at least six months.

# Friday

10:38

## **The Clinical Utility of High Resolution Manometry in the Evaluation of Dysphagia**

Alexander Walker Murphey, BS, Charleston, SC; Ashli K. O'Rourke, MD, Charleston, SC; Gregory N. Postma, MD, Augusta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain how high resolution manometry can help guide medical and surgical treatment in patients with esophageal dysphagia.

**Objectives:** The utility of high resolution pharyngoesophageal manometry (HRM) to guide treatment planning for otolaryngologists has not been clearly defined. This study evaluated treatment recommendations resulting from HRM in dysphagic patients presenting to an otolaryngology practice. **Study Design:** Retrospective review. **Methods:** Retrospective chart review of patients referred for HRM over a 4 year period. **Results:** Eighty-seven patients were included with 42 males, 45 females and an average age of 59 years (range 17-87). The most common indication for HRM was nonspecific dysphagia (61/87; 70.1%). Only 10.3% (9/87) of patients had a completely normal examination. 34.5% of patients (30/87) were found to have cricopharyngeal (CP) dysfunction and 73.6% (64/87) of patients were found to have esophageal body dysfunction. Importantly, 36.7% (11/30) of patients with CP dysfunction were also found to have concomitant esophageal hypomotility. This finding is important when considering surgery to target the CP muscle. Ultimately, 15.9% (13/82) of patients underwent some form of CP intervention (myotomy, dilation, and/or botulinum toxin injection) based on HRM findings. 8% (7/87) patients were found to have achalasia or LES hypertension and referred for lower esophageal sphincter myotomy or botulinum toxin relaxation. 14.9% (13/87) of patients with esophageal spasm were managed conservatively with medication. **Conclusions:** While most complaints leading to HRM referral are nonspecific, it can be essential in guiding appropriate specific surgical or medical intervention in many cases.

10:45

## **Q&A**

10:48

## **The Cost of Facial Deformity: A Valuation and Health Utility Study**

Jacob K. Dey, BS, Baltimore, MD; Lisa E. Ishii, MD MHS, Baltimore, MD; Jennifer Goines, BS, Atlanta, GA; Patrick J. Byrne, MD, Baltimore, MD; Kofi D.O. Boahene, MD, Baltimore, MD; Masaru Ishii, MD PhD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain how established valuation and health utility metrics were used to assess the value of reconstructing facial lesions as perceived by society, and then appreciate the potential implications of these quantitative outcomes data.

**Objectives:** Measure the dollar value and health utility of surgically reconstructing facial lesions as perceived by society. **Study Design:** Prospective randomized controlled experiment. **Methods:** A socioeconomically diverse group of 200 casual observers viewed images of faces with lesions of varying sizes and locations, before and after surgical reconstruction, and normal comparison faces. Observers were instructed to imagine the lesion in each image was on their own face, and rate 1) their own health state utility with the facial lesion; and 2) how much they would be willing to pay to have the facial lesion surgically repaired to normal. Established valuation and health state utility metrics were used. **Results:** Mixed effects linear regression showed that willingness to pay (WTP) varied with preoperative lesion size and location. Participants were willing to pay an average of \$2260 (95% CI: \$1690-2830) to repair a small peripheral lesion, an additional \$2580 (95% CI: \$2100-3060) if the lesion was large, and an additional \$1620 (95% CI: \$1140-2100) if it was centrally located. Reconstructive surgery both improved perceived health utility and markedly decreased WTP for complete reconstruction back to normal; normalizing these metrics for some lesion categories. Using these valuation and health utility data, we calculated WTP per quality adjusted life year (WTP/QALY), a value related metric. **Conclusions:** These are the first data demonstrating that surgical reconstruction of facial lesions is a high value intervention as perceived by society. They have implications for informing guidelines for surgeons and health policy makers, alike.

10:55

## **The Use of Promogran Prisma (a Collagen/Oxidized Regenerated Cellulose Dressing) Treated with Ofloxacin Drops as a Novel Approach to Treating Exposed Cartilage after Revision Rhinoplasty**

Del R. Sloneker, MD, Tacoma, WA; Joseph Shvidler, MD, Tacoma, WA; Patricia S. McAdams, MD, DuPont, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe and apply the use of prisma treated with ofloxacin drops as a means to treat exposed cartilage following revision rhinoplasty when unable to cover the exposure with native tissue.



**Objectives:** To describe the use of prisma treated with ofloxacin drops as a means to treat exposed cartilage following revision rhinoplasty when unable to cover the exposure with native tissue. **Study Design:** Case study and literature review. **Methods:** We present three representative cases in which prisma infused with ofloxacin was used to treat cartilage exposure following revision rhinoplasty. **Results:** Patient 1, a 60 year old man with history of multiple rhinoplasties, underwent tip and ala reconstruction utilizing an autologous costal cartilage graft as part of a Mohs reconstruction for basal cell carcinoma. After multiple local tissue advancements failed to resolve his wound dehiscence and exposure of costal cartilage, prisma treated with ofloxacin was used. The wound healed by secondary intention after 4 weeks of frequent dressing changes. Patient 2, a 55 year old male who, after resection of a right Schneiderian papilloma requiring full thickness reconstruction, developed a patch of exposed septal cartilage. This was also treated successfully with prisma and ofloxacin drops for one month, healing by secondary intention. Patient 3, a 22 year old female with history of cleft lip and palate, who suffered wound dehiscence and cartilage exposure following revision cleft rhinoplasty using cadaveric costal cartilage for tip reconstruction. The wound was successfully treated with six weeks of dressing changes with ofloxacin treated prisma. **Conclusions:** Prisma, treated with ofloxacin, is a novel and effective way to decrease bacterial colonization of exposed cartilage in revision rhinoplasty, when unable to cover the defect with native tissue.

**11:02**                      **Outcomes with the Mohler Rotation Advancement Repair of the Unilateral Cleft Lip**  
 Jessyka G. Lighthall, MD, Hershey, PA; James D. Sidman, MD, Minneapolis, MN; Timothy A. Lander, MD, Minneapolis, MN; Robert J. Tibesar, MD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the Mohler repair, its benefits, and its limitations.

**Objectives:** The Mohler technique for repair of a unilateral cleft lip is a variation of the Millard rotation advancement technique. The rotation flap incision is carried into the columella. This allows for primary columellar lengthening and improved scar camouflage. However, it may lead to a short cleft side lip. The objective of this study is to evaluate lip height and aesthetic results with the Mohler variation. **Study Design:** Retrospective review. **Methods:** Medical records of patients who underwent Mohler repair of a unilateral cleft lip over two years with at least six months followup and available photographs were reviewed. Measurements comparing the cleft and non-cleft side lip height were taken from postoperative photographs and photos were graded for symmetry of lip height, nasal symmetry, scar appearance, and overall appearance. **Results:** For 18 patients identified, there was a small but significant difference in average lip height between the cleft side ( $25.1 \pm 6.9$  mm) and non-cleft side ( $28.0 \pm 6.8$  mm),  $p < 0.001$ . On a five point scale with one being very good and five being very poor, seven observers on average rated nasal symmetry (1.74), lip height (1.80), scar (1.83), and overall appearance (2.04) as good. **Conclusions:** This study suggests that the Mohler technique is associated with a slightly short cleft side lip postoperatively. However, observers still rated results as favorable for all aesthetic categories. In our experience, the Mohler variation has limitations, but still represents an improved technique for repair of unilateral cleft lip. The search for the ideal cleft lip repair technique continues.

**11:09**                      **Comparison of Intraoral and Extraoral Approaches to Mandibular Angle Fracture Repair with Cost Implications**  
 Wayne D. Hsueh, MD, Bronx, NY; Clyde B. Schechter, MD, Bronx, NY; Emily I. Shaw, DDS, Bronx, NY; Howard D. Stupak, MD, Bronx, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare intraoral and extraoral approaches for repair of mandibular angle fractures both in terms of outcome and cost.

**Objectives:** Mandibular angle fractures can be repaired using both intraoral and extraoral approaches. The objective of this study was to analyze outcomes of these two approaches and provide cost estimates for comparison. **Study Design:** A retrospective review from January 2005 to June 2013 was performed of patients who underwent open reduction internal fixation of mandibular angle fractures at a level I trauma center. **Methods:** Patients were treated by three surgical specialties: otolaryngology-head and neck surgery, oral and maxillofacial surgery, and plastic and reconstructive surgery. Inpatient and outpatient medical records were reviewed for pertinent data including age, gender, duration of followup, presence of other mandible fractures, surgical approach, surgical team, operative time, and postoperative complications. **Results:** Of the 155 patients with mandibular angle fractures, 74% underwent open reduction internal fixation through an intraoral approach, while 26% of patients were treated with an extraoral approach. The occurrence of any complication was 69.6% in the extraoral group and 39% in the intraoral group ( $p = 0.009$ ). In propensity weighted analysis however, the occurrence of any complication was less frequent in intraoral cases, but no longer statistically significant (OR 0.28, 95% CI 0.08-1.02,  $p = 0.053$ ). OR time was significantly shorter with the intraoral approach. We estimate that the intraoral ap-

# Friday

proach directly saves at least \$2,900 per case. **Conclusions:** We recommend when clinically appropriate, the use of an intraoral approach for the repair of mandibular angle fractures. This can result in a comparable rate of success; however with significant cost savings to the health care system.

**11:16**                    **Q&A**

**11:20 - 12:00**           **Panel: Revision Rhinoplasty: Trends, Technology, Avoiding Litigation**

**Moderator:**            Brian J.F. Wong, MD PhD, Irvine, CA

**Panelists:**             Robin W. Lindsay, MD, Boston, MD  
Anthony P. Sclafani, MD FACS, New York, NY  
Jeffrey H. Spiegel, MD FACS, Chestnut Hill, MA  
Tom D. Wang, MD FACS, Portland, OR

**Noon**                    **Adjourn**

**5:30 - 7:00**            **Meet the Authors Poster Reception - Triological Society, ANS, AOS, ARS and ASPO  
Hynes Convention Center Exhibit Hall D**

**SATURDAY, APRIL 25**  
**HYNES CONVENTION CENTER - BALLROOM A**

7:00 Triological Business Meeting (Fellows Only)

8:00 Announcements

8:05 - 8:25 **OGURA LECTURE**  
**Rethinking Head and Neck Cancer in the Era of Quantum Biology**  
Uttam K. Sinha, MD FACS, Los Angeles, CA

**HEAD & NECK SESSION**

8:25 - 9:10 **Panel: Tumor Board: Multidisciplinary Care of Head and Neck Cancer Patients**

**Moderator:** Maie A. St. John, MD, Los Angeles, CA

**Panelists:** Carol R. Bradford, MD FACS, Ann Arbor, MI  
Jonas T. Johnson, MD FACS, Pittsburgh, PA  
Cherie-Ann Nathan, MD FACS, Shreveport, LA  
Randal S. Weber, MD FACS, Houston, TX

**Moderators: Kevin Fung, MD FRCS(C) FACS, London, ON**  
**David Myssiorek, MD FACS, New York, NY**

9:10 **Role of Elective Neck Dissections in High Grade Mucoepidermoid Carcinoma of the Salivary Glands**  
Max A. Plitt, BA, Newark, NJ; Tapan D. Patel, BS, Newark, NJ; George Gorgy, BA, Newark, NJ; Jean Anderson Eloy, MD FACS, Newark, NJ; Chan W. Park, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate the benefits of elective neck dissection in clinically negative neck patients with mucoepidermoid carcinoma.

**Objectives:** Mucoepidermoid carcinoma (MEC) is the most common malignant salivary gland carcinoma. Primary treatment for patients diagnosed with MEC is tumor resection with neck dissection if there is nodal involvement. This study aims to determine if there is survival benefit to performing elective neck dissections (END) in a clinically negative neck (N0) with high grade MEC (histologic grades III and IV). **Study Design:** Retrospective analysis. **Methods:** The Surveillance, Epidemiology, and End Results (SEER) registry (1973-2011) was queried to extract data on disease specific survival (DSS) for N0 high grade MEC. Survival was analyzed using the Kaplan-Meier and Cox proportional hazards models. **Results:** 3460 cases of MEC were identified. Of those, 354 were identified as N0 high grade. END in patients staged N0 was associated with higher DSS at 5 years (79.91% versus 64.98%, p=0.005). Omission of END was associated with a two-fold greater hazard of death (HR 2.085, 95% CI 1.219-3.515, p=0.0079). In patients who received both surgery at the primary tumor site and adjuvant radiotherapy, END was associated with higher DSS (79.46% versus 63.44%, p=0.0177). In patients who did not receive radiotherapy, DSS was 86.63% in END group and 70.57% in no END group, however, statistical significance was not observed. **Conclusions:** There is survival benefit for patients diagnosed with high grade MEC that undergo END. This is one of largest studies using SEER to show evidence supporting the practice of END in N0 high grade MEC.

9:17 **Laryngeal Preservation in Glottic Cancer: A Comparison of Costs and Treatment Morbidity**  
Rachel S. Mandelbaum, BA, Los Angeles, CA; Abie H. Mendelsohn, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to critically compare cost and post-treatment morbidity associated with larynx preserving therapies for glottic cancer.

**Objectives:** Due to the fundamental role of the larynx in human communication, organ preserving treatment approaches for glottic cancer are standard of care. Published literature has demonstrated similar local control rates and survival between surgery and primary radiation therapy, and therefore we sought to analyze both cost and post-treatment morbidity differences. **Study Design:** The Healthcare Cost and Utilization Project Nationwide Inpatient Sample (NIS) was utilized to analyze the hospital discharge records of 5,983 patients with a diagnosis of primary glottic cancer between 2001-2011. **Methods:** Glottic cancer patients were subdivided based on ICD-9

# Saturday

codes for nonsurgical therapies, namely radiation and/or chemotherapy, or partial laryngectomy, specifically endoscopic procedures, in order to compare the costs and morbidity associated with endoscopic surgery, open surgery, and medical therapy. Patients were not subdivided by stage, as TNM staging is unavailable through NIS. **Results:** Compared to patients who underwent open surgery or received radiation and/or chemotherapy, patients who underwent endoscopic surgery had significantly decreased costs in thousands of dollars at discharge (relative risk reduction [RRR]=.983; 95% CI = .977-.990 and RRR=.983; 95% CI = .977-.989, respectively) and length of hospital stay (RRR=.768; 95% CI = .726-.812 and RRR=.808; 95% CI = .764-.854, respectively). Rates of dysphagia were also significantly reduced in patients who had endoscopic surgery (3.7%) versus those who had nonsurgical therapy (8.3%) (OR=.419; 95% CI=.194-.906). **Conclusions:** This analysis suggests that increased utilization of endoscopic surgery would lead to substantial cost savings and decreased morbidity compared with open or nonsurgical therapy for glottic cancer.

## 9:24 Prognostic Significance of p16 Cellular Localization in Oropharyngeal Squamous Cell Carcinoma

Ashley E. Wenaas, MD, Houston, TX; Syeling Lai, MD, Houston, TX; Vlad C. Sandulache, MD PhD, Houston, TX; Jennifer R. Kramer, PhD, Houston, TX; Christine M. Hartman, PhD, Houston, TX; Jose P. Zevallos, MD MPH, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss how p16 immunohistochemical expression serves as a surrogate for human papillomavirus positive oropharyngeal squamous cell carcinoma and the prognostic significance that p16 cellular localization may play in understanding the carcinogenesis of oropharyngeal squamous cell carcinoma.

**Objectives:** The purpose of this study is to investigate the prognostic significance of p16 cellular localization in OPSCC. **Study Design:** Retrospective. **Methods:** Retrospective cohort study and immunohistochemical expression analysis of 159 OPSCC patients treated at a tertiary care veterans affairs medical center. **Results:** All patients included in this study were male and the majority had significant tobacco (92%) and alcohol (88%) exposure. Overall, 42.7% of tumors were p16-negative, 32 (20%) subjects have tumors demonstrating low nuclear/low cytoplasmic (LN/LC) p16 expression, 29 (18%) high nuclear/high cytoplasmic (HN/HC) expression, 25 (16%) high nuclear/low cytoplasmic (HN/LC) expression, and 5 (3%) subjects low nuclear/high cytoplasmic (LN/HC) expression. The 5 year disease free survival (DFS) for the p16-negative group was 13.7%, LN/LC 28.4%, LN/HC 0%, HN/LC 74.7%, and HN/HC 93.1% ( $p < 0.0001$ ). Overall survival for p16-negative group was 24.2%, LN/LC 23.5%, LN/HC 0%, HN/LC 74.2%, and HN/HC 88.7% ( $p < 0.0001$ ). On multi-variable analysis, HN/HC and HN/LC expression patterns were associated with a statistically significant decreased risk of recurrence and death compared to p16-negative tumors. **Conclusions:** P16 localization has prognostic significance in OPSCC, with high nuclear expression associated with significantly better oncologic outcomes compared to high cytoplasmic or low p16 expression. P16 localization may provide additional insight into OPSCC carcinogenesis, particularly in patients with heavy tobacco exposure.

## 9:31 An Investigation of Treatment Modalities and Demographic Parameters of Early Laryngeal Cancer: A SEER Analysis

Charles Khalil Saadeh, BS, Lubbock, TX; Mitchell S. Wachtel, MD, Lubbock, TX; Shengping Yang, PhD, Lubbock, TX; Sharmila Dissanaiké, MD, Lubbock, TX; Joehassin Cordero, MD, Lubbock, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss current optimal treatment strategies as well as epidemiological characteristics of early laryngeal cancer.

**Objectives:** No consensus exists regarding an optimal treatment modality for early laryngeal cancer. No recent population based studies have assessed the difference in survival of different treatments for early laryngeal cancer. We also present various predictor variables for early laryngeal cancer. **Study Design:** Retrospective cohort utilizing SEER population database. **Methods:** We utilized the Surveillance, Epidemiology, and End Results (SEER) database to identify patients with early laryngeal cancer from 1998-2011. Competing risks regression models were assessed with predictor variables including surgery, radiotherapy, site within the larynx, tumor grade, age, marital status, family poverty, race and gender. **Results:** 11,278 cases of T1-T2 and M0 were studied. Poorly differentiated, supraglottic tumors had higher laryngeal cancer cause death (LCCD). Comparing surgical techniques, local excision and partial laryngectomy were superior to total laryngectomy and local destruction ( $P < .05$ ). Radiation therapy had no impact on LCCD. Poor predictors of LCCD included age  $> 65$  years, male sex, widowed status, and economic status within lower two quartiles of family poverty ( $P < .05$ ). **Conclusions:** Based on this retrospective study, current techniques of local excision and partial laryngectomy

afford increased survival for T1-2M0 laryngeal cancers. These findings confirm the need for randomized controlled trials to assess the optimal management of early laryngeal cancer.

9:38 Q&A

9:41 **Factors Predictive of Lymph Node Metastasis in Papillary Thyroid Microcarcinoma**

Ashley E. Wenaas, MD, Houston, TX; Celeste Z. Nagy, BA, Houston, TX; Yin Yiu, MD, Houston, TX; Li Xu, PhD, Houston, TX; Jose P. Zevallos, MD MPH, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand which patients may be at higher risk of having papillary microcarcinoma that charts a more aggressive course and what factors may be present at the time of initial treatment that differentiate these patients from those whose disease is more indolent.

**Objectives:** There has been a worldwide increase in the incidence of papillary thyroid microcarcinoma (PTMC), although controversy still exists about management and surveillance. There is a subset of these tumors that chart a more aggressive course with a higher propensity for regional metastasis and recurrence. This large, population based SEER analysis looks at factors associated with regional lymph node metastasis in PTMC. **Study Design:** A retrospective review of the Surveillance Epidemiology and End Results database. **Methods:** Patients diagnosed with papillary thyroid carcinoma whose tumors measured <1cm were extrapolated from the Surveillance Epidemiology and End Results database. Of these patients, 2,585 patients had lymph nodes examined at the time of surgery. These 2,585 patients were further analyzed in terms of tumor characteristics and demographic data. **Results:** 21.4% of patients had lymph node metastasis at the time of initial surgical management. On multivariable analysis, males were more likely to have lymph node metastasis than females (OR 3.51 95% CI 2.46-4.04,  $p < 0.0001$ ). Age less than 45 years was associated with lymph node metastasis when compared to patients 45-64 (OR 0.59 95% CI 0.48-0.74) and compared to patients > 65 (OR 0.64 95% CI 0.46-0.88,  $p$  trend  $< 0.0001$ ). In terms of tumor characteristics, multifocality (OR 1.78 95% CI 1.46-2.21,  $p < 0.0001$ ), extrathyroid extension (OR 4.10 95% CI 3.01-5.58,  $p < 0.0001$ ) and tumor size between 0.5-1cm (PE 1.42 95% CI 1.14-1.76,  $p = 0.0015$ ) were also associated with lymph node metastasis. **Conclusions:** Since lymph node metastasis has been associated with a higher rate of local recurrence and distant metastasis in PTMC, identifying factors associated with lymph node metastasis at the time of initial treatment may help guide initial management as well as long term surveillance. Patients <45 years of age or male with tumors that are between 0.5cm-1cm, multifocal or with extrathyroid extension should be considered for more aggressive initial surgical management and/or longer term surveillance.

9:48 **A Lean Neck Mass Clinic Model: Adding Value to Care**

Brittney N. Tillman, MD, Ann Arbor, MI; Amrita Ray, MPH, Ann Arbor, MI; Tiffany A. Glazer, MD, Ann Arbor, MI; Chad Brenner, PhD, Ann Arbor, MI; Matthew E. Spector, MD, Ann Arbor, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that ultrasound guided fine needle aspiration (UGFNA) with on-site cytopathologic analysis eliminates unnecessary diagnostic testing, return visits, repeat procedures and optimizes quality of care.

**Objectives:** To demonstrate that ultrasound guided fine needle aspiration (UGFNA) with on-site cytopathologic analysis eliminates unnecessary diagnostic testing, return visits, repeat procedures and optimizes quality of care. **Study Design:** Retrospective cohort study. **Methods:** 61 new patients (28 female; 33 male; age range 19-85) were seen in our dedicated neck mass clinic over a one year period. All patients underwent UGFNA of masses located in neck levels I-VI (40), parotid gland (20), or parapharyngeal space (1). Each patient underwent two UGFNA passes followed by on-site cytopathologic analysis with additional passes if required for diagnosis. **Results:** Diagnosis was made in 93.4% (57) of patients allowing for counseling and treatment planning at the first visit. In order to obtain a diagnosis, more than half (55.7%, 34) of our patients required additional passes which implies that they would have required an additional visit without on-site cytopathologic analysis. Treatment included: observation in 47.5% (29) of patients, surgery in 31.1% (19) of patients and nonsurgical treatment (chemotherapy +/- radiation) in 21.3% (13) of patients. The average time from check-in to checkout including the clinic visit, biopsy and treatment counseling was 103 minutes, and the average round trip mileage traveled per patient was 127.6 miles. **Conclusions:** The adult neck mass is a commonly encountered scenario in otolaryngology. For the patient this can be a stressful situation in which timely and accurate diagnosis is critical. A dedicated lean neck mass clinic model with UGFNA and on-site cytopathologic analysis can be both an efficient part of one's practice and a valuable addition to patient care.

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**9:55**                    **Diagnostic Value of Narrow Band Imaging According to Different Oral Cavity and Oropharyngeal Epithelial Types**  
Cesare Piazza, MD, Brescia, Italy; Francesca del Bon, MD, Brescia, Italy (Presenter); Luigi Garofalo, MD, Brescia, Italy; Alberto Paderno, MD, Brescia, Italy; Pietro Perotti, MD, Brescia, Italy; Piero Nicolai, MD, Brescia, Italy

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the diagnostic value of narrow band imaging in the oral cavity and oropharynx according to different epithelial types.

**Objectives:** To investigate the diagnostic value of narrow band imaging (NBI) according to different epithelial types of oral cavity (OC) and oropharynx (OP). **Study Design:** Prospective evaluation of NBI sensitivity (Se), specificity (Sp), positive (PPV), negative predictive values (NPV), and accuracy (Ac) in diagnosis of OC/OP erythroleukoplakia. **Methods:** Between 2009-2013, 128 OC/OP erythroleukoplakias were evaluated by NBI and submitted to excisional biopsy. True positives were those considered as NBI positive with histopathology ranging from mild dysplasia to invasive carcinoma. Squamous epithelia were classified as follows: type 1, keratinized thick stratified (gingiva, hard palate, dorsal tongue); type 2, non-keratinized thin stratified (floor of the mouth, vestibule, ventral tongue, soft palate, palatine tonsil, base of tongue); type 3, non-keratinized, very thick stratified (retromolar trigon, labial, buccal mucosa). **Results:** Excisional biopsy turned out to be benign in 32% of lesions, mild or moderate dysplasia in 13%, high grade dysplasia/carcinoma in situ in 15%, microinvasive cancer in 16%, and invasive cancer (pT1) in 23%. NBI Se, Sp, PPV, NPV, and Ac in the entire cohort were 89%, 85%, 93%, 78%, and 88%; for epithelial type 1, 92%, 80%, 88%, 86%, and 87%; for type II, 84%, 92%, 97%, 65%, and 86%; for type III, 92%, 86%, 92%, 86%, and 90%. NBI gave the correct diagnosis (true positives) in 88% of mild, 79% of severe dysplasias, 90% of microinvasive, and 93% of invasive carcinomas. **Conclusions:** No statistically significant difference was noted in NBI diagnostic value according to different epithelial types or degree of precancerous/neoplastic erythroleukoplakia.

**10:02**                    **Q&A**

**10:05 - 10:30**           *Break/View Posters - Hynes Convention Center Exhibit Hall D*

## GENERAL SESSION

**10:30 - 11:15**           **Panel: Optimizing Use of EMR**  
**Moderator:** Michael D. Seidman, MD FACS, West Bloomfield, MI  
**Panelists:** Sujana S. Chandrasekhar, MD, New York, NY  
Susan Rachelle Cordes, MD FACS, Indianapolis, IN  
Brian Nussenbaum, MD FACS, St. Louis, MO  
Richard L. Scher, MD FACS, Durham, NC

**Moderators: Natasha Mirza, MD FACS, Philadelphia, PA**  
**Tanya K. Meyer, MD, Seattle, WA**

**11:15**                    **Standardized Letters of Recommendation and Successful Match into Otolaryngology**  
Adam J. Kimple, MD PhD, Chapel Hill, NC; Anthony G. Del Signore, MD PharmD, Chapel Hill, NC; Mohamed O. Tomoum, MD, Chapel Hill, NC; Feng-Chang Lin, PhD, Chapel Hill, NC; Brent A. Senior, MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the components of the standardized letters of recommendation that correlate with successful match into otolaryngology-head and neck surgery residency programs.

**Objectives:** Historically, narrative letters of recommendation have been utilized in selection of applicants for otolaryngology residency programs. In the last two application cycles, our specialty adopted a standardized letter of recommendation (SLOR). The intent was to decrease time burden for letter writers and to provide readers with an objective evaluation of applicants. The objective of this study is to determine attributes in the SLOR that correlate with matching into a residency program. **Study Design:** We performed a retrospective study using SLOR, USMLE step 1 scores and match outcomes of applicants who applied to our institution for the 2013 and 2014 match cycle. **Methods:** We included the following

variables from the SLOR in the statistical analysis to determine which ones were associated with matching: patient care, medical knowledge, communication skills, procedural skills, research, initiative and drive, commitment to otolaryngology, commitment to academic medicine, match potential and USMLE1 scores. **Results:** We identified 532 applicants and 964 SLOR. In applicants who matched, scores for patient care, medical knowledge, communication skills, initiative and drive, match potential and USMLE 1 scores were statistically higher ( $p < 0.05$ ). Scores for professionalism, procedural skills, research, commitment to otolaryngology and commitment to academic medicine were not higher among successfully matched applicants. **Conclusions:** While SLOR can save time for letter writers and provide an objective description of applicants, the utility of individual domains within the SLOR is questionable. Additionally, it is concerning that applicants' professionalism and procedural skills are not correlated with matching in our specialty.

**11:22**                    **Elongated Uvula Producing Chronic Cough**

Patricia A. Loftus, MD, Bronx, NY; Kathleen M. Tibbetts, MD, New York, NY; Arsen T. Stegnajic, MD, Bronxville, NY

**Educational Objective:** At the conclusion of the presentation, the participants should be able to accurately diagnose the condition and be able to perform the modified uvulopalatoplasty procedure.

**Objectives:** Chronic cough with its associated morbidity is emerging as a worldwide problem. The objective of this study is to evaluate the subset of patients with chronic cough due to elongated uvula and to describe surgical treatment option for these patients. **Study Design:** We present 30 consecutive chronic cough cases treated with modified uvulopalatoplasty from January to December 2013. All patients were referred by medical providers after a complete medical workup and after the completion of appropriate conservative medical treatment. **Methods:** All patients underwent upper airway endoscopy and were found to have elongation of the uvula down to the laryngeal surface of epiglottis. Modified uvulopalatoplasty was then performed under local anesthesia. **Results:** There were 23 females and 7 males in the study. Age range was 22 to 90 years. 27 patients experienced immediate and complete improvement of their symptoms. They remained asymptomatic for the entire postoperative followup period from 10 to 18 months. 2 patients experienced improvement of their symptoms and in one patient cough recurred several months after initial improvement. **Conclusions:** Elongation of the uvula causing chronic coughs is more frequent than previously suspected. At the conclusion of the presentation, the participants should be able to accurately diagnose this condition and be able to perform modified uvulopalatoplasty procedure.

**11:29**                    **Predictors of Oral HPV Infection in the United States**

Ryan K. Orosco, MD, San Diego, CA; Avram S. Hecht, MD, San Diego, CA; Suraj Kedarisetty, BS, San Diego, CA; Philip A. Weissbrod, MD, San Diego, CA; Charles C. Coffey, MD, San Diego, CA; David C. Chang, PhD, San Diego, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss risk factors for oral HPV infection, and compare the particular risk factor profiles for infection with both high risk and low risk HPV types.

**Objectives:** To determine predictors of oral HPV infection in the United States. **Study Design:** The National Health and Nutrition Examination Survey (NHANES) cross-sectional survey of U.S. population for years 2009-2012. **Methods:** Participants aged 18 to 69 years were screened for low risk and high risk HPV infection types using DNA from oral rinse samples. Cox proportional hazard models were constructed to identify factors associated with infection. Covariates included: age, gender, ethnicity, income poverty ratio, sexual orientation, HIV infection, other sexually transmitted infection, lifetime sexual partners, lifetime oral sex partners. **Results:** In total, 9,256 subjects were identified, with equal male/female ratio and mean age of 42.1 years. Oral HPV infection was present in 8.1% (N=747); 55.7% high risk infection, 55.3% low risk infection, 11% both. Oral HPV infection had a statistically significant negative association with female gender (OR 0.3,  $P < 0.005$ ), income poverty ratio  $\geq 3$  (OR 0.7,  $P = 0.02$ ), and 1 lifetime oral sex partner (OR 0.7,  $P = 0.03$ ). Increasing oral sex behaviors (6-21+ lifetime oral sex partners) demonstrated positive correlations (OR 1.4 to 3.0,  $P < 0.03$  for all). Low risk infection had a negative correlation with female gender, non-Hispanic white ethnicity, income poverty ratio  $\geq 3$ ; and a positive association with increased sexual partners (oral and any sex). Predictors of high risk HPV infection included male gender and oral sex behaviors. **Conclusions:** Increased number oral sex partners elevated the risk of oral HPV infection. Negative associations included female gender and higher socioeconomic class. The risk factor profiles for high risk and low risk HPV types are distinct, with similar trends related to increased sexual behaviors.

# Saturday

11:36

## **Impostor Syndrome and Burnout Among Otolaryngology Residents and Attendings in the United States - Implications for Education and Professional Development**

Lindsay B. Sobin, MD, Syracuse, NY; Jennifer A. Villwock, MD, Syracuse, NY; Tucker M. Harris, MD, Elmira, NY

**Educational Objective:** At the conclusion of this presentation, the participants should understand impostor syndrome and burnout indices as well as their implications for residents/residency education as well as for attendings and future professional development.

**Objectives:** To determine the incidence of impostor syndrome (IS) and burnout in otolaryngology residents and attendings in the United States as well as any demographic differences. **Study Design:** Anonymous survey published online. **Methods:** An anonymous survey was published online and residents as well as attending physicians affiliated with an academic institution were recruited via email. The survey included demographic data, an IS screening questionnaire, and the Maslach Burnout Inventory. Main outcome measures included presence or absence of frequent to intense impostor feelings (designated as positive for IS) and burnout indices. Subgroup comparisons were performed using Fisher Exact Tests. **Results:** 88 otolaryngology residents and 61 attending physicians completed the survey. Significantly more residents (33/88) experienced frequent to intense impostor feelings than attending physicians (9/61) ( $p=0.029$ ). IS in residents was significantly associated with high levels of emotional exhaustion ( $p=0.013$ ). IS in attending physicians was significantly associated with high levels of exhaustion, emotional exhaustion, cynicism, and depersonalization (all  $p<0.05$ ). There was no association with gender or level of training/duration of career. **Conclusions:** Over a third of otolaryngology residents surveyed experienced IS. Though this was seen less in attending physicians, IS was significantly associated with high levels of multiple burnout indices in this group. Given the high psychological morbidity of these conditions, this association cannot be ignored. These data suggest that IS is an important factor that should be taken into account in resident education as well as in attending professional development.

11:43

## **Hemodynamic Changes in Office Based versus Operating Room Laryngoscopic Procedures**

William S. Tierney, MS, Cleveland, OH; Rebecca L. Chota, BS, Cleveland, OH; Michael S. Benninger, MD, Cleveland, OH; Paul C. Bryson, MD, Cleveland, OH

**Educational Objective:** Compare hemodynamic effects of operating room procedures versus office based procedures.

**Objectives:** Previous research has shown that office based (OB) laryngoscopic procedures can induce hemodynamic changes including tachycardia and severe hypertension. However, comparison between OB and operating room (OR) procedures has not been carried out. Therefore, we prospectively measured hemodynamic variables in both settings to compare hemodynamic changes in OB and OR procedures. **Study Design:** Using a case control study design, OB and OR laryngoscopic procedures were prospectively identified and included. **Methods:** Heart rate and blood pressure were measured at established time points before and after procedures. Intraoperative hemodynamic measurements were gathered from the OR group. 54 OR procedures and 30 OB procedures were included. **Results:** No significant difference was found between pre-procedure and post-procedure heart rate or blood pressure in either OB or OR groups. Additionally there was no significant difference in these variables between groups. 28% of OR subjects became tachycardic during their procedure, 26% became severely hypertensive (blood pressure  $>180$ mmHg systolic or  $>110$ mmHg diastolic) and 41% had either severe hypertension or tachycardia. This is significantly higher (CI 30-54%) than previous reported rates of these hemodynamic changes in the office setting. **Conclusions:** While hemodynamic changes occur in both groups, our data fail to show differences in pre- and post-procedure hemodynamic measurements between groups or within each group. We also show that serious hemodynamic events are likely to occur in the operating room. While larger studies will be required to establish rates of dangerous cardiovascular events in laryngoscopic procedures, hemodynamic parameters alone indicate that similar cardiovascular strain is induced in these two settings.

11:50

## **Impact of Lean on Surgical Instrument Reduction: Less Is More**

Todd J. Wannemuehler, MD, Indianapolis, IN; Alhasan N. Elghouche, BA, Indianapolis, IN; Mimi S. Kokoska, MD, Indianapolis, IN; Bruce H. Matt, MD MS, Indianapolis, IN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the basics of Lean Six Sigma methodology and develop an appreciation for how these concepts may be applied to quality improvement endeavors within the field of otolaryngology - head and neck surgery at their home institutions.

**Objectives:** To determine if instrument sets that are frequently used by multiple surgeons can be substantially reduced



in size with consensus. **Study Design:** Prospective quality improvement study using Lean Six Sigma principles for purposeful and consensual reduction of non-value added instruments in adenotonsillectomy instrument sets. **Methods:** Value stream mapping was utilized to determine instrumentation usage and reprocessing workflow. Pre-intervention instrument utilization surveys allowed consensual and intelligent set reduction. Non-value added instruments were targeted for waste elimination by placement in a supplemental set. Times for pre- and post-intervention instrument assembly, Mayo set up, and surgery were collected for adenotonsillectomies. Post-intervention satisfaction surveys of surgeons and OR staff were conducted. **Results:** Instrument sets were reduced from 54 to 24 instruments. Assembly times were significantly reduced from 11.0 to 6.2 minutes ( $p < 0.001$ ). After accounting for Hawthorne effect, Mayo set up times were significantly reduced from 97.6 to 76.1 seconds ( $p < 0.001$ ). Operative times were not significantly affected (1,773 versus 1,631 seconds,  $p = 0.181$ ). The supplemental set was opened in only 16% of cases. Scrub personnel and staff surgeon satisfaction was greater than 90% regarding the intervention. Set processing/assembly cost was significantly reduced by 41% ( $p < 0.001$ ). Set build cost was reduced by \$1,468.99 per set. **Conclusions:** Lean Six Sigma improves efficiency and reduces waste by empowering team members to improve their environment. Instrument set reduction is ideal for waste elimination because of tool accumulation over time and obsolescence of some instruments as newer technologies are adopted. Similar interventions could be applied to larger sinus, orthopedic, and spine sets.

11:57 Q&A

12:00 - 1:00 Lunch Break/Visit Posters - Hynes Convention Center Exhibit Hall D

## SLEEP MEDICINE SESSION HYNES CONVENTION CENTER - BALLROOM A

1:00 - 1:40

**Panel: Multidisciplinary Approach to OSA**

**Moderator:** Erica Robb Thaler, MD FACS, Philadelphia, PA

**Panelists:** Andrew N. Goldberg, MD MSCE FACS, San Francisco, CA  
Brian William Rotenberg, MD MPH, London, ON Canada  
Kathleen L. Yaremchuk, MD MSA, Detroit, MI

**Moderators: Stacey L. Ishman, MD MPH, Cincinnati, OH  
Ho-Sheng Lin, MD FACS, Detroit, MI**

1:45

**Establishing a Danger Zone: An Anatomic Study of the Lingual Artery in Base of Tongue Surgery**

David S. Cohen, MD, Detroit, MI; Antoine E. Melkane, MD MSc, Beirut, Lebanon; Jonathan A. Waxman, MD PhD, Detroit, MI; Vibhav K. Sekhsaria, MD, Detroit, MI; Mahdi A. Shkoukani, MD, Detroit, MI; Ho-Sheng Lin, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize that the position of the lingual artery in the base of tongue is significantly variable based on the amount of tongue retraction. This difference is pronounced when the tongue is in an anatomical, resting position, versus a surgically retracted position. Due to the retraction, the anatomical relationships and anatomy of the dorsal artery around the base of tongue may be different than as previously described. If a safe one could be established, one could avoid the hypoglossal/lingual artery complex and avoid inadvertent and potentially catastrophic injury.

**Objectives:** To identify the relationship of the hypoglossal/lingual artery neurovascular bundle (HLNVB) in the base of tongue (BOT) to constant surface landmarks. This study illustrates that the anatomical relationship differs considerably depending on tongue position and degree of retraction. Our goal is to establish a safe zone for BOT robotic surgery to reliably preserve the HLNVB. **Study Design:** Human cadaver study. **Methods:** After institutional approval, five fresh frozen head and neck complexes were obtained and dissected, with seven HLNVB's preserved. A microcaliper was used to measure surgical landmarks in resting and surgically simulated positions using a Feyh-Kastenbauer (FK) retractor. **Results:** Measurements from foramen cecum (FC) to palatoglossus muscle (PGM) and to midway circumvallate papilla (mCVP) were significantly different when comparing anatomical to surgically simulated positions. FC to PGM was 9.2mm less in a surgical position when compared to anatomical position; FC to CVP was on average 4.6mm less. These measurements are remarkably different to previous studies that did not implement surgically simulated positions. Furthermore, the distance of the lingual artery to measured landmarks was significantly different based on tongue retraction; however,

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these branches were never encountered anterior to a line between mCVP and FC. **Conclusions:** Measurements of the HLNVB to surface landmarks in the BOT differs significantly based on the amount of tongue retraction. Measurements in surgically simulated positions are markedly different when compared to resting, anatomic positions. The dorsal branch of the lingual artery seems more superficial in the deep BOT than previously described. A safe zone may exist posterior to a line between mCVP and FC; however further studies are needed to confirm such a safe zone.

## 1:52 **Uvulopalatopharyngoplasty - A Comparison of Three Different Techniques Currently Being Utilized to Determine Soft Palate Resection Height**

David W. Cuthbertson, MD, Houston, TX; Masayoshi Takashima, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, participants will be able to discuss three different methods commonly used to determine the height of soft palate resection in uvulopalatopharyngoplasty surgery and assess if all three methods consistently lead to the same point on the soft palate. Additionally, the participants should be able to demonstrate if obstructive sleep apnea severity, patient BMI, or the dimensions of the hard palate cause variation in the location of these measured points.

**Objectives:** 1) Compare the resection levels indicated by three commonly used methods of soft palate measurement employed in uvulopalatopharyngoplasty (UPPP); and 2) demonstrate the effects that obstructive sleep apnea (OSA) severity and anthropomorphic measurements have on determining these resection levels. **Study Design:** Prospective observational study. **Methods:** Patients undergoing UPPP for OSA were recruited. Prior to surgery, the soft palate was marked at the point of plication caused by contact with the posterior pharyngeal wall when a k sound was phonated (k-point). The portion of palate distal to the mark was deemed resectable. After intubation, a Yankauer tipped suction was placed in one naris while the other was manually occluded. The negative pressure pulled the soft palate closed, and the new plication point of the soft palate was marked (s-point). The distance from the posterior edge of the hard palate to each marking was measured and compared with a traditional 2cm resection point. The dimensions of the hard palate were also measured, along with the patient's body mass index and apnea hypopnea index. **Results:** The average s-point and k-point were 16.5 and 16.2mm, respectively, both falling short of the presumed safe distance of 2cm. A longer hard palate correlates with an increased s-point measurement. OSA severity, BMI, and hard palate height and width did not appear to correspond to soft palate measurement techniques. **Conclusions:** Using phonation and suction to determine the amount of soft palate resection result in a more conservative operation than using a uniform 2cm measurement. Hard palate length may aid in making soft palate measurements.

## 1:59 **Multilevel Surgery for Obstructive Sleep Apnea with TORS Base of Tongue Reduction: Outcomes Stratified by Friedman Stage**

Tiffany A. Glazer, MD, Ann Arbor, MI; Matthew E. Spector, MD, Ann Arbor, MI; Paul T. Hoff, MD, Ann Arbor, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that transoral robotic surgery (TORS) +/-multi-level procedures can successfully address the retrolingual space in selected patients with obstructive sleep apnea hypopnea syndrome (OSAHS) with Friedman stage I, II, or III anatomy.

**Objectives:** To stratify outcomes in patients with moderate to severe OSAHS undergoing TORS +/- multi-level procedures according to Friedman stage. **Study Design:** Retrospective case series. **Methods:** 118 patients (87 male, 31 female; mean age 54.6 years) with moderate to severe OSAHS were studied between 2013-2014. Patients were stratified preoperatively by Friedman stage, and all patients had TORS assisted lingual tonsillectomy, either standalone or in combination with palatal surgery. Apnea hypopnea index (AHI) and body mass index (BMI) were measured preoperatively and three months postoperatively. Success was defined as a decrease in AHI by 50% and AHI <20. **Results:** The breakdown by Friedman stage was: 4 stage I, 40 stage II, 64 stage III and 10 stage IV. The average preoperative and postoperative AHI was 43.0 and 22.6, respectively, and the overall success rate was 63%. When stratifying by Friedman stage, success was seen in 75% of stage I, 70% of stage II, 66% of stage III, and 10% of stage IV patients. When stratifying by preoperative BMI, success was seen in 75% of stage II and 72% of stage III patients with preoperative BMI <30, compared to 58% of stage II and 56% of stage III patients with preoperative BMI >30. **Conclusions:** TORS lingual tonsillectomy+-multilevel procedures can be moderately successful in treating patients with moderate to severe OSAHS with Friedman stage I-III anatomy. Success rates are even greater if patients are stratified according to preoperative BMI, as those with BMI <30 are significantly more likely to achieve success even with Friedman stage II-III anatomy.

2:06

## Inspire Upper Airway Stimulation for Sleep Apnea: The Surgical Learning Curve

Alexander W. Murphey, BS, Charleston, SC; Andrew B. Baker, BS, Charleston, SC (Presenter); Tapan A. Padhya, MD, Tampa, FL; B. Tucker Woodson, MD, Milwaukee, WI; David L. Stewart, MD, Cincinnati, OH; Shaun A. Nguyen, MD, Charleston, SC; M. Boyd Gillespie, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to correlate improvements in surgical operating time with surgeon experience, and demonstrate a working knowledge of the Inspire implantation technique.

**Objectives:** To determine if surgeon experience with upper airway stimulation (UAS) therapy implantation affects surgical time and complication rate. **Study Design:** Retrospective review. **Methods:** Retrospective review of surgical times and complications observed in patients implanted at 21 study centers as part of a phase III, multicenter surgical trial of UAS therapy. **Results:** The study involved 126 subjects who were predominantly male (83%) with a mean age of 54.5 years (range: 31-80), and the mean body mass index was  $28.4 \pm 2.6$ . There were an average of 5.7 (range: 1-22) surgical implants per site. The average surgical time was  $2.52 \pm 0.98$  hours, (range: 1.08 to 6.0). After completing the first 3 cases, the remaining 71 cases decreased on average to  $2.25 \pm 0.77$  hours which is a significant decrease in surgical time of 0.27 hours (95% CI: 0.0036 to 0.5364;  $p = 0.0470$ ). Of those 71 remaining cases, 52 had a surgical time below the overall average ( $p < 0.0001$ ). Surgical related complications were low (20%) and did not decrease appreciably with increasing experience. **Conclusions:** Implant time for the Inspire upper airway nerve stimulation decreased significantly after the first 3 implants. After this, the surgery time appears to stabilize. Surgeon experience with the procedure does not reduce rate of complications.

2:13

## Resolution of Headache in Patients that Undergo Vertical Directed Endoscopic Septoplasty (VDES) for Contact Point Septal Spurs, a Retrospective Review

Virginia M. Plauché, MD, New Orleans, LA; Newland K. Worley, MD, New Orleans, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to consider implementation of the novel technique of vertical directed endoscopic septoplasty (VDES) for removal of contact point septal spurs associated with headache.

**Objectives:** Our objective is to measure the reduction in headaches after employing the novel technique of vertical directed endoscopic septoplasty (VDES) for contact point septal spurs using a validated headache score. **Study Design:** A retrospective chart review. **Methods:** A chart review of forty patients who were previously evaluated and treated for facial pain and headaches secondary to a deviated nasal septum with a contact point septal spur was conducted. The patients all underwent preoperative CT scans of the sinuses confirming a deviated septum with spurring resulting in a contact point into (the lateral nasal wall). No sinusitis or other sinus pathology was evident on the scans. Preoperatively, the contact point was sprayed with 4% cocaine solution in order to document a perceived reduction in pain. All patients underwent a vertical directed endoscopic septoplasty (VDES), of which the details of this technique will be further described, to remove the septal spur. As part of the preoperative and postoperative evaluation, the Headache Intensity Test 6 (HIT-6) validated survey was used to objectively measure the degree of the intensity of the headaches. The HIT-6 scoring system is a proven, validated score, used by others in previously published literature evaluating treatment results on headaches. The preoperative scores were compared to the postoperative scores to determine if a statistically significant reduction in the headaches after VDES and if there was a corresponding improvement in the patient's quality of life. **Results:** Forty (N=40) patient charts were reviewed. There were 22 males and 18 females. Ages >18, and followup range was 4 weeks-18 months post-surgery. A preoperative mean score of 61.6 was compared to a postoperative mean score of 47.5 and was found to be statistically significant ( $p < 0.05$ ). **Conclusions:** The surgical technique of vertical directed endoscopic septoplasty when used to remove contact point septal spurs resulted in a statistically significant reduction in headaches and improved patient quality of life as measured by the HIT-6 validated survey. The vertical directed endoscopic septoplasty is a useful technique in the otolaryngologist's armamentarium for alleviation of headache associated with contact point septal spurs. After review of the current literature, we believe this to be the first study to investigate patient perceived improved quality of life after undergoing this novel technique.

2:20

Q&A

## RHINOLOGY SESSION

2:25 - 3:10

**Video Session: Masters of Rhinology Video Panel-Point/Counterpoint**

**Moderators:** Alexander Guang-Yu Chiu, MD, Tucson, AZ  
Richard R. Orlandi, MD FACS, Salt Lake City, UT

**Panelists:** Pete S. Batra, MD FACS, Chicago, IL  
Richard R. Orlandi, MD FACS, Salt Lake City, UT  
Brent A. Senior, MD FACS, Chapel Hill, NC  
Peter H. Hwang, MD FACS, Stanford, CA

3:10 - 3:35

**Break/View Posters - Hynes Convention Center Exhibit Hall D**

**Moderators: Ghassan J. Samara, MD FACS, Stony Brook, NY  
Sandra Y. Lin, MD, Baltimore, MD**

3:35

**The Place of the Osteoplastic Flap in the Endoscopic Era: Indications and Pitfalls**

Matthew C. Ochsner, BS, Atlanta, GA; John M. DelGaudio, MD, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the different indications for the osteoplastic flap in treating frontal sinus pathology. Additionally, participants should be able to discuss potential complications associated with this procedure and should be aware of the different options available once a procedure fails and the outcomes of these options.

**Objectives:** To evaluate the osteoplastic flap (OPF) procedure for frontal sinus pathology at our institution, including indications, revisions, obliteration vs. non-obliteration, and obliteration materials. **Study Design:** Single institution retrospective review from 1998-2013. **Methods:** CPT codes identified all OPF procedures. Demographic data, diagnoses, previous frontal procedures, obliteration materials, and outcomes were evaluated. Diagnoses were divided into 2 groups: inflammatory and non-inflammatory. **Results:** 57 patients underwent 73 OPFs: 36 obliterative and 37 non-obliterative. Obliterative procedures were for inflammatory indications in 76% of patients, had previous frontal surgery in 81%, and required revision in 25%, vs. 25%, 58%, and 8% respectively for non-obliterated patients. 10 patients required revision (8 obliterative, 2 non-obliterative), 7 requiring only 1 revision, but the other 3 requiring 9 additional procedures. One required 2 revisions to remove infected bone cement, 4 in a cement obliterated patient with previous trauma and mucocoeles, and 3 in a non-obliterated patient with severe neo-osteogenesis and outflow obstruction. 8 patients required complete removal of all obliteration material, including 2 patients with fat and 6 with bone cement. 29% of fat obliterations required revision vs. 24% of bone cement. However, failed bone cement obliteration required a mean of 2 additional OPFs vs. only 1 with fat. **Conclusions:** The OPF approach is still valuable for pathology refractory to or inaccessible to endoscopic approaches. Infectious etiologies have a much higher revision rate. Careful selection of pathologies can reduce revision rates, but in some cases repeated OPF is the only viable alternative. When bone cement becomes infected the only resolution is complete removal.

3:42 **Optical Imaging with a High Resolution Microendoscope to Identify Inverted Papilloma of the Sinuses**

Arjun K. Parasher, MD, New York, NY; Sarah Kidwai, BS, New York, NY; Victor J. Schorn, MD, New York, NY; Andrew Sikora, MD PhD, Houston, TX; Satish Govindaraj, MD, New York, NY; Brett A. Miles, MD DDS, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the current challenges in diagnosis and surgical management of inverted papilloma and the potential role of high resolution microendoscopy (HRME) in real time identification of inverted papilloma.

**Objectives:** High resolution optical imaging via a microendoscope is an imaging modality that allows the operator to obtain real time images of epithelial tissue and the structural changes within. We hypothesize that HRME using proflavine, a contrast agent with high affinity for keratinized tissue, is a mechanism to distinguish inverted papilloma from uninvolved mucosa, potentially enabling real time surgical margin differentiation. **Study Design:** Ex vivo imaging of histopathologically confirmed samples of inverted papilloma and uninvolved, normal sinus epithelium. **Methods:** Seven inverted papilloma and three uninvolved sinus epithelia specimens were imaged ex vivo with fiberoptic endoscope after surface staining with proflavine. Following imaging, the specimens were submitted for hematoxylin and eosin staining to allow his-

topathological correlation. **Results:** Results show that inverted papilloma and normal sinus epithelia have distinct HRME imaging characteristics. Inverted papilloma specimens show increased nuclear to cytoplasmic ratio and small internuclear separation, whereas normal sinus epithelia specimens show small, bright nuclei with dark cytoplasm and relatively large internuclear separation. **Conclusions:** This study demonstrates the feasibility of HRME to discriminate inverted papilloma from normal sinus epithelia. As a result, HRME is a novel imaging technique that may assist with real time surgical margin differentiation, enabling complete surgical resection of inverted papilloma and reduced recurrence rates.

3:49

### **Balloon Catheter Dilation in Office - Analysis of Patient Risk Factors for Reoperation**

Michael J. Sillers, MD, Birmingham, AL; Chantal E. Holy, PhD, Menlo Park, CA (Presenter);  
Kristopher F. Lay, MD, Birmingham, AL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand comorbid conditions that may increase patient risks for reoperations following an in-office balloon catheter dilation.

**Objectives:** Balloon catheter dilation in the office setting (BCD-IO) of paranasal sinuses has been described in a number of publications. This study was designed to further understand rates and risk factors for reoperation, using a real world population from a claims database. **Study Design:** Retrospective claims database analysis. **Methods:** From MarketScan, all patients with BCD-IO (primary or secondary) in 2011 and 2012 and continuous preoperative and postoperative medical history for 12 months were identified. Patients with concurrent traditional endoscopic sinus surgery (ESS) ( $\pm$  30 days) were eliminated. Patient demographics and comorbidities for the entire cohort were compared to those of patients presenting for a subsequent surgery (BCD or ESS) within 12 months of the index BCD-IO. **Results:** The total cohort (TC) included 420 patients (mean (SD) age: 46.2 (11.7), 36.0% males). At 12 months, the revision cohort (RC) included 25 patients (5.9% of TC). Rates of patients with Samter's triad, polyps, aspirin sensitivity and allergy were greater in the RC vs. the TC (Samter's triad: RC: 20.0%; TC: 6.2% ( $p=0.008$ ); polyps: RC: 40.0%; TC: 13.30% ( $p<0.0001$ )), and showed trends of increase for asthma (RC: 48.0%, TC: 32.4% ( $p=0.27$ )). The risk ratio (RR) for reoperation was greatest for patients with Samter's triad (RR: 3.78; 95%CI: 1.54-9.28), allergy (RR: 4.87; 95%CI: 1.16-20.35), polyps (RR: 4.30, 95%CI: 2.05-9.16) and aspirin sensitivity (RR: 4.23, 95%CI: 1.95-9.21). **Conclusions:** Twelve months after surgery, the revision rate following BCD-IO was comparable to those historically reported for ESS. Respiratory comorbidities were associated with greater risk of reoperations.

3:56

### **The Minimal Important Difference of the Epistaxis Severity Score in Hereditary Hemorrhagic Telangiectasia**

Linda X. Yin, BA, Baltimore, MD; Douglas D. Reh, MD, Baltimore, MD; Jeffrey B. Hoag, MD, Philadelphia, PA; Sally E. Mitchell, MD, Baltimore, MD; Stephen C. Mathai, MD MHS, Baltimore, MD; Christian A. Merlo, MD MPH, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better understand how to utilize the epistaxis severity score and define the smallest change in this disease index what would be important to the clinician and patient.

**Objectives:** Hereditary hemorrhagic telangiectasia (HHT) is a disease of abnormal angiogenesis, causing epistaxis in over 96% of patients. The epistaxis severity score (ESS) was developed as a standardized measurement of nasal symptoms among HHT patients. The minimally important difference (MID) of a disease index estimates the smallest change that a patient and clinician would identify as important. This study aims to establish the MID of the ESS in a diverse population of HHT patients. **Study Design:** Retrospective cross-sectional study in patients with a diagnosis of HHT using Curacao criteria or genetic testing. **Methods:** The ESS questionnaire and Medical Outcomes Study 36-item short form (SF-36) were administered to subjects recruited through the HHT foundation website. Demographics and relevant medical histories were collected from all participants. An anchor based method using a change of 5 in the physical component summary (PCS) of the SF-36 and a distributional method were used to estimate the MID. **Results:** 604 subjects were recruited between April and August 2008. All participants reported epistaxis. An increasing ESS in the study cohort showed a significant negative correlation to the PCS ( $r=-0.43$ ,  $p<0.001$ ). The MID was determined to be 0.41 via the anchor based approach and 1.01 via the distribution based approach, giving a mean MID of 0.71. **Conclusions:** The MID of the ESS identifies the smallest change in treatment outcome that yields clinically significant effects in HHT patients. Further implications include key metrics to help guide clinical care and essential information to calculate power and sample size for future clinical trials.

# Saturday

- 4:03**                    **A Comparison of Dexmedetomidine and Remifentanil in Controlled Hypotension Undergoing Functional Endoscopic Sinus Surgery in a Randomized Clinical Trial: Surgical Conditions, Anesthetic Consumption and Recovery**  
Safinaz Karabayirli, Ankara, Turkey; Kadriye Serife Ugur, Ankara, Turkey (Presenter); Ruveyda Irem Demircioglu, Ankara, Turkey; Bunyamin Muslu, Ankara, Turkey; Burhanettin Usta, Ankara, Turkey; Huseyin Sert, Ankara, Turkey; Nebil Ark, Ankara, Turkey

**Educational Objective:** At the conclusion of this presentation, the participants should be able to consider the drug for controlled hypotension during functional endoscopic surgery.

**Objectives:** The effects of infusion of remifentanil and dexmedetomidine on surgical conditions, anesthetics consumption and recovery during FESS were compared. **Study Design:** Randomized, double blinded, prospective study. **Methods:** 50 ASA I, II patients who had been scheduled for FESS were randomly divided into two groups. In group D (n=25), dexmedetomidine 1µgkg<sup>-1</sup> infused intravenous (IV) over 10 minutes before anesthesia induction, followed by a continuous infusion of 0.7µg kg<sup>-1</sup>h<sup>-1</sup> during operation. In group R (n= 25), 1µgkg<sup>-1</sup> remifentanil IV bolus was administered with induction of anesthesia and continued 0.25 to 0.50 µg kg<sup>-1</sup>min<sup>-1</sup> during operation. Heart rate, mean arterial pressure, end tidal CO<sub>2</sub> and end tidal sevoflurane were recorded at basal, after intubation, every 5 minutes during operation, before and after extubation. Patients were evaluated to eligibility of surgical field condition for bleeding and time being Aldrete recovery score 9-10. Postoperative nausea, vomiting, pain, shivering and sedation were followed up over 24 hours. **Results:** There was no significant difference between groups according to the amount of bleeding during surgery, assessment of surgical field condition, consumption of sevoflurane, scores of postoperative VAS, and rates of nausea and vomiting, shivering, demands of additional analgesic medication. Time being Aldrete recovery score 9-10 and sedation scores at the postoperative first 1 hours were significantly higher in group D (P=0.001). **Conclusions:** We concluded as control of hypotension, the amount of bleeding, surgical field during anesthesia of FESS were observed similar in both group, however the usage of dexmedetomidine in FESS for the controlled hypotension anesthesia may be limited when compared with remifentanil due to the higher postoperative sedation scores and recovery time in group D.

- 4:10**                    **Q&A**

## GENERAL SESSION

- 4:15 - 5:00**            **Video Session: How I Do It: Experts Demonstrate Their Techniques**  
**Moderator:** Adam M. Zanation, MD, Chapel Hill, NC  
**Panelists:** **Atraumatic Cochlear Implant Insertions for Electric Acoustic Stimulation**  
Craig Alan Buchman, MD FACS, Chapel Hill, NC  
**In Office Laryngeal Procedures**  
Mark S. Courey, MD, San Francisco, CA  
**Facial Trauma Innovations**  
Robert M. Kellman, MD FACS, Syracuse, NY  
**Eustachian Tube Balloon Dilatation**  
Dennis S. Poe, MD PhD FACS, Boston, MA  
**Pediatric Transoral Robotic Surgery**  
Adam M. Zanation, MD FACS, Chapel Hill, NC

- 5:00**                    **Introduction of 2015-16 Triological President, Fred D. Owens, MD, Dallas, TX**  
  
**Adjourn**

## Allergy/Rhinology/Facial Plastic & Reconstructive

11. **A Novel Technique for Open Reduction Internal Fixation of the Mandibular Condyle**  
Nicole L. Aaronson, MD, New Haven, CT; Clarence T. Sasaki, MD, New Haven, CT; Roger A. Lowlicht, DDS, New Haven, CT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the benefits of ORIF of the mandibular condyle and the benefits of the novel plating technique described.

**Objectives:** Fractures of the condyle are among the most common mandibular fractures. They have traditionally been managed by closed reduction except in cases of severe displacement. Recent data has suggested that a broader class of patients may benefit from open reduction internal fixation (ORIF). The objective of this paper is to present a novel technique for the repair of condylar neck fractures. **Study Design:** Retrospective case series. **Methods:** Review of a single attending surgeon's cases from 2012-2014 revealed 16 cases of condylar neck fractures managed by ORIF via the retromandibular approach using the extended H plate from the Synthes LCP hand set. All patients were assessed postoperatively through a standardized checklist to record subjective and objective outcomes of the repair. **Results:** 5 out of 16 patients were available for postoperative followup due to poor patient compliance. All patients were male ranging in age from 15 to 76 years old. All had minimal pain and normal masticatory function. Maximal interincisal opening varied from 25 mm to 46 mm, and occlusion was at baseline. None of the patients had any complications. **Conclusions:** The adult population has shown benefit from ORIF of condyle fractures that are not severely displaced. Data further suggests that adolescent patients, who have also completed mandibular development, may similarly benefit from expanded criteria for ORIF. Use of the extended H plate is useful when performing ORIF as it provides 3 dimensional stabilization of the fracture segments avoiding the need for postoperative fixation and allowing a more rapid return to function.

12. **Application of Indocyanine Green Angiography in Supraclavicular Artery Island Flap for Head and Neck Reconstruction**  
Carolyn A. Brydon, BS, Houston, TX; Jo-Lawrence M. Bigcas, MD, Houston, TX; Tang Ho, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain how indocyanine green angiography can benefit the design and harvesting of the supraclavicular artery island flap.

**Objectives:** Identification of vascular pedicle and its tributaries in the design of supraclavicular artery island flap can be difficult with conventional vascular mapping techniques. We introduce the application of indocyanine green angiography (ICG-A) to aid in the design and harvest of supraclavicular artery island flap (SCAIF). **Study Design:** Case report. **Methods:** Case report of a SCAIF performed with ICG-A for head and neck reconstruction. **Results:** An 81 year old man with recurrent high grade squamous cell carcinoma of the left auricle status post radiation and surgical resection underwent a SCAIF to reconstruct his left auricle and neck defect. Intraoperatively, ICG-A SPY angiography was used to map the pedicle and its perforators prior to raising the SCAIF. SPY angiography was used to confirm full flap perfusion after inset. The flap remained viable with no evidence of ischemia or loss throughout the postoperative period. **Conclusions:** Few studies have assessed the use of ICG-A in pedicled flaps and none have assessed its use in the SCAIF. The SCAIF is praised for its versatility, good aesthetic results, and shorter operating time compared to free flaps. The use of ICG-A aids the surgeon in intraoperative planning by delineating the course of this often tenuous vascular pedicle in addition to confirming flap perfusion after inset. The use of ICG-A in the SCAIF can likely lead to improved flap survival and more efficient flap design.

13. **Potential National Savings from Prescribing Guideline Recommended Antibiotics for Acute Rhinosinusitis**  
John D. Cramer, MD, Chicago, IL; Bruce K. Tan, MD, Chicago, IL; Robert C. Kern, MD, Chicago, IL; Dustin D. French, PhD, Chicago, IL; Charlesnika T. Evans, PhD MPH, Chicago, IL; Stephanie S. Smith, MD, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the average costs of antibiotics for acute rhinosinusitis and understand the estimated national cost of antibiotics for acute rhinosinusitis based on current prescribing and if national guidelines were instituted.

**Objectives:** To compare the total national cost of actual antibiotic therapy vs. hypothetical substitution with antibiotics recommended by national guidelines for acute rhinosinusitis (ARS) in the United States. **Study Design:** Cross-sectional study of a national database. **Methods:** Antibiotic prescriptions for a representative sample of

# Posters

adult outpatient office visits for ARS were tabulated from the National Ambulatory Medical Care Survey and National Hospital Ambulatory Care Survey data from 2006 to 2010. The average wholesale price (AWP) of the prescriptions was compared to the AWP of antibiotics recommended by national guidelines for ARS. **Results:** 2.8 million prescriptions were given annually for adults with a primary diagnosis of ARS. The estimated total cost of actual antibiotic prescriptions for ARS was \$352 million per year. The total estimated cost of antibiotics for ARS based on the American Academy of Otolaryngology-Head and Neck Surgery 2007 guidelines would be \$107 million per year. The average cost per antibiotic was \$125 per prescription based on actual prescriptions and \$38 per prescription if guideline based treatment was instituted. Widespread prescriptions for brand name and macrolide antibiotics contributed significantly to increased cost of current prescriptions. **Conclusions:** Compared to hypothetical antibiotic selection according to the guideline recommendations, current U.S. antibiotic prescriptions for ARS account for an estimated excess direct cost of \$245 million annually. Selecting guideline recommended antibiotics for ARS could result in substantial national savings while maintaining quality of care.

## 14. Analysis of Sinonasal Outcomes following Endoscopic Transsphenoidal Surgery

Colin R. Edwards, MD, Cincinnati, OH; Tasneem Shikary, MD, Cincinnati, OH; Lee A. Zimmer, MD PhD, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the morbidity associated with the transsphenoidal approach to the sella and how it compares with sublabial and microscopic approaches.

**Objectives:** To examine sinonasal outcomes following transsphenoidal surgery by a single otolaryngologist working in conjunction with a team of neurosurgeons. **Study Design:** Retrospective chart review. **Methods:** Analysis of 444 consecutive patients who underwent endoscopic removal of tumors between April, 2006 and March, 2014. Complications examined included epistaxis, CSF leak, sinusitis, nasal obstruction, anosmia, and wound debridement. **Results:** Pathology included pituitary adenomas (74.1%, 58.1% hormone positive, 16% null cell), Rathke's cleft cysts (6.8%), other tumors (6.5%), and unidentifiable masses (12.6%). 3.5% of patients with sellar reconstruction developed post-op CSF leaks, compared to 9.1% of patients who did not have sellar reconstruction (chi square,  $p=0.11$ ). 50% of patients developed nasal obstruction, leading to an average of 1.7 debridements. 44 patients (9.9%) experienced one or more episodes of epistaxis. Of the 44 patients with epistaxis, 17 (38.6%) required intervention; 7 were cauterized with silver nitrate, 5 returned to the OR for control of bleeding, 2 underwent embolization, 2 had rapid rhinos placed, and 1 was treated with FloSeal. Other complications included sinusitis (8.5%), septal osteomyelitis (3.2%), anosmia (1.7%), meningitis (0.7%), sellar hematoma (0.7%), sphenoid sinus mucocele (0.5%), DVT (0.5%), PE (0.5%), septal ulcer (0.2%), and septal perforation (0.2%). **Conclusions:** The most common sinonasal complications are epistaxis, CSF leaks, sinusitis, and septal osteomyelitis. While CSF leaks are more common when the sella is not reconstructed, this difference is not significant. Overall, the endoscopic transsphenoidal approach is safe and well tolerated with low sinonasal complication rates. Comparison of the endoscopic approach to sublabial, microscopic approaches will be discussed.

## 15. Fibrin-Genipin Hydrogel for Cartilage Tissue Engineering in Nasal Reconstruction

Nikita Gupta, MD, New York, NY; Michelle A. Cruz, BS, New York, NY; Philip Nasser, MSME MSEE, New York, NY; Joshua D. Rosenberg, MD, New York, NY; James C. Iatridis, PhD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss limitations in nasal reconstruction, describe the mechanical properties of fibrin-genipin hydrogels, and compare these to native cartilage.

**Objectives:** The availability of autologous cartilage can be a limiting factor in nasal reconstruction. Fibrin glue has been studied as a scaffold for tissue engineered cartilage because it provides a favorable environment for chondrocytes to produce extracellular matrix (ECM), but its use has been limited by fast degradation and weak mechanical properties. Genipin is a naturally occurring cross-linking agent and fibrin-genipin hydrogels have demonstrated biocompatibility in studies of use in articular and intervertebral disc applications. The aim of this study is to evaluate mechanical properties of these hydrogels in order to match the material properties of native tissue for engineered nasal cartilage. **Study Design:** Basic science. **Methods:** Mechanical testing was performed on fibrin, fibrin-genipin gels, and fibrin-genipin gels with ECM components, including compression, tensile, and shear testing. Rabbit nasal septal cartilage was harvested and tested in these modalities for comparison. Scanning electron microscopy and transmission electron microscopy were used to characterize the hydrogels. **Results:** Fibrin-genipin gels had significantly higher compressive, tensile, and shear moduli compared to fibrin alone or fibrin-genipin with ECM. However, it had significantly lower moduli than the rabbit nasal septal cartilage. Microscopy showed genipin cross-linking, but this was interrupted with added ECM. **Conclusions:** The addi-



tion of genipin significantly improves the mechanical properties of fibrin hydrogels by increasing the compressive, tensile, and shear moduli. The addition of ECM decreased these moduli due to a reduction in cross-linking density. Fibrin-genipin hydrogels offer some promise as a scaffold for cartilage tissue engineering in nasal reconstruction, yet require further augmentation to match material properties of native tissue.

## 16. **Brown Tumor of Nasal Bone: 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 the brown tumor of the nasal bone as a differential diagnosis of nasal bone tumors, also to consider hyperparathyroidism after the excision of a brown tumor from the nose.

**Objectives:** The brown tumor is a bone lesion that arises in settings of excess osteoclast activity, such as hyperparathyroidism. It is not a true neoplasm, it represents a reparative cellular process rather than a neoplastic process and could be a difficult differential diagnosis to anticipate. In this presentation we report a case of brown tumor of the nasal bone and reviewed the literature. **Study Design:** A case report and literature review. **Methods:** We report a 19 year old woman presented with 12 month history of bilateral nasal obstruction mainly on the left side. There is not any present or past medical history. The patient had no family history of any nasal diseases. On nasal endoscopic examination, a bilateral posterior nasal cavity mass originating from the vomer and expanding on both sides, the possibility of a tumor of the nasal cavity was considered, for further evaluation of the mass, high resolution CT of the nasal bone were performed. The CT study showed a mass causing the obstruction. **Results:** Wide excision of the mass was performed. The mass appeared yellowish brown in color. Histocytopathology report revealed the presence of a giant cell tumor consistent with brown tumor of bone. Laboratory evaluation of the patient revealed hyperparathyroidism. The patient recovered uneventfully, remained asymptomatic and recurrence free at the 1 year followup. **Conclusions:** If the mass is resectable we should remove it completely, also to consider the brown tumor as a differential diagnosis of nasal cavity masses and the nasal lesions with histologic features of a giant cell tumor should be evaluated for hyperparathyroidism.

## 17. **Management of Cervical Spine Defects with Vascularized Fibula Free Tissue Transfer Bone Graft Reconstruction**

Ryan S. Jackson, MD, Rochester, MN; Eric J. Moore, MD, Rochester, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the use of vascularized fibula free tissue bone grafts for reconstruction of cervical spine defects.

**Objectives:** We aim to report characteristics and outcomes of patients undergoing vascularized fibula free tissue transfer (FTT) for cervical spine defects. **Study Design:** Retrospective chart review. **Methods:** We report four cases of cervical spine defects reconstructed with vascularized fibula FTT between 06/2010 and 05/2012. **Results:** Case 1 is a 67 year old male who underwent fibula FTT reconstruction for a cervical spine chordoma. He remains tumor free 48 months postoperatively but still requires gastrostomy tube supplementation to his oral diet. Case 2 is a 60 year old female with a history of osteomyelitis and pharyngeal hardware exposure 3 years after chemoradiation for supraglottic carcinoma. She underwent osteocutaneous fibula reconstruction of her cervical spine and pharyngeal defects. She is tolerating a pureed diet with some soft foods at 18 months followup. Case 3 is a 61 year old male who underwent fibula FTT for osteomyelitis 15 years after surgical resection and adjuvant radiation therapy for tonsil cancer. He continues to be gastrostomy tube dependent 29 months postoperatively. Case 4 is a 45 year old female who presented with pharyngeal hardware exposure and osteomyelitis 4 years after multiple resections and radiation therapy for a cervical spine giant cell tumor. Therefore, osteocutaneous fibula FTT reconstruction of her spinal and pharyngeal defects was performed. At 45 months followup, she had no evidence of disease and is tolerating a regular diet. **Conclusions:** Vascularized bone grafts have advantages over nonvascularized grafts in the cervical spine in compromised wound beds secondary to salivary contamination and prior irradiation. Fibula FTT can successfully reconstruct large defects of the cervical spine.

## 18. **Clinical Application for Regeneration of the Skull/Temporal Bone**

Shin-ichi Kanemaru, MD PhD, Osaka, Japan; Rie Kanai, MD, Osaka, Japan; Masaru Yamashita, MD PhD, Osaka, Japan; Takuya Tsuji, MD, Kyoto, Japan; Masaki Yamamoto, MD, Osaka, Japan; Shigeru Hirano, MD PhD, Kyoto, Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to know how to regenerate the skull/temporal bone and its great merits.

# Posters

**Objectives:** To establish the new treatment for regeneration of the skull/temporal bone. Cranial bone reconstructive surgery is usually performed after a craniotomy or posttraumatic repair of the skull. In most cases, cranial bone reconstructions have been performed by fixing bone flaps to surrounding bone with artificial devices such as titanium plates or stainless steel wire. These materials interfere with imaging by computed tomography (CT), magnetic resonance (MRI), and X-ray. Because no bone regenerates around the bone flap, it is gradually replaced by fibrous tissues. Deformations of the reconstructed site after surgery cause cosmetic handicaps for patients. **Study Design:** Clinical trial in three general hospitals. **Methods:** 84 patients (Age: 23-85, M=37, F=47) were performed this regenerative treatment accompanied by cochlea implant (n=33), decompression of facial nerve (n=23), endolymphatic sac surgery (n=19) and resection of acoustic tumor by translabyrinthine approach (n=5)/middle cranial fossa approach (n=4). Materials used for regeneration of the skull/temporal bone were cranial bone flap, bone powder and fibrin glue. After replacing bone flap, the space between bones was filled with bone powder with fibrin glue. One year after the operation, whether the bone was regenerated or not was estimated by CT scan image. **Results:** Perfect regeneration of the skull/temporal bone was achieved in 79 patients (94%). Partial bone defects were observed in five patients (6%). No serious sequelae were observed in any patient. **Conclusions:** This clinical study demonstrates that a combination of bone flap, bone powder and fibrin glue enables to regenerate the skull without conventional operative procedures. This regenerative treatment is easy, safe, cost effective, and cosmetically good.

## 19. **Chronic Rhinosinusitis and Olfactory Dysfunction: Investigating the Role of Superior Airflow Patterns**

Jarrod A. Keeler, MD, Durham, NC; Aniruddha U. Patki, MD, Durham, NC; David W. Jang, MD, Durham, NC; Dennis O. Frank-Ito, PhD., Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the airflow of the olfactory cleft and reasons for chronic rhinosinusitis patients having decreased olfaction.

**Objectives:** Chronic rhinosinusitis (CRS) is frequently associated with olfactory dysfunction (OD). In CRS with nasal polyposis, airflow through the olfactory cleft is reduced by mechanical obstruction. In CRS without polyps, inflamed nasal mucosa has been hypothesized as the cause of OD. It is unclear if diminished olfactory cleft airflow is present in CRS without polyps as well. Determining the root cause of OD in CRS could help direct therapy. **Study Design:** Retrospective review. **Methods:** This is a retrospective study utilizing CFD to determine olfactory cleft airflow in three categories of subjects: normal healthy, CRS with OD, and CRS without OD. CFD analysis was conducted in the sinonasal cavities in six subjects (2 subjects per category), and superior airflow in the vicinity of the olfactory cleft was quantified in three cross-sections: anterior, middle and posterior. **Results:** Bilaterally, superior airflow in L/min and average airflow velocity in all three cross-sections was similar for all groups. Nonetheless, CFD results showed that relative change in superior airflow from anterior to middle (AM) and from middle to posterior (MP) cross-sections increases in both normal healthy (AM=4.5%, MP=8.5%) and CRS without OD (AM=3.9%, MP=5.8%) subjects, but decreases in the CRS with OD subjects (AM=-3.9%, MP=-1.6%). **Conclusions:** The results obtained in this pilot study showed that as airflow travels posteriorly, the amount of flow in the superior nasal cavity is reduced in subjects with CRS and OD, and increased in both normal healthy and CRS without OD subjects. Altered patterns of airflow may play a role in OD for CRS patients.

## 110. **Blunt Cerebrovascular Injury and Facial Fractures: A Systematic Review of the Literature**

Gregory I. Kelts, MD, San Antonio, TX; Stephen C. Maturo, MD, San Antonio, TX; Marion E. Couch, MD PhD MBA, Indianapolis, IN; Cecelia E. Schmalbach, MD MS, Birmingham, AL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify craniomaxillofacial trauma patients at risk for blunt cerebrovascular injury and describe the optimal diagnostic and therapeutic modalities to treat these patients.

**Objectives:** Blunt cerebrovascular injury (BCVI) is a rare but lethal sequela of high velocity trauma often resulting in stroke or death. The objective of this systematic review is to 1) identify craniomaxillofacial (CMF) trauma patients who may benefit from BCVI screening; and 2) describe the optimal diagnostic and therapeutic modalities to treat these patients. **Study Design:** Medline, PubMed, and Cochrane Systematic Review 01JAN1946-14FEB2013. **Methods:** Using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis model, a comprehensive review of the literature was conducted for BCVI studies involving CMF injuries. Dual blinded data extraction was conducted for article meeting inclusion criteria. **Results:** 682 abstracts were reviewed; 21 met inclusion criteria. BCVI incidence was 0.45%. 86.6% of patients had high velocity mechanism of injury. Facial fractures incidence in the setting of BCVI was highest for mandible (12.5%) and maxilla fractures (11.8%). Computed tomographic angiography (CTA) has emerged as the screening modal-

ity of choice. 63.1% of patients with BCVI were treated nonsurgically with anticoagulant or antiplatelet medications. The mortality among BCVI patients was 23.9% and the morbidity from associated stroke was 47.1%. **Conclusions:** BCVI is a rare yet devastating complication of blunt trauma, with a stroke rate approaching 50%. 1/3 of all BCVI patients present with facial fractures. Patients sustaining CMF fractures in the setting of high velocity trauma may benefit from CTA screening to avoid the risk of stroke and death.

## I11. Causes of Dacryocystorhinostomy (DCR) Failure: External vs Endoscopic Approach

Giant C. Lin, MD, Boston, MA; Ralph B. Metson, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare causes of dacryocystorhinostomy (DCR) failure between external and endoscopic techniques and discuss surgical steps at revision operation to improve overall results.

**Objectives:** To compare the causes of dacryocystorhinostomy (DCR) failure between external and endoscopic techniques for the treatment of lacrimal obstruction. **Study Design:** Retrospective cohort study. **Methods:** The study population consisted of 53 patients who underwent revision endoscopic DCR from 2002 to 2013. Patient demographics, surgical details, and identified causes of prior DCR failure were compared between those patients whose initial surgery was performed through an external vs. endoscopic approach. **Results:** Reasons for DCR failure following external (n=32) vs. endoscopic (n=21) techniques included ostial closure (52.4% vs 53.1%, p=0.958), inadequate bone removal (23.8% vs 9.4%, p=0.151), sump syndrome (9.5% vs 9.4%, p=0.986), and adhesions involving the middle turbinate (57.1% vs 28.1%, p=0.035), ethmoid cells (14.3% vs 18.8%, p=0.672), and nasal septum (9.5% vs 15.6%, p=0.521). Septoplasty was more likely to be performed when the initial procedure was external vs. endoscopic (71.1% vs 15.6%, p<0.001). Overall success rate for revision DCR was comparable between groups (71.4% external vs. 71.8% endoscopic) over the 12 year study period with a mean followup of 12.7 months. **Conclusions:** Compared to endoscopic DCR, external DCR fails more commonly from obstructing adhesions involving the middle turbinate. Proper management of the middle turbinate and deviated nasal septum appears to be an important consideration at time of lacrimal surgery.

## I12. Salvage Total Laryngectomy after Chemoradiation: Fistula and Stenosis Prevention by Fasciocutaneous Free Flaps

Cesare Piazza, MD, Brescia, Italy; Francesca del Bon, MD, Brescia, Italy; Alberto Paderno, MD, Brescia, Italy; Valentina Taglietti, MD, Brescia, Italy; Alberto Grammatica, MD, Brescia, Italy; Piero Nicolai, MD, Brescia, Italy

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that use of radial forearm and anterolateral thigh fasciocutaneous free flaps for salvage total laryngectomy after radiotherapy/chemoradiotherapy leads to low pharyngocutaneous fistula and pharyngoesophageal stenosis rates.

**Objectives:** To reduce pharyngocutaneous fistula (PCF) and pharyngoesophageal stenosis (PES) rates in total laryngectomy (TL) after radiotherapy (RT)/chemoradiotherapy (CRT) using fasciocutaneous free flaps (FCFF) for pharyngeal closure and long lasting salivary bypass stent (SBPS). **Study Design:** Prospective evaluation of consecutive patients treated by salvage TL and reconstruction by FCFF and SBPS in a tertiary academic institution. **Methods:** Between 2008-2014 forty-three patients (mean age, 64 years; range, 35-85; M:F ratio, 7.6:1) underwent salvage TL after RT (n=23) or CRT (n=20) and reconstruction with anterolateral thigh (ALT) in 29 cases, and radial forearm (RF) in 14. The skin paddle of such FCFFs was always sutured to the hypopharyngeal defects after partial removal of edematous/pale piriform sinus mucosa. Long lasting BPSS was used in all of them and left in place for 45 days. Antibiotic prophylaxis with ampicillin sulbactam and metronidazole was administered for at least 15 days. **Results:** Flap failure occurred in 1 (2.3%) case and was managed by pectoralis major. We encountered 3 (7%) PCFs: 1 was cured by medical treatment alone, while 2 needed surgical revision with direct suture. One patient (2.3%) experienced late PES, successfully managed by endoscopic dilatation. No statistically significant difference in terms of final outcome (flap failure, PCF, or PES) in relation to type of preoperative treatment or free flap used was found. **Conclusions:** Use of RF and ALT FCFFs for salvage TL after RT/CRT leads to low PCF and PES rates.

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## 113. Mucosal Leishmaniasis of the Nasal Cavity: Case Report and Review of Literature

Aron Z. Pollack, MD, New York, NY; Stephanie E. Teng, MD, New York, NY (Presenter); Christine M. Kim, BA, Washington, DC; Richard A. Lebowitz, MD, New York, NY; Joseph B. Jacobs, MD, New York, NY; Seth M. Lieberman, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to report a case of mucosal leishmaniasis in the nasal cavity and discuss the literature on diagnosis and management.

**Objectives:** To report a case of mucosal leishmaniasis in the nasal cavity and review the literature on diagnosis and management. **Study Design:** Case report with literature review. **Methods:** A review of the English literature on mucosal leishmaniasis was undertaken. A PubMed search using several terms in various combinations was completed. Appropriate articles were selected and analyzed. **Results:** Leishmaniasis is a disease caused by protozoan parasites of the genus leishmania. The disease can manifest as cutaneous, mucosal and visceral lesions. The mucosal form is the least common, likely resulting from hematogenous or lymphatic dissemination from cutaneous lesions to regions of the upper aerodigestive tract. This entity is associated with significant morbidity and remains largely endemic to Central and South America; outside of those regions, it is almost exclusively seen in individuals having recently returned from travel. Economic globalization and international travel have increased the prevalence of leishmaniasis in developed countries, including the US and, as such, it is incumbent upon the otolaryngologist to be familiar with such pathology so as to facilitate prompt diagnosis and treatment. Herein, we describe a case of mucocutaneous leishmaniasis involving the right caudal septum and nasal cavity in a 39 year old male who presented with progressive unilateral nasal congestion and intermittent epistaxis. The patient had been diagnosed with cutaneous leishmaniasis 10 months prior after vacationing in Peru. Rhinoscopy showed a discrete region of friable, nodular appearing mucosa over the right caudal septum and anterior face of the inferior turbinate. Diagnosis was confirmed from mucosal biopsy via polymerase chain reaction. Two months after completion of a four week treatment course with pentavalent antimonials, symptoms gradually resolved and rhinoscopic exam improved. **Conclusions:** Due to continued economic globalization and increasing international travel, the prevalence of leishmaniasis has risen in developed countries, including the US and, as such, it remains incumbent upon the otolaryngologist to be familiar with such pathology so as to facilitate prompt diagnosis and treatment.

## 114. Reconstruction of an Extensive Skull Base Defect as a Result of a Frontal Sinus Pneumocele

Vaibhav H. Ramprasad, BA, Durham, NC; Charles R. Woodard, MD, Durham, NC; David W. Jang, MD, Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the risk of extensive pneumocele and spontaneous pneumocephalus in patients with chronic CSF shunting. Participants should also be able to describe the proposed management strategy for patients with long term CSF shunts.

**Objectives:** 1) To describe a case of frontal sinus pneumocele with extensive posterior table defect resulting from chronic ventriculoperitoneal shunting; and 2) to propose a management strategy for patients who have long term CSF shunts. **Study Design:** Case report. **Methods:** We report the case of a 54 year old male with a history of congenital hydrocephalus managed with a ventriculoperitoneal shunt who presented with sudden onset headache with a near syncopal episode after sneezing. A computed tomographic scan showed massive pneumocephalus and a large frontal sinus pneumocele with near complete erosion of the posterior table of the frontal sinus. Although the patient's headache improved over the next 48 hours, the large posterior defect and need for continual shunting posed the risk of another episode of pneumocephalus. The patient was taken to the operating room and underwent reconstruction of the posterior table defect with a pericranial flap followed by frontal sinus obliteration with abdominal fat. **Results:** The patient's symptoms resolved with resolution of pneumocephalus on postoperative imaging one month later. **Conclusions:** This case illustrates the risk of extensive pneumocele with sudden spontaneous pneumocephalus in patients with long term CSF shunts. These patients should be counseled regarding this complication. In addition, maneuvers that produce sudden Valsalva, such as sneezing, should be avoided in patients with evidence of bony erosion. If bony erosion of the skull base is extensive, reconstruction of the skull base defect is advisable.

## 115. A Comparison of Short and Long Term Efficacy on Symptom Control and Quality of Life between Partial Turbinectomy, Radiofrequency Coblation, and Microdebrider Assisted Partial Turbinoplasty

Jessica L. Riccio, MD, Albany, NY; Sarah M. Kidwai, BS, Albany, NY; Lauren P. Garcia, BS, Albany, NY; Carlos D. Pinheiro-Neto, MD PhD, Albany, NY

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

pare the clinical efficacy of various surgical techniques for inferior turbinate hypertrophy.

**Objectives:** To investigate and compare short and long term outcomes of surgical treatment modalities for inferior turbinate hypertrophy, specifically radiofrequency coblation, partial turbinate resection, and microdebrider assisted turbino-plasty. The primary endpoints will be resolution of nasal obstructive symptoms and quality of life. Secondary endpoints will be operative time, intraoperative blood loss, and postoperative complication rate between treatment modalities. **Study Design:** A retrospective chart review. **Methods:** Once all data is acquired, a retrospective chart review will be performed. Adult patients (>18 years) who underwent surgical treatment for nasal obstruction, specifically inferior turbinate hypertrophy at our medical center between 2012-2014 will be enrolled. Patients will be excluded if there is a history of previous nasal surgery. Medical records will be reviewed and data including type of hypertrophy (bony or mucosal), surgical method, intraoperative time, and intraoperative bleeding will be recorded and compared. Records will also be examined for presence and timing of postoperative complications such as pain, crusting, synechiae, bleeding, and resolution of symptoms. A standard 4 point scale will be used. A postoperative endoscopic grading score will be recorded and compared between patients based on in-office rigid endoscopic examination and visual analog scale (0-10). Nasal symptom resolution score will be based on the S-NOT questionnaire and compared to preoperative symptoms. **Results:** Once a combination of objective and subjective data is acquired between patients, a comparison of results will be performed. We anticipate a cohort of approximately 100 patients for evaluation who meet inclusion criteria. We also anticipate a followup period of one year postoperatively. Statistical analysis will be performed using a student's t-test to evaluate for significance between categories in each surgical modality ( $p < 0.05$ ). Endoscopic imaging will be recorded. **Conclusions:** Nasal obstruction, specifically inferior turbinate hypertrophy, is a common clinical entity in patients, and there are a multitude of surgical techniques offered without definitive data as to which method is superior. This study will demonstrate both objective and subjective findings regarding the clinical effectiveness of three surgical modalities for inferior turbinate hypertrophy. The study will further provide a useful contribution to the literature regarding the safest and most efficacious surgical method regarding symptom control and quality of life.

## 116. Health Utility Values in Medically Treated Patients with Chronic Rhinosinusitis

Brooke M. Su, BA, Boston, MA; George A. Scangas, MD, Boston, MA; Aaron K. Remenschneider, MD MPH, Boston, MA; Eve Wittenberg, PhD, Boston, MA; Ralph B. Metson, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of how patient reported health utility values in medically managed chronic rhinosinusitis compare to the general population and to other common chronic conditions, as well as discuss implications of this baseline HUV for future comparison of treatment modalities.

**Objectives:** Health utility values (HUV) can describe important general health related quality of life preferences among patients with chronic disease. This study aimed to identify baseline HUV measures in medically treated US patients with chronic rhinosinusitis (CRS). **Study Design:** Retrospective analysis of national surveys. **Methods:** Using data from the Medical Expenditure Panel Survey (MEPS), all adult patients with a diagnosis of CRS who had not undergone sinonasal surgery between 2000-2003 were assessed. Corresponding EQ-5D preference based index scores (HUV) were extracted, as were demographic and comorbidity data. Multivariable regression was used to identify predictors of EQ-5D scores. **Results:** A total of 4,231 responses from patients with medically treated CRS were identified out of 79,524 total survey responses. Mean EQ-5D scores were significantly lower in the medically treated CRS population as compared to the general survey population (0.787, SD 0.235, vs. 0.819, SD 0.246,  $p < 0.001$ ; minimally clinically important difference is 0.03). CRS patients differed from the overall population in terms of sex (31% male vs. 46%,  $p < 0.001$ ), education level (34% beyond high school vs. 26%,  $p < 0.001$ ), and income distribution (44% above 400% of federal poverty level vs. 34%,  $p < 0.001$ ). Multivariable regression demonstrated that male sex ( $p < 0.001$ ), higher education level ( $p < 0.001$ ), and higher income ( $p < 0.001$ ) are associated with higher HUV scores, indicating the impairment in HUV associated with CRS overcomes demographic differences. **Conclusions:** Medically treated patients with chronic rhinosinusitis report lower quality of life and have lower mean utility scores than the general population. These findings can inform comparative effectiveness assessments of surgical versus medical treatment in CRS.

## 117. Epistaxis in Patients on Extracorporeal Membrane Oxygenation

Andrew J. Victores, MD, Houston, TX; Celeste Z. Nagy, BA, Houston, TX; Asma Zainab, MD, Houston, TX; Sarah Homer, NP, Houston, TX; Masayoshi Takashima, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss epistaxis in patients on extracorporeal membrane oxygenation (ECMO).

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**Objectives:** To evaluate epistaxis in patients on ECMO and determine etiologies and outcomes of these episodes. **Study Design:** Retrospective, cross-sectional study. **Methods:** A retrospective study was conducted of ECMO patients in the years 2013-2014. **Results:** Fifty-five patients were identified who met criteria for inclusion in the study. Ten of these patients (18.2%) demonstrated significant epistaxis requiring otolaryngology-head and neck surgery intervention. Almost all of these patients had a Dobbhoff tube inserted prior to the episode of epistaxis (90%). Most of these cases occurred on the same side of the nasal cavity as the Dobbhoff tube (78%) and during the initial placement of the tube (67%). Nearly one-third of patients required blood transfusion during the episode of epistaxis. Four patients required formal posterior nasal packing and two of these patients ultimately required intervention in the operating room to control the epistaxis. About half of the patients were placed on ECMO for H1N1 related reasons. **Conclusions:** This is the first study to evaluate epistaxis in ECMO patients. Our study demonstrates a considerable rate of epistaxis in this patient population. Most of these cases appeared to be related to Dobbhoff tube insertion or maintenance as well as the anticoagulation required for ECMO. Our findings provide an important insight into epistaxis in the ECMO population, which can require blood transfusion or operative intervention at times.

**118. Posterior Nasal Injection of Botulinum Toxin in Allergic Rhinitis: A Pilot Study**  
Edward Zy Zhang, MBBS, Singapore,; Yu Feng Soh, MBBS, Singapore,; Ian Cy Loh, MBBS, Singapore,

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate the potential of this single dose sustained effect therapeutic option in the treatment of allergic rhinitis.

**Objectives:** Botulinum toxin (BTX) is a new therapeutic option in the treatment of allergic rhinitis (AR). Several studies have demonstrated its safety and effectiveness in controlling the symptoms of AR for up to 20 weeks. The delivery technique and optimum dosage is nonetheless highly varied. The aim of this study is to evaluate symptom control, safety, and patient comfort using a novel technique of low dose BTX injection into the posterior lateral nasal wall in close proximity to the vidian nerve, from which the nasal cavity derives its parasympathetic innervation. **Study Design:** Single arm pilot study. **Methods:** 10 patients with moderate-severe and persistent allergic rhinitis, allergic to dust mites on skin prick test, and not on anti-allergic medication two months prior were recruited. They received a single dose of BTX 12.5units to each nasal cavity injected under endoscopic guidance to the posterior lateral nasal wall in the clinic setting. Patient discomfort immediately post-procedure and total nasal symptom scores (TNSS) over a period of one month were assessed. **Results:** TNSS (6 point Likert scale max=20, min=0) showed an improvement from a mean of 16.2 to 7.3, with greatest effect seen in subscales of rhinorrhea 4.4 (max=5, min=0) to 2.3, followed by itch, sneeze, and congestion. Discomfort of the procedure was low (mean visual analogue scale 2.4/10). No patients experienced any side effects. **Conclusions:** Our technique of BTX injection shows good efficacy and tolerability, with no side effects. Further studies comparing techniques of administration of BTX, and its role in the stepwise management of AR, in combination with intranasal and oral treatment modalities is required.

## General/Clinical Fundamentals

**119. Prophylactic Immunization with Human Papillomavirus Vaccines Induces Oral Immunity in Mice**  
Julie J. Ahn, BS, Baltimore, MD; Simon R.A. Best, MD, Baltimore, MD (Presenter); Shiwen Peng, MD PhD, Baltimore, MD; Richard Roden, PhD, Baltimore, MD

**Educational Objective:** The present study aims to determine whether oral immunity can be established with prophylactic HPV vaccination.

**Objectives:** While it has been shown that prophylactic vaccination can induce genital immunity, there is inadequate information on HPV vaccine induced oral immunity, which is of particular interest due to HPV associated oropharyngeal malignancies. Therefore, we assessed the efficacy of various HPV vaccines against oral HPV infection in mice. **Study Design:** Pre-clinical scientific investigation. **Methods:** C57BL/6 mice were vaccinated three times at 2 week intervals with either Gardasil (50 µl i.m.) or a pan-HPV L2 vaccine with alum adjuvant (25 µg s.c.). An in vitro neutralization assay confirmed vaccine efficacy. Additional mice were immunized with passive transfer of either Gardasil human antisera or non-immunized sera (100 µl i.p.). All vaccinated and naïve control mice were then challenged with HPV16 E6E7 Luciferase pseudo virus in the oral mucosa. Visualization of HPV infection was monitored through luciferase activity using the IVIS Spectrum Imaging System. **Results:** Virus neutralization could be detected in the Gardasil mouse sera collected two weeks after final vaccination. Oral Luciferase expressing HPV infection was not detected in Gardasil, L2 vaccine and Gardasil antisera immunized mice whereas robust Luciferase expression was observed in all control mice. **Conclusions:** Oral HPV infection in mice was completely prevented with all methods of prophylactic HPV immunization. These findings

provide preliminary evidence that human vaccines induce protection against oral HPV infection, which has significant public health implications for HPV associated oropharyngeal malignancies.

## 120. Otolaryngologic Manifestations of Levamisole Induced Vasculitis

Aurash S. Alemi, MD, San Francisco, CA; Daniel L. Faden, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the pathophysiology, natural history, workup and treatment of levamisole induced vasculitis.

**Objectives:** Levamisole is an antihelminthic agent with known immunomodulator activity in humans and has recently emerged as a contaminant in cocaine. Levamisole induced vasculitis is a newly described entity related to exposure to levamisole-containing cocaine, characterized by microvascular thrombosis and vasculitis causing necrotic cutaneous facial lesions. Here, we describe a patient with levamisole induced vasculitis, resulting in widespread facial, oral and laryngeal lesions. **Study Design:** Case report and literature review. **Methods:** Patient history, physical exam findings, photographic imaging of lesions and management are discussed. Additionally, a review of the existing literature is provided. **Results:** A 40 year old female presented with cutaneous facial lesions and breathy dysphonia which began 2 days after using cocaine. Examination revealed widely spread necrotic facial lesions, an ulcerative hard palate lesion and bilateral true vocal fold lesions impairing vocal fold mobility. The diagnosis of levamisole induced vasculitis was made and the patient was treated conservatively with resultant slow resolution of the lesions. A review of the literature revealed no previously reported cases of laryngeal involvement in levamisole induced vasculitis. **Conclusions:** Levamisole induced vasculitis is an emerging clinical entity in the US with severe otolaryngologic manifestations. To our knowledge, no reports in the literature have documented a description of laryngeal lesions. It is estimated that 70% of the cocaine in the US is contaminated with levamisole; thus, it will become increasingly important for otolaryngologists to recognize and diagnose this disease promptly, as the incidence of cases is likely to rise in coming years.

## 121. Identification and Remediation of Problematic Residents

Nasir I. Bhatti, MD, Baltimore, MD; Aadil Ahmed, MD, Baltimore, MD; Michael G. Stewart, MD, New York, NY; Robert H. Miller, MD, Houston, TX; Sukgi S. Choi, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the characteristics of problematic residents and successful strategies to correct those weaknesses.

**Objectives:** Despite careful selection processes, residency programs face trainees which fall below minimal performance standards. Poor performance of a resident can endanger patient safety and reputation of the residency program. Therefore it is important for a residency program to identify such residents and implement strategies for their successful remediation. The purpose of this study was to gather information on evaluation and remediation strategies employed by different otolaryngology programs. **Study Design:** Survey study. **Methods:** A national survey was conducted by sending a questionnaire form to the program directors of 106 otolaryngology residency programs listed in ACGME directory. Information was collected on demographics of the program, identification of problematic residents, and remediation strategies. **Results:** Faculty compliance in the evaluation process was greater than 75% in 69% of programs and majority of problematic residents were identified by faculty (59%). The most frequently reported difficulties of problem residents were unsatisfactory behavior with colleagues/staff (75%), insufficient medical knowledge (72%), and poor clinical judgment (68%). Personal or professional stresses were most frequently identified underlying problem (84%). Methods of addressing the problem included general counseling (91%), frequent feedback sessions (86%), and assignment of a mentor (85%). These efforts were successful in more than 76 percent of the residents whereas it failed in 23% of the cases ultimately leading to dismissal from program. **Conclusions:** The presenting characteristics and underlying issues of problematic residents varies which makes remediation a daunting task. The results of this study should serve as a framework to enhance future assessment and corrective procedures implied in otolaryngology residency programs.

## 122. Quality Improvement in Otolaryngology Residency: Survey of Program Directors

Sarah N. Bowe, MD, JBSA-Ft. Sam Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the extent of resident and faculty participation in quality improvement and derive opportunities for both resident curriculum and faculty development.

**Objectives:** The Clinical Learning Environment Review (CLER) Pathways to Excellence focus on the responsibility of

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the sponsoring institution for healthcare quality and patient safety. Very little information is known regarding the status of quality improvement (QI) education in otolaryngology training programs. The purpose of this survey is to evaluate the extent of resident and faculty participation in QI in order to derive opportunities for both resident curriculum and faculty development. **Study Design:** Cross-sectional survey. **Methods:** A 15 item survey was distributed to 106 otolaryngology program directors. The survey was developed after an extensive review of literature regarding education in practice based learning, systems based practice, quality improvement, and patient safety. Questions were directed at the format and content of the QI curriculum, as well as barriers to implementation. **Results:** There was a 28% response rate. Ninety-three percent of program directors considered education in quality improvement important or very important to a resident's future success. Only 17% of programs contained an educational curriculum in QI and only 28% monitored resident's individual outcome measures, both CLER requirements. Barriers to implementation of a QI program included inadequate number of faculty with expertise in QI (69%), low level of faculty enthusiasm toward curriculum (59%), and competing resident educational demands (90%). **Conclusions:** Program directors recognize the importance of quality improvement in otolaryngology practice. Unfortunately, this survey identifies a distinct lack of resources in support of these educational goals. The results provide necessary information in order to generate comprehensive QI curriculum for both faculty development and resident instruction.

## I23. The Ethnic Sinus

Sonia H. Chen, MD, Oakland, CA; Jonathan Liang, MD, Oakland, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify anatomic differences that exist among common racial groups, which can be considered in patients undergoing endoscopic sinus surgery.

**Objectives:** Based on the ethnic nose concept for rhinoplasty, we set out to investigate if there are sinonasal anatomic differences that exist among ethnic groups. **Study Design:** In this case control study, we retrospectively reviewed sinus/maxillofacial computer tomography (CT) from Caucasian, Asian, African-American/Black, and Hispanic/Latino patients. **Methods:** Patient exclusion criteria included age <18, bi/multi/undefined race, and previous sinonasal surgery. CT exclusion criteria included abnormal/diseased scans (sinusitis, facial trauma) and insufficient views. We analyzed for septal deviation, middle turbinate (paradoxical, concha bullosa), uncinat process attachment, skull base depth, anterior ethmoidal artery (AEA) position, special cells (Haller, Onodi, agger nasi, frontal), sinus size/pneumatization, and carotid artery and optic nerve dehiscence. **Results:** CTs from 150 patients (53 Caucasians, 46 African-American/Blacks, 28 Hispanic/Latinos, and 23 Asians) were included. Caucasians had significantly lower prevalence of Haller cells and hanging AEAs; African-American/Blacks had significantly lower prevalence of Onodi cells; Asians had significantly higher prevalence of Haller cells, Onodi cells, and hanging AEAs ( $p < 0.05$ ). Compared with Caucasians, Asians are 4.3X, 4.2X, and 3.6X more likely to have Haller cells, Onodi cells, and hanging AEAs, respectively. There were no significant differences for other variables. **Conclusions:** This is the largest study investigating sinonasal anatomic differences among several racial groups. Important variables (AEA position, Haller and Onodi cells) demonstrated significant racial variations, supporting the ethnic sinus concept. As the population diversifies, chronic sinusitis does not discriminate, making these anatomic nuances invaluable for preoperative assessment and planning.

## I24. Football Related Facial Trauma: A Population Based Analysis

Steven T. Cox, BS, Detroit, MI; Christopher T. Rose, MD, Detroit, MI (Presenter); Peter F. Svider, MD, Detroit, MI; Jean A. Eloy, MD, Newark, NJ; Adam J. Folbe, MD, Detroit, MI; Giancarlo Zuliani, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify trends in football related facial injuries, specifically most common site and mechanism of injury. Furthermore, viewership will demonstrate a vast comprehension in the evolution of football regulation, bolstering discussion on possible explanations of shifting football related trauma trends.

**Objectives:** Increased recognition of deleterious sequelae resulting from facial trauma has facilitated changes in regulations governing organized football in recent years. Our objectives were to evaluate the national incidence of football related facial injuries for trends that may be associated with new rules, as well as characterize the types of injuries that occur by patient demographic data. **Study Design:** U.S. emergency department (ED) visits for football related facial trauma as reported to the National Electronic Injury Surveillance System were accessed. **Methods:** Patients were further analyzed by gender, age, and diagnosis, as well as by anatomic location and mechanism of injury. **Results:** From 2008-2013, there were an estimated 103,803 ED visits for football related facial injuries. The median and peak age of patients were 15.0 (IQR: 11.0 - 19.0) and 17.0 years of age respectively, and 93.9% of patients were male. There has been a 67.3% decrease



in injury incidence over this time period. The most common facial injuries were lacerations (51.1%), followed by contusions/abrasions (23.2%) and fractures (18.7%). A plurality of specified fractures was nasal fractures (71.2%), followed by those sustained in the mandible (16.8%) and orbital wall/floor (3.5%). **Conclusions:** There has been a significant decline in football related facial trauma concomitant with societal changes in football safety practices. Nonetheless, football related facial injuries account for a significant number of ED visits annually, significantly affecting healthcare expenditures. Knowledge of demographic trends provides relevant information for clinicians managing facial trauma. This analysis provides evidence that may further influence football regulations and ultimately provide safer play.

## 125. Utility of Daily Mobile Tablet Use for Residents on an Otolaryngology - Head and Neck Surgery Inpatient Service

Matthew G. Crowson, MD, Durham, NC; Russel R. Kahmke, MD, Durham, NC (Presenter); Marisa A. Ryan, MD, Durham, NC; Richard L. Scher, MD, Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) explain the benefits of mobile tablet devices during inpatient care; and 2) demonstrate increased efficiency and cost savings during personal implementation.

**Objectives:** To investigate the utility of electronic tablets and their capacity to increase hospital floor productivity, efficiency, improve patient care information safety, and to enhance resident education and resource utilization on a busy otolaryngology - head & neck surgery inpatient service. **Study Design:** Prospective. **Methods:** Thirteen otolaryngology residents had a two week pre-implementation period with standard paper census lists without mobile tablet use. A two week post-implementation period followed with electronic tablets used to place orders, look up pertinent clinical data, educate patients as appropriate, and to record daily to dos that would previously be recorded on paper. **Results:** The time for inpatient rounding was shorter with the use of tablets ( $p = 0.037$ ). There was a nonsignificant trend in the number of times a resident had to leave rounds to look up a clinical query on a computer, with less instances occurring in the post-implementation study period. The residents felt that having a tablet facilitated more detailed and faster transfer of information, and improved ease of documentation in the medical record. Seventy percent felt tablets helped them spend more time with patients, 70% could spend more time directly involved in rounds because they could use the tablet to query information at point of care, and 80% felt tablets improved morale. **Conclusions:** The utility of mobile tablet devices coupled with our hospital's electronic medical record appeared to have both quantitative and qualitative improvements in efficiency, increased time with patients and attendance at academic conferences. Tablets should be encouraged but not mandated for clinical and educational use.

## 126. Mandatory Inservice Directed Didactic Sessions: Does It Actually Make a Difference?

Pedram P. Daraei, MD, Atlanta, GA; Kevin K. Motamedi, MD, Atlanta, GA; Justin C. Wise, PhD, Atlanta, GA; Anita B. Sethna, MD, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the role of resident education, other than daily clinical activities, in preparing residents for the otolaryngology training exam and to demonstrate the effect of mandatory in-service directed didactic sessions on otolaryngology training exam scores.

**Objectives:** Otolaryngology training examination (OTE) scores can be important surrogates for resident performance. To improve performance on the OTE, resident education can be employed in the form of didactic lectures, small group exercises, and self study. To date, no data exist in the English literature addressing in-service targeted didactics programs for otolaryngology residents. **Study Design:** Retrospective data analysis. **Methods:** Scores from individual residents ( $n=18$ ) who trained at our program from 2007 to 2012 were obtained from the American Board of Otolaryngology. Trends in scores based on training year were analyzed using ANOVA, while pairwise analysis was used to compare resident scores to the national mean. Comparison of scores before and after implementation of a weekly in-service directed didactic program, while accounting for year of training, was also performed. Comparison to the national mean was required, as the national mean differed significantly year to year. **Results:** When comparing resident scores, it is clear that increasing year of training resulted in increased scores; however, a difference of at least two years was necessary to observe a significant difference in scores (i.e. PGY-2 vs. PGY-4). Overall, no significant difference was found between pre- and post-didactic scores ( $p=.80$ ). Relative to the national mean, and stratified for year of training, there was no significant difference in pre and post-didactic scores ( $p=.97$ ). **Conclusions:** The institution of prophylactic in-service directed didactics does not significantly improve OTE scores. Didactics may not afford the same benefits that have been shown with self-study techniques. Further studies are necessary, and multi-institution analysis of didactics may help elucidate the effect of interactive learning modalities on the OTE.

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## I27. **The Impact of Electronic Medical Records on Workflow and Patient Satisfaction in an Academic Otolaryngology Practice**

Anthony G. Del Signore, MD, Chapel Hill, NC; Mohamed O. Tomoum, MD, Tanta, Egypt; Brent A. Senior, MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the impact on workflow in implementing an electronic medical record in a busy academic otolaryngology practice, comparing the effect of implementation on patient satisfaction scores.

**Objectives:** Despite the ubiquity of computers in today's office practices, the conversion to electronic medical records (EMR) has been seen as a challenging undertaking, posing issues with workflow and patient perception. To date, there is little information on its impact on patient satisfaction and physician workflow in a busy otolaryngology academic practice.

**Study Design:** A longitudinal pre-post study: two months prior and post the introduction of EMR. **Methods:** A total of 364 adult patients were evaluated. Visits were broken down into specific physician workflow areas and total visit time was recorded with and without resident assistance. A non-validated patient questionnaire was distributed examining three patient satisfaction domains: 1) satisfaction with visit components; 2) comprehension of the visit; and 3) perceptions of the physician use of the computer. **Results:** Patient total visit times within the post-implementation period were significantly higher than pre-EMR period with ( $p=0.01$ ) and without ( $p<0.01$ ) resident assistance. Patient satisfaction was significantly decreased in the post-EMR without resident assistance ( $p=0.01$ ), but no significant difference was noted with assistance. ( $p=0.55$ ) The only domain with a significant decrease in scores pertained to physician use of the computer. **Conclusions:** Conversion to an EMR results in both significantly higher visit times and decreased patient satisfaction scores during the first two months following conversion. These effects can be partially mitigated with the help of an assistant. This is the first study examining patient visits at an academic otolaryngology practice comparing the pre- and post-EMR era. Further research is warranted to elucidate specific components to help improve the patient physician relationship.

## I28. **Community Acquired Methicillin Resistant Staphylococcus Aureus Abscesses of the Head and Neck: Anatomic Site Variation and Patient Characteristics**

Luke A. Donatelli, MD, New York, NY; Yomayra Perez, 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 incidence of head and neck abscesses in the patient population presented, compare the incidence of abscesses containing methicillin resistant *S. aureus* (MRSA) versus abscesses containing methicillin sensitive *S. aureus*, and identify which anatomic sites within the head and neck are more likely to have an abscess containing MRSA.

**Objectives:** To determine the anatomic site variation of community acquired methicillin resistant staphylococcus aureus (CA-MRSA) abscesses of the head and neck in an urban, community based population. **Study Design:** Retrospective review. **Methods:** ICD-9 codes were used to search the electronic medical record over a 5 year period. Inclusion required abscess of the head or neck and documented culture result. Comorbidities were recorded, including diabetes mellitus (DM) and the human immunodeficiency virus (HIV). 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:** A search based on ICD-9 codes identified 3,411 patients. Of these, 243 met inclusion criteria. Chin and nose abscesses were highly likely to be CA-MRSA ( $p=0.004$ ,  $0.0125$ ,  $0.024$ ,  $0.03$  chin:periorbital, face, ear, neck respectively; and  $p=0.036$  nose:periorbital). When compared with all other sites combined, only chin was significantly associated with CA-MRSA ( $p=0.01$ ) while the nose was not ( $p=0.37$ ). There was no difference in proportion between nose and chin abscesses ( $p=0.15$ ). CA-MRSA did not vary by gender ( $p=1.0$ ) or association with DM ( $p=0.23$ ). HIV was present in only 3.7% of patients. Comparison of hair bearing versus non-hair bearing sites was not significant. The proportion of CA-MRSA to methicillin sensitive staphylococcus aureus abscesses was relatively constant between years. **Conclusions:** Abscesses of the chin and nose are significantly associated with CA-MRSA. In this patient cohort, the proportion of CA-MRSA remained stable over time. Finally, there was no variation of CA-MRSA with respect to gender, comorbidities, or hair bearing versus non-hair bearing sites.

## 129. Impact of iPad Incorporation in an Otolaryngology Training Program

Jasmine A. Ebot, BS, Richmond, VA; Derek A. Chapman, PhD, Richmond, VA; Evan R. Reiter, MD, Richmond, VA; Kelley M. Dodson, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) elucidate the degree of iPad usage among otolaryngology residents; 2) ascertain if the iPad improves productivity; and 3) assess overall attitude towards the iPad as a tool for educational and clinical purposes.

**Objectives:** 1) Elucidate the degree of iPad usage among otolaryngology residents; 2) ascertain if the iPad improves productivity; and 3) assess overall attitude towards the iPad as a tool for educational and clinical purposes. **Study Design:** Survey study. **Methods:** All otolaryngology residents at our medical center were provided an iPad and technical support, allowing mobile access to the institution's EMR and library resources. After 12 months, residents completed a published questionnaire determining utility of the iPad in graduate medical education. **Results:** Average iPad use during duty hours in a typical day was 2.5 h/d (range, 1–5 h/d). Duty hours were decreased on average by 1.48 h/d (range, 0–5 h/d). All residents felt the iPad improved communication of care and felt that widespread usage of iPads among residents was a symbol of an advanced and supportive GME program. More than half of the residents (60%) felt the iPad reduced duty hours or allowed them to better take care of issues during call from home. Results were not statistically different from a cross-sectional survey of residents from various specialties. **Conclusions:** Otolaryngology residents feel the iPad improves both their clinical and educational experiences. Residents felt the tool enhanced educational opportunities, diminished time needed for care coordination on rounds, reduced overall duty hours, and maximized overall efficiency.

## 130. First Bite Syndrome: Our Experience with Intraparotid Injections of Botulinum Toxin A

Ankona Ghosh, MD, Philadelphia, PA; Natasha Mirza, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to determine efficacy of BTA injections for first bite syndrome.

**Objectives:** First bite syndrome is the sudden onset of acute and severe pain in the parotid region at the initiation of mastication. Although it generally lasts less than a minute it can be disabling and leads to a fear of oral intake. It is typically seen after parapharyngeal or deep parotid space surgery. Intraparotid injection of botulinum toxin A (BTA) has been suggested as a treatment for this condition but there is little supporting literature. The purpose of this study is to document our experience using this treatment technique. **Study Design:** Patients were identified through IRB approved retrospective chart review. **Methods:** Five patients with first bite syndrome, developed after parapharyngeal space surgery, were treated by multi-site injection of BTA into the parotid gland. Between 17.5 and 50 total units of BTA were injected into 6 or more sites in the parotid region. The patients were then followed up every 4 months. **Results:** 3 of 5 patients reported a significant improvement in symptoms during the 4 month followup visit though complete resolution was not reported. One patient reported only moderate improvement. Despite two series of injections there was no improvement in one patient leading us to question our initial diagnosis. **Conclusions:** Unilateral BTA injection into the affected parotid gland produces a decrease in the severity of symptoms. It is a safe and viable noninvasive treatment for this difficult to treat condition and may lead to permanent resolution of symptoms in some patients.

## 131. The Impact of Electronic Health Records on Otolaryngologist's Productivity in the Ambulatory Setting

Yarah M. Haidar, MD, Irvine, CA; Tjason Tjoa, MD, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to examine the impact of the electronic health record (EHR) on productivity in an ambulatory tertiary care otolaryngology setting.

**Objectives:** To examine the impact of the electronic health record (EHR) on productivity in an ambulatory tertiary care otolaryngology setting. **Study Design:** Retrospective. **Methods:** We examined a total of 6 practitioners in the ambulatory setting for an 8 month period (4 months prior and 4 months after transitioning to EHR). Productivity was measured using work relative value units (RVUs) and the average number of clinic visits per practitioner per week. **Results:** There was no statistically significant change in work RVU of otolaryngology practitioners in the ambulatory setting after transitioning to EHR when comparing the average RVU per month in the 4 month period prior to and after the change (297.2 average RVU per practitioner per month prior to EHR vs 236.2 with EHR,  $p=0.2089$ ). There was similarly no statistically significant change in the average number of clinic visits per practitioner per week after transitioning to EHR ( $p=0.2646$ ). **Conclusions:** EHR use at our tertiary care medical center otolaryngology ambulatory setting resulted in no significant change in

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physician productivity as measured by the average RVU and number of clinic visits in the 4 month period afterwards. This suggests that transitioning to EHR results in no change in otolaryngologist's productivity in the period immediately after the change. However, the long term effects on efficiency and doctor-patient relationship needs to be elucidated.

## 132. Factors Associated with Lingual Tonsillar Hypertrophy in Canadian Adults

Matthew S. Harris, MD, London, ON Canada; Brain W. Rotenberg, MD, London, ON Canada; Kathryn E. Roth, MD, London, ON Canada; Leigh J. Sowerby, MD, London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify factors associated with lingual tonsil hypertrophy and explain the role of lingual tonsil hypertrophy in the pathophysiology of obstructive sleep apnea.

**Objectives:** The lingual tonsil consists of reactive lymphoid tissue found at the base of tongue between the palatine tonsils. Hypertrophy of the lingual tonsil tissue in the adult patient is thought to contribute to the pathophysiology of obstructive sleep apnea, but the underlying cause of lingual tonsil hypertrophy (LTH) in the adult patient is less well understood. Previous studies have suggested that the lingual tonsils may undergo compensatory hyperplasia post-tonsillectomy in children, although it is unknown if this occurs or persists in adulthood. Recently, laryngopharyngeal reflux (LPR) and body mass index (BMI) have been shown to be independently associated with lingual tonsil hypertrophy in a group of Korean adults with obstructive sleep apnea. The primary objective of this study is to determine if an association with LTH exists with LPR, BMI or previous tonsillectomy in a population of Canadian adults presenting for otolaryngologic assessment.

**Study Design:** Cross-sectional study. **Methods:** Adult patients presenting for consultation to an academic rhinology/general otolaryngology practice were eligible for enrollment. Endoscopic photographs of the base of tongue and larynx were captured. These were graded for LTH and LPR by blinded examiners. A retrospective review of patient demographics including age, BMI, reflux symptom index and history of tonsillectomy was performed. Comparison among grades of lingual tonsil hypertrophy using a chi-squared test for discrete variables was performed.  $P < .05$  was considered significant. **Results:** 102 subjects were enrolled, age ranged from 18-78. Twenty-eight patients had previous tonsillectomy. This was not associated with a significant increase in lingual tonsil tissue ( $p=0.51$ ). RFS  $>7$  or RSI  $>13$  was considered positive for LPR. There was no difference in LTH based on RSI positivity ( $p=0.44$ ). RFS positivity did correlate with increased lingual tonsil tissue ( $p<0.05$ ). A BMI  $>30$  was associated with increased lingual tonsils ( $p<0.05$ ). **Conclusions:** Body mass index and reflux finding score are associated with lingual tonsil hypertrophy in Canadian adults. Reflux symptom index and history of tonsillectomy are not associated with LTH.

## 133. Otolaryngology Needs in a Free Clinic Providing Indigent Care

Amanda C. Hu, MD FRCSC, Philadelphia, PA; Thomas C. Sibert, BS, Philadelphia, PA; Wei Zhao, MS, Philadelphia, PA; Vincent Zarro, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) describe the otolaryngology needs in a free clinic providing indigent care, as perceived by the patients and health care providers; and 2) compare the differences and similarities in their perceptions of the otolaryngology needs in this indigent population.

**Objectives:** To determine the otolaryngology needs in a free clinic providing care to medically indigent patients, as perceived by patients and health care providers. **Study Design:** Cross-sectional survey. **Methods:** A survey was administered to patients and health care providers of a free clinic in September 2014 in an urban, inner city location. **Results:** Patient survey participants ( $n=45$ , 28% male, age  $48.8 \pm 14.7$  years) reported mean household incomes of  $\$28,126 \pm \$5664$ , 41% English proficiency, 54% employment, and 8% health insurance coverage with 31% having previously visited a primary care provider outside of the free clinic. Patients' top three ENT complaints were sleep apnea/snoring (38%), heartburn/reflux (31%), and dizziness (26%). Over one-third (41%) of patients perceived a need to have chest X-rays in the free clinic. Surveyed healthcare providers ( $n=11$ , 45% male, age  $40.5 \pm 15.3$  years, 64% MD/medical student, 36% nurse) perceived the following ENT complaints as the most prevalent in this population, in descending order: cough, nasal congestion, reflux/heartburn, sore throat, ear infection, thyroid complaints. Providers indicated that sleep apnea and hearing loss were the least common ENT complaints, while surveyed patients indicated these complaints with high frequency. The most requested diagnostic tool among providers was chest X-rays. **Conclusions:** There are unmet otolaryngology needs in a free clinic providing care to medically indigent patients. Patient and provider perceptions of top ENT complaints differed, but both identified access to chest X-rays as a major unmet need. Knowledge of patient perceptions may help providers to elicit the breadth of ENT complaints from clinic patients.

**134. Lean Sigma Application to Improve Clinic Efficiency, Productivity, and Patient Accessibility at a Tertiary Outpatient Hearing Center**

Matthew G. Huddle, MD, Baltimore, MD; Amy M. Tirabassi, BS, Baltimore, MD; Laurie K. Turner, RN, Baltimore, MD; Emily B. Lee, BA, Baltimore, MD; Kathryn L. Ries, MHA, Baltimore, MD; Sandra Y. Lin, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the value of Lean Sigma as a tool for increasing clinic efficiency and productivity.

**Objectives:** To apply Lean Sigma, a quality improvement strategy to eliminate waste and reduce variation and defects, to improve audiology schedule utilization in a large tertiary care center. Project goals included increase in utilization rates of audiology block time and appointment lead time reduction. **Study Design:** Prospective observational study. **Methods:** Value stream mapping was performed for the audiology scheduling process and wasteful steps were identified for elimination. Intervention included a 2 week release of specialty scheduling blocks, audiology template revision, and reduction of underutilized scheduling blocks. Schedule utilization, lead time, and relative value units (RVU) collected for new patient diagnostic audiogram were measured for 5 months post-intervention and compared to 5 months pre-intervention. Overall, 2,995 pre-intervention and 3,714 post-intervention booked appointments were analyzed. **Results:** After value stream mapping, the least utilized specialty scheduling blocks were reduced by 23%, block time was doubled for joint audiology appointments with physician appointments, and a 2 week block release was instituted to streamline last minute appointment scheduling. Audiology schedule utilization increased from 77% to 90% after intervention ( $p < 0.01$ ). Utilization of joint audiology with physician visits increased from 39% to 67% ( $p < 0.01$ ). Booked appointments increased from 2,995 to 3,714 with joint with physician booked appointments increasing from 317 to 1193. Appointment lead time decreased to an average of 24 days from 29 days. Collected RVUs increased from an average of 13321 to 14778 per month, but this increase was not significant ( $p = 0.28$ ). **Conclusions:** Lean Sigma principles were successfully used to reduce wasteful scheduling practices, increase appointment block utilization, improve productivity, and provide greater patient access.

**135. Chronic Parotitis with Multiple Parotid Calcifications: Imaging and Sialendoscopy Findings**

Emmanuel J. Jauregui, BA, San Francisco, CA; Ruwan Kiringoda, MD, San Francisco, CA; William R. Ryan, MD, San Francisco, CA; David W. Eisele, MD, Baltimore, MD; Jolie L. Chang, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss immunologic, imaging and sialendoscopy findings in chronic parotitis cases with multiple parotid calcifications.

**Objectives:** To correlate immunologic, imaging and sialendoscopy findings in chronic parotitis cases with multiple parotid calcifications. **Study Design:** Retrospective review. **Methods:** Clinical history, radiographic images and reports, blood tests, and operative reports were reviewed for patients with chronic parotitis and multiple parotid calcifications who underwent parotid sialendoscopy between November 2005 and August 2014. Preoperative computed tomography (CT) images were analyzed for parotid calcification size and location. **Results:** Eleven of 131 (8%) patients undergoing parotid sialendoscopy had more than one calcification in the parotid gland(s). Average duration of symptoms was 78 months (4-120 months). Five of 11 patients (45%) had bilateral gland involvement. Three patients (27%) were diagnosed with autoimmune parotitis (positive Sjogren's antibodies or ANA) and two (18%) were HIV positive. Seven of 11 patients (63%) had at least one stone found in the duct on sialendoscopy. Four patients had multiple punctate calcifications within the parotid tail—all of whom had either autoimmune parotitis or HIV. None of the proximal parotid calcifications posterior to the masseter was seen on sialendoscopy. **Conclusions:** Cases of chronic parotitis with multiple parotid calcifications are uncommon. Multiple punctate parotid calcifications suggest an underlying disease process such as autoimmune parotid disease or HIV. Additionally, autoimmune parotitis is rarely associated with obstructive distal parotid duct stones. Proximal parotid calcifications posterior to the masseter are not seen on sialendoscopy suggesting other treatment modalities may be required.

**136. Surface Charge Modification Inhibits P. Aeruginosa Adhesion and Biofilm Formation in vitro and Negative Surface Charge Modification Facilitates Eradication of P. Aeruginosa Biofilm Infection in an in vivo Rat Model**

Wee Tin K. Kao, MD, St. Louis, MO; Patricia L. Gagnon, MS, St. Louis, MO; Richard A. Chole, MD PhD, St. Louis, MO

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

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nism of biofilm formation and surface charge modification of biomedical implants as a potentially important contribution to inhibition of recurrent biofilm related infections in medicine.

**Objectives:** Although biomedical implants have significantly improved quality of life, they inevitably become colonized with biofilms leading to recurrent infections. In this study, we look at the effect of surface charge modification on the inhibition of biofilm infection in vitro and in vivo. **Study Design:** In vitro, adhesion on charge modified surfaces of eight strains of wild type and otopathogenic *P. aeruginosa* was evaluated. Then, 24 rats were randomized to unmodified and charge modified groups. Implantation of biofilm colonized, charge modified titanium screws followed. At euthanasia, the rats were evaluated for persistent infection. **Methods:** The surface charge of a cell culture plate was modified using polyelectrolytes;  $10^9$  bacteria were added and adherent bacteria counted after 2 hours. Four week old rats were implanted with biofilm infected, charge modified titanium screws and treated with antibiotics. The rats were euthanized after 4 weeks implantation; the implants were removed for scanning electron microscopy (SEM) and a skull sample was homogenized for bacterial counts. **Results:** The wild type and otopathogenic strains demonstrated a 70-95% and 22-94% decrease in adhesion on charge modified surfaces. In vivo, the number of bacteria recovered/mg of tissue harvested in the unmodified, positively and negatively charged groups were 802 CFU/mg (SD=594 CFU/mg), 863 CFU/mg (SD=863 CFU/mg) and 368 CFU/mg (SD=352 CFU/mg). **Conclusions:** Successful charge modification in vitro results in decreased adhesion of all eight strains of *P. aeruginosa* studied. However, in vivo studies show that only a negative surface modification results in a decreased number of bacteria recovered after 4 weeks of implantation. This suggests that a negative surface modification inhibits bacterial resistance to antibiotics and host defenses.

## I37. How Much Blood Would a JP Suck if a JP Could Suck Blood?

Kelly S. Kimple, MD MPH, Chapel Hill, NC; Adam J. Kimple, MD PhD, Chapel Hill, NC (Presenter); Feng-Chang Lin, PhD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, participants should be able to describe the amount of suction provided by a standard Jackson Pratt bulb evacuated by standard evacuation, bottoms-up evacuation, and as it accumulates fluid.

**Objectives:** Active surgical drains minimize fluid accumulation in the postoperative period. The Jackson Pratt (JP) system consists of a silicone drain connected by flexible tubing to a bulb. When the bulb is evacuated, negative pressure is applied at the surgical site to evacuate fluid. The objective of this study is to determine if the evacuation method and volume of accumulated fluid affect the pressure generated by the bulb. **Study Design:** Bulbs were connected to a digital manometer under various experimental conditions. **Methods:** A random number generator determined the initial evacuation for each bulb, either standard evacuation or bottoms-up evacuation. Subsequent evacuations were alternated until data was collected in triplicate for each method. Indicated amounts of water were placed into the bulb, air was evacuated and pressure was recorded. All setups were allowed to equilibrate for 1 minute prior to data acquisition. **Results:** The average amount of pressure after a standard evacuation of a JP bulb was 84.5 (95% C.I. 77-98) cm H<sub>2</sub>O compared to 11.6 (95% C.I. 4-31) cm H<sub>2</sub>O for a bottoms-up evacuation ( $p < 0.00001$ ). When the drain contained 25 ml, 50 ml, 75 ml 100 of fluid, the pressure applied dropped to 72, 41, 36 and 34 cm H<sub>2</sub>O respectively. **Conclusions:** JP drains generate negative pressure in order to reduce fluid accumulation at surgical sites. While its function is frequently taken for granted, this study demonstrates that both the specific method for evacuating the bulb as well as the amount of fluid in the bulb significantly affect the performance of this device.

## I38. Two Cases of Recurrent Head and Neck Myiasis Acquired in the Northern United States and Literature Review

Robert W. Kopp, MD, Syracuse, NY; Jennifer A. Villwock, MD, Syracuse, NY; Tucker M. Harris, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify, understand the clinical ramifications, and develop a treatment algorithm for patients with myiasis.

**Objectives:** Report cases of recurrent myiasis occurring in the northern United States and identify a treatment algorithm. **Study Design:** Retrospective review of myiasis over 5 years with literature review. **Methods:** Two cases of recurrent myiasis were identified. A literature review was then conducted. **Results:** An 85 year old female with previously undiagnosed basaloid squamous cell carcinoma presented for otolaryngologic evaluation. The lesion was infested with maggots. After debridement, she was treated with antibiotics and definitive radiation therapy was planned. Prior to completion of radiation, myiasis recurred including infestation of the left globe. Management again included antibiotics, debridement

and local wound care with completion of radiation therapy. Upon completion of radiation, there was no evidence of recurrence. A 72 year old male presented with myiasis. He was lost to followup after diagnosed with auricular basal cell carcinoma. Antibiotics and local wound care were offered. Despite extensive counseling and evaluation for competence, he refused definitive malignancy management. The patient developed recurrent myiasis yet continued to refuse definitive management. Based on our literature review, no prior cases of recurrent myiasis have been reported in the United States.

**Conclusions:** Myiasis is a rare condition typically seen in the tropics and often in association with chronic wounds and cutaneous malignancies. Prompt diagnosis and treatment is paramount. In our case, recurrence of myiasis was successfully eradicated with completion of radiation therapy, a modality not previously reported.

### 139. Incidence of Sudden Hearing Loss in United States Emergency Rooms

Elliott D. Kozin, MD, Boston, MA; Rosh K.V. Sethi, MD MPH, Boston, MA; Aaron K. Remenschneider, MD MPH, Boston, MA; Alyson B. Kaplan, BS, Boston, MA; Taha Jan, MD, Boston, MA; Daniel J. Lee, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the incidence of sudden hearing loss in United States emergency rooms.

**Objectives:** Estimates on the incidence of sudden hearing loss (SHL) vary widely based on study settings. No contemporary review has described its incidence in emergency rooms (ER) at the national level. Using validated nationwide emergency department data, we aim to quantify the number of patients who present to ERs with SHL, and understand patient demographics and trends in care. **Study Design:** Retrospective review of the U.S. Nationwide Emergency Department Sample (NEDS). **Methods:** The 2009-2011 NEDS was queried for encounters with a diagnosis of SHL (ICD9 388.2). Weighted estimates for annual trends, demographics, admission data and charges were extracted. **Results:** There was a weighted total of 388,904,009 ER visits in 2009-2011. A total of 2,331 visits were related to diagnosis of SHL, 731 of which were a primary diagnosis. Among patients with a primary diagnosis of SHL, mean age was 49.2 years (SE 1.5) and 62% patients were male. The largest proportion of visits occurred in the northeast (37.8%, SE 3.4). There was no seasonal predilection. Majority of patients (94.5%, SE 1.4) were treated and released. Mean total charges for ED services were \$1,512.85 (SE 237.70). **Conclusions:** These data represent among the first analyses of SHL in United States ERs. Sudden hearing loss is a rare diagnosis in the ER setting. Given that previous studies have reported a higher incidence of SHL, the present study raises novel questions regarding where the majority of SHL patients present, as well the accuracy of ER provider diagnosis and coding. These data have implications for policy, patient and physician education.

### 140. Examining the Availability and Quality of Online Health Information for Rhinosinusitis

Kent Lam, MD, Chicago, IL; Qiu Zhong, MD, San Diego, CA; Stephanie Shintani-Smith, MD, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) appreciate the use of the internet as a means to disseminate health information regarding rhinosinusitis; and (2) recognize the variability in quality of commonly visited internet websites that offer resources on rhinosinusitis.

**Objectives:** In the internet age, medical information regarding acute and chronic rhinosinusitis has become widely available to the general public. No prior study, however, has evaluated the quality of this online information. This study analyzes the scope and nature of online searches for rhinosinusitis and evaluates the quality of the websites found via these internet searches. **Study Design:** Observational study. **Methods:** The five most common terms related to the keyword sinusitis were determined with the publicly available Google AdWords Keywords software. The first ten websites identified by the search function of the Google search engine were obtained for each of these five common terms, providing a total of fifty unique websites. A 3 point scale was used to evaluate the comprehensiveness of content for the following parameters: differentiation of disease by chronicity, identification of symptom based diagnostic criteria, and inclusion of evidence based treatment regimens. **Results:** In 2013, the term sinusitis and other related terms resulted in 2.1-3.2 million searches on the Google search engine per month. Of the 50 websites identified with Google searches of the five most common terms as identified by Google AdWords, only 14 (32%) are endorsed by an academic institution or government body. These websites were also found to be heterogeneous in terms of the accuracy and depth of health information regarding rhinosinusitis. **Conclusions:** While online information for rhinosinusitis is commonly sought by the general public, the top search results for rhinosinusitis on Google provide material that is variable and potentially insufficient. Clinicians should understand the quality and distribution of internet information on rhinosinusitis in order to effectively direct patients to educational material and to prevent spread of misinformation amongst patients researching on the internet.

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## 141. Status and Trends of General Otolaryngology in Academia

Jiahui Lin, BA, New York, NY; Ashutosh Kacker, MD, New York, NY; Oscar Trujillo, MD, New York, NY; Michael G. Stewart, MD MPH, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the trends of academic general otolaryngology in the context of increasing subspecialization.

**Objectives:** This article aims to better characterize the role of general otolaryngology in the face of today's changing medical landscape. Given the increase in subspecialization, especially in academia, this study focuses on the hiring trends of academic general otolaryngologists. **Study Design:** Cross-sectional survey study. **Methods:** A survey was created to evaluate past, present, and projected issues in the academic otolaryngology workforce, specifically related to general otolaryngology. Data included faculty appointments, work hours, clinical and research roles, academic productivity, patient load, promotions, and criteria for future hires. Surveys were sent via e-mail to all academic chairpersons of accredited otolaryngology residency programs in the United States. **Results:** The response rate was 34.3%. On average, generalists made up 17% of otolaryngology faculty in academic departments. Most generalists were assistant professors (65%), but nearly half of promotions had been given to generalists (49%) in recent years. Between 2009 and 2014, there was an average of six total new hires per academic otolaryngology practice (range, 1 - 13), and of those, 21% were generalists. Respondents estimated that in the next 5 years, they would hire an average of three new faculty per practice (range, 0 - 7), with 39% being generalists. Most (82%) chairmen reported an increase in subspecialization in their department, but 94% reported that they would require the same number or more generalists as well. **Conclusions:** Despite an overall increase in specialization, general otolaryngology is a growing part of academic otolaryngology departments.

## 142. Recurrent Vallecular Varices: A Rare Cause of Hemorrhage from the Upper Aerodigestive Tract

Patricia S. McAdams, MD, Tacoma, WA; Anne E. Gunter, BA, Temple, TX; Del R. Sloneker, MD, Tacoma, WA; Wayne J. Harsha, MD, Tacoma, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate awareness of vallecular varices as a potential cause for hemorrhage from the upper aerodigestive tract in order to expedite diagnosis and treatment. They should also be able to discuss theories on the etiology of this condition and appreciate the importance of postoperative surveillance due to the potential for recurrence.

**Objectives:** To raise awareness of a rare and diagnostically challenging disease entity that has the potential to recur. **Study Design:** Case report and literature review. **Methods:** Presentation of the only known case of recurrent vallecular varices requiring multiple surgical interventions. **Results:** Patients with hemorrhaging vallecular varices are frequently misdiagnosed as bleeding is often attributed to a gastrointestinal or pulmonary source. We herein describe the only reported case of recurrent varices after surgical management. A 56 year old male with a history of hepatitis B/C co-infection and cirrhosis presented to the emergency department hemorrhaging from the mouth. While upper GI endoscopy revealed only blood above the esophageal inlet, flexible laryngoscopy demonstrated active bleeding from a prominent vallecular varix. The patient underwent diagnostic laryngoscopy (DL) with cauterization; however, five months later, the patient presented again with similar symptoms, and multiple recurrent varices were identified on examination. The patient required repeat DL and cauterization and has had no further recurrence six months postoperatively. Six previous case reports of bleeding vallecular varices were reviewed, and all cases were managed definitively with a single procedure. **Conclusions:** While the etiology of vallecular varices is unknown, most cases are associated with COPD. Elevated right heart pressures may cause distension of veins in the vallecula resulting in varices. One previous case was associated with cirrhosis. A rare anatomic variant with anastomoses between the portal and systemic venous systems in the vallecula may explain this presentation. Our experience suggests there may be a role for routine postoperative surveillance in these patients to monitor for recurrence.

## 143. Impact of a Mentored Otolaryngology-Head and Neck Surgery Clerkship for Underrepresented Minority Students

Jason C. Nellis, MD, Baltimore, MD; David W. Eisele, MD, Baltimore, MD; Howard W. Francis, MD, Baltimore, MD; Sandra Y. Lin, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should understand the positive impact of a clerkship initiative for medical students from underrepresented minority groups interested in pursuing a career in otolaryngology-head and neck surgery.



**Objectives:** To describe the impact of a mentored clerkship initiative on underrepresented minority (URM) medical students interested in otolaryngology-head and neck surgery (OHNS). **Study Design:** Prospective observational study. **Methods:** An outreach effort to recruit URM students to the specialty was initiated in 2008, consisting of a three month research clerkship and a one month clinical rotation. Financial assistance and faculty mentorship were provided to the students. Upon conclusion of the clerkship, students completed a post-clerkship evaluation form. Students were followed regarding residency applications, match status, and publications. Post-rotation evaluations were compiled and reviewed. The number of overall publications including publications resulting from interaction with faculty was calculated. **Results:** Thirteen students participated in the clerkship from eleven medical schools. Seven students participated in the clinical clerkship, five in the research clerkship, and one in both clerkships. Evaluation 5 point Likert average scores and comments revealed high student satisfaction with the rotations (4.91), provided individual mentorship (4.82), and exposure to academic medicine (4.91). Participants indicated the rotation favorably impacted their decision to apply for OHNS residency training and increased their interest in academic medicine. The participants had an average number of 1.7 publications, with 1.18 publications in OHNS journals. Six publications resulted because of direct interaction between students and faculty during the clerkship. Five students applied for OHNS residency programs and 4 matched successfully. **Conclusions:** Mentored clerkships for URM medical students interested in OHNS can intensify student interest in applying to OHNS residency training programs, expand the number of research opportunities and increase student interest in academic medicine.

**144. Association of Emotional Quotient and Learner Autonomy with Resident Competency in Otolaryngology - Head and Neck Surgery**

Eunmi Park, EdD, Baltimore, MD; Douglas D. Reh, MD, Baltimore, MD; Howard W. Francis, MD, Baltimore, MD; David W. Eisele, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appraise the role of effective support strategies for developing trainee competencies using trainees' personal attribute in emotional intelligence and their readiness to utilize learner autonomy.

**Objectives:** To explore associations of emotional quotient (EQ), learner autonomy (LA), and trainee competencies during residency training in otolaryngology and head and neck surgery (OHNS). **Study Design:** A longitudinal case control design. **Methods:** During 10 months of OHNS training, we reviewed the milestone progression of trainee competencies at 3 month intervals (i.e., fund of knowledge, critical thinking, technical ability, interpersonal skills). A group of trainees that showed growth in all four competencies was compared to the second group that did not demonstrate any positive change or experienced a decline in one or more competences. We compared the associations between component factors of EQ measured by Trait Emotional Intelligence Questionnaire - Short Form (TEIQue-SF, Petrides & Furnham, 2006) and LA measured by Learner Autonomy Profile - Short Form (LAP-SF, Confessore & Park, 2004) for both groups. TEIQue-SF assesses 4 factors (i.e., wellbeing, self-control, emotionality, and sociability). LAP-SF assesses 22 factors in 4 components (i.e., desire, resourcefulness, initiative, and persistence). **Results:** Response rate was 52% (n=13, total 25 trainees). Responses showed acceptable internal consistency (TEIQue-SF Cronbach's Alpha = .849; LAP-SF Cronbach's alpha = .916). From the total cases (n=13), we found some correlations of EQ and LA (e.g., totals r = .672). For the cases showing growth (n=5), their EQ and LA were highly related in many domains (totals r = .961, 12 paired factor associations r > .906), with the exception of the emotionality domain in EQ. There was no correlation between EQ and LA in the second group. **Conclusions:** Strategies promoting emotional intelligence and learner autonomy may be beneficial in supporting the development of trainee competencies.

**145. Penetrating Injury in the Neck by Golf Clubs: A Case Series and Review of Literature**

Adam E. Singleton, MD, Memphis, TN; Nicholas A. Beckman, DO, Memphis, TN; Francisco O. Vieira, MD, Memphis, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate a comprehensive understanding of the injuries that can occur with penetrating damage to the neck by golf clubs.

**Objectives:** To describe the sequela of golf club impalement in the neck. **Study Design:** Case series of two patients with penetrating neck injury by golf clubs. **Methods:** Penetrating neck trauma from golf club impalement is extremely rare. With an increasing number of participants, the number of golf related injuries is potentially on the rise. The most common injury related to golf is musculoskeletal; however, we present two cases of accidental impalement in the neck by a fractured golf club. **Results:** The first case involved a male who suffered a penetrating injury to the midline neck, with the fractured shaft piercing the cricothyroid membrane in addition to damaging the thyroid and cricoid cartilages. He

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underwent tracheotomy and neck exploration with repair of laryngeal cartilage fractures. He had no complications from his injury. The second case involved a female who suffered a penetrating injury to the left posterior neck and an exit wound in the right floor of mouth. The trajectory of the shaft in her neck resulted in hemitranssection of the right spinal cord and severing of the right vertebral artery. She developed Brown-Sequard syndrome with resultant ipsilateral motor paralysis and a contralateral loss of pain and temperature sensation. **Conclusions:** We present two cases of penetrating injury by a golf club to the neck, an extremely rare occurrence only once described in the literature. When a club breaks in the shaft region, the edges tend to crimp creating a sharp surface capable a penetrating deep into tissues. A lack of awareness of broken golf clubs as penetrating objects likely contributed to both of these preventable injuries.

## 146. The Effect of Resident Duty Hour Restrictions on Surgical Complications for Otolaryngology Head and Neck Key Indicator Procedures

Aaron Mathew Smith, MD, Memphis, TN; Merry E. Sebelik, MD, Memphis, TN; Jim Y. Wan, PhD, Memphis, TN; Cameron M. Kaplan, PhD, Memphis, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the general surgical outcomes from teaching and non-teaching hospitals before and after duty hour reform with regard to otolaryngology head and neck key indicator procedures.

**Objectives:** Graduate medical education has traditionally required long work hours, allowing trainees little time for adequate rest. Based on concerns over performance deterioration with sleep deprivation, duty hour restrictions have been mandated. We aim to characterize any differences in otolaryngology key indicator head and neck procedure complications before and after duty hour reform. **Study Design:** Retrospective cross-sectional analysis of the National Inpatient Sample (NIS). **Methods:** We queried the NIS for key indicator procedure codes correlating to the head and neck key indicator groupings: thyroid/parathyroid, parotidectomy, neck dissection and oral cavity procedures for the years 2000-2002 and 2006-2008. Procedures were grouped based upon teaching status into three groups: non-teaching, teaching without otolaryngology residents, and teaching with otolaryngology residents. We compared surgical complication rates, length of stay, and mortality of patient discharges. Statistical analysis software was used for analysis. **Results:** The total number of head and neck key indicator procedures was 45,363 and 51,144, for the 2000-2002 and 2006-2008 periods, respectively. There were more total complications for oral cavity procedures at otolaryngology teaching hospitals for both time periods ( $p < 0.016$  for 2000-2002,  $p < 0.005$  for 2006-2008) and sialoadenectomy in 2006-2008 ( $p < 0.001$ ). Analysis between time periods showed no difference between complication rates in non-teaching hospitals ( $p < 0.58$ ,  $p < 0.16$ ,  $p < 0.46$ ,  $p < 0.81$ ) or teaching hospitals with otolaryngology residents ( $p < 0.07$ ,  $p < 0.23$ ,  $p < 0.56$ ,  $p < 0.31$ ). **Conclusions:** This investigation reveals that complication rates did not change for head and neck key indicators during the periods immediately before and after duty hour restrictions. However, a higher rate of complications for some procedures occurred at teaching institutions.

## 147. Surgical Telementoring of Endoscopic Surgery at a Remote Site

Carl H. Snyderman, MD MBA, Pittsburgh, PA; Paul A. Gardner, MD, Pittsburgh, PA; Bostjan Lanisnik, MD, Maribor, Slovenia; Janez Ravnik, MD, Maribor, Slovenia

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) define the challenges of surgical mentoring; 2) identify the components of a surgical telementoring program; 3) describe the telementoring process; and 4) recognize the limitations and risks of surgical telementoring.

**Objectives:** Assess the efficacy of a surgical telementoring program for endoscopic endonasal surgery of the skull base. **Study Design:** Prospective case series with surveys of surgeons. **Methods:** A surgical telementoring program was established for mentoring of a skull base team (otolaryngology and neurosurgery) in a European country by an experienced skull base team (otolaryngology and neurosurgery) in the US. Two way video and audio streaming provided real time communication with the surgical team. Over a period of three years, 10 endoscopic endonasal surgeries were mentored preoperatively and during the key part of the procedure. Following each procedure, an evaluation form was used to document the mentoring interventions and rate the experience. **Results:** Procedures included endoscopic endonasal approaches to the sella, anterior cranial fossa, posterior cranial fossa, and orbit. Diagnoses included benign and malignant neoplasms, cerebrospinal fluid leak, and inflammatory disease. In 9 of 10 cases, adequate audio and video communications were maintained. The most frequent mentoring interventions were for identification of anatomy, extent of exposure, extent of resection, and surgical technique. The median perceived value by the junior surgical team was 9.5 (range 8-10). A model for surgical telementoring is proposed. **Conclusions:** Surgical telementoring provides the ability to help surgeons develop their surgical skills to a greater level of proficiency for complex surgeries when experienced mentors are not available locally. The technology is reliable and available at most institutions. Perceived benefits of surgical tele-

mentoring include improved surgical exposure, increased extent of tumor resection, and decreased duration of surgery.

## 148. Development of an Epistaxis Training Module and Emergency Department Outcomes

David W. Timme, MD, Springfield, IL; Terah L. Cheatham, MD, Springfield, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand methods to construct an epistaxis model.

**Objectives:** Implement a novel epistaxis training module with hands-on model and observe emergency medicine residents' treatment outcomes for epistaxis patients. **Study Design:** Retrospective cohort. **Methods:** An epistaxis training module including lecture and hands-on practical session was performed with emergency medicine residents. Pre and post session questionnaires were administered. Patients presenting to the emergency department who were treated by residents attending the session in a 6 month window prior to and post training session were evaluated. **Results:** An epistaxis model provided scenarios to control active anterior and posterior epistaxis using varied basic and advanced techniques. 15 residents attended the session with an average level of comfort increasing from 2.2 to 3.6 on a 5 point scale. 23 patients were treated for epistaxis during the 6 months surrounding the training session. No effects were observed in change in treatment method, recidivism, or otolaryngology consultation. **Conclusions:** Practical models for epistaxis can be developed which simulate bleeds requiring different methods of control. This can increase comfort of managing epistaxis amongst emergency medicine residents. However, the low rates of patient treatment by these residents should be further examined in training programs.

## 149. Impostor Syndrome and Burnout among American Medical Students--Incidence and Implications for Otolaryngology

Jennifer A. Villwock, MD, Syracuse, NY; Lindsay B. Sobin, MD, Syracuse, NY; Tucker M. Harris, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be familiar with impostor syndrome and associated psychosocial comorbidities in medical trainees and the potential implications for medical education.

**Objectives:** To determine the incidence of impostor syndrome (IS) and burnout in United States medical students, to recognize demographic differences in those experiencing IS, and to examine implications for otolaryngology. **Study Design:** Anonymous survey of medical students at two institutions. **Methods:** An anonymous survey including demographic data, an IS screening questionnaire, and the Maslach Burnout Inventory was published online and sent to 726 medical students at two medical schools. Main outcome measures included level of burnout, presence or absence of impostor syndrome, and learning style. Subgroup comparisons were performed using chi-squared tests or Fisher Exact Tests, as appropriate. **Results:** There was a 19% (138 of 726) response rate. Female gender was significantly associated with an increased incidence of IS ( $p=0.004$ ), more than double the incidence of male counterparts (49.4% versus 23.7%). IS was significantly associated with the burnout components of exhaustion ( $p=0.049$ ), cynicism ( $p=0.004$ ), emotional exhaustion ( $p=0.018$ ), and depersonalization ( $p=0.007$ ). Students in the fourth year of medical school exhibited a significant increase in IS ( $p=0.015$ ). **Conclusions:** Almost a quarter of male and nearly half of female U.S. medical students surveyed experience IS. Burnout indices were found to be significantly associated with IS. Given the high psychological morbidity of these conditions, this association cannot be ignored. These data suggest that IS is common and must be acknowledged and addressed to optimize the medical learning environment. This may be particularly true in surgical specialties where a rigorous and intimidating learning environment has historically been cultivated.

## 150. Relationship of Obesity to Pharyngitis, Tonsillitis, and Peritonsillar Abscess

Jennifer A. Villwock, MD, Syracuse, NY; Rachel Umbenhouer, RN, Syracuse, NY; Eric K. Fung, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the relationship of obesity to inflammatory conditions of the oropharynx including pharyngitis, tonsillitis, and peritonsillar abscess.

**Objectives:** Tonsillectomy is one of the most common procedures performed by the otolaryngologist. Obesity is known to have a pro-inflammatory effect in multiple organ systems. We investigate the role of obesity in pharyngitis, tonsillitis, and the decision to perform tonsillectomy. **Study Design:** Retrospective chart review from 2008--2010 of an urban private otolaryngology practice. **Methods:** 280 patients with primary diagnoses of acute tonsillitis, chronic tonsillitis, acute pharyngitis, chronic pharyngitis, nasopharyngitis, peritonsillar abscess (PTA), and streptococcal sore throat were iden-

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tified. The treatment patients received was noted as well as additional patient factors including BMI, age, and presence of conditions associated with obesity (diabetes, hypertension, GERD, sleep apnea, snoring). **Results:** Obesity was not significantly associated with inflammatory pharyngeal conditions. There was a trend towards significance for the association of obesity (BMI > 30) with PTA ( $p = 0.086$ ). There was also a significant association of obesity with diabetes, sleep apnea, and snoring ( $p < 0.05$ ). Of the variables investigated, only age was a significant predictor of treatment with younger patients more likely to undergo tonsillectomy. Treatment overall was divided into four groups - no treatment (22.4%); antibiotics and steroids (10.7%); tonsillectomy (49.8%); tonsillectomy, antibiotics, and steroids (17.1%). The selection of treatment was not impacted by obesity. **Conclusions:** While obesity is a known cause of inflammation and its comorbid diseases often associated with increased risk of infection, we did not find it to be significantly associated with pharyngitis or tonsillitis in our study. A trend towards a significant association of obesity with PTA was found and warrants further investigation.

## 151. The Global Tracheostomy Collaborative - The Impact of a Quality Improvement Collaborative in Otolaryngology

Karen F. Watters, MB BCH MPH FRCSI, Boston, MA; Michael J. Brenner, MD FACS, Livonia, MI; Tanis Cameron, MA CCC-SLP, Melbourne, Australia; Antony Narula, MA MB BChir FRCS FRCS(Ed), London, UK; David Roberson, MD FACS, Boston, MA; Rahul K. Shah, MD FAAP FACS, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the importance of quality improvement collaboratives in the acceleration and dissemination of improvement.

**Objectives:** The Global Tracheostomy Collaborative (GTC), founded in 2012, is an international multidisciplinary quality improvement (QI) collaborative established to improve processes and outcomes in adult and pediatric tracheostomy care ([www.globaltrach.org](http://www.globaltrach.org)). The aim of this study is to evaluate the initial effectiveness of such a collaborative in otolaryngology. **Study Design:** Observational. Qualitative interviews. **Methods:** Analysis of GTC membership and attendance at three international kickoff meetings was performed. Qualitative interviews were conducted either face to face or via telephone with care teams from GTC member hospitals. **Results:** 570 individuals representing 125 institutions attended kickoff meetings in Boston (April 2014), London (July 2014) and Melbourne (October 2014); 1000 additional individuals from more than 20 countries and all continents except Africa attended a kickoff meeting using virtual technology. Attendees were from a range of disciplines: otolaryngology, anesthesia, neonatology, pulmonary, critical care, respiratory therapy/physiotherapy, nursing, speech pathology, and hospital management. As of October 2014, over 35 hospitals in the United States, United Kingdom, Sweden, Singapore, Qatar, and Australia have joined, and another 75 hospitals are considering joining. Preliminary data collection has been successful with 178 new tracheostomy cases entered in an international, HIPPA compliant REDCap database within the first few months of launch. Qualitative interviews reveal that many sites have instituted new practices in response to joining. **Conclusions:** It is widely recognized that there is a need to improve the speed at which successful care models disseminate. Quality improvement collaboratives have been successful at accelerating improvement in many disciplines. The GTC may be an exemplar of this new methodology in otolaryngology.

## 152. Cost Burden of Cerumen Extraction in Medicare Beneficiaries

Eleanor L. Yang, BA, Oakland, CA; Tyler M. Macy, MD, Oakland, CA; Kevin H. Wang, MD, Oakland, CA; Megan L. Durr, MD, Oakland, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the cost burden and utilization of healthcare for cerumen extraction in the United States.

**Objectives:** To quantify the cost burden and utilization of healthcare for cerumen extraction in the United States. **Study Design:** Retrospective cross-sectional study. **Methods:** The Center of Medicare and Medicaid Services (CMS) Provider Utilization and Payment Database for 2012 was queried for all cerumen extractions and all otolaryngology-head and neck surgery (OHNS) procedures. Cerumen extractions were analyzed by state, medical/surgical specialty, reimbursement amount, and credential of the provider performing the procedure. **Results:** In 2012, CMS reimbursed a total of 46.8 million dollars for 1.3 million cerumen disimpactions with an average reimbursement of \$35.38 per procedure. Within OHNS, cerumen removal was the 2nd highest billed procedure by volume and 3rd by total dollars reimbursed. The majority of cerumen extractions were performed by OHNS providers (67.5%), followed by internal medicine (14.6%), and family medicine (13.5%). Most cerumen removal procedures were performed by physicians (90.5%), registered nurses (4.3%), and physician assistants (3.7%). The average reimbursement rate per cerumen disimpaction by state varied from \$25.41 to \$40.24. The percentage of Medicare beneficiaries receiving cerumen extractions per state ranged from 0.55% to 4.92%. New Jersey had the highest percentage of Medicare beneficiaries receiving cerumen extraction followed by New York and

Florida. **Conclusions:** The economic utilization of healthcare and cost burden of cerumen extraction is high. In 2012, CMS spent \$46.8 million in reimbursements for this procedure. This study highlights a definite need for an improved triage protocol for management of cerumen impaction in the United States healthcare system.

## **Head & Neck**

### **I53. Diagnostic Open Lymph Node Biopsy of Head and Neck Patients: Historic Problem or Modern Dilemma?**

Sarah R. Akkina, MS, Ann Arbor, MI; Roderick Y. Kim, DDS, Ann Arbor, MI; Tiffany A. Glazer, MD, Ann Arbor, MI; Chaz L. Stucken, MD, Ann Arbor, MI; Melissa A. Pynnonen, MD MS, Ann Arbor, MI; Carol R. Bradford, MD MS, Ann Arbor, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe appropriate indications for open lymph node biopsies in the head and neck and recognize why open lymph node biopsy may complicate management of head and neck squamous cell cancer (HNSCC) patients.

**Objectives:** To characterize the current practice of open lymph node biopsy in patients presenting with a neck mass. **Study Design:** Retrospective chart review of 943 adult patients in the SPORE II Project 3 database, which consists of patients referred to a tertiary care center for evaluation and treatment of HNSCC. **Methods:** We reviewed patients' referral documentation to determine the number who received open lymph node biopsies as part of their HNSCC diagnosis. We recorded the indications documented for biopsy and what further treatment the patient received. Management was compared to patients with similar stage disease who did not undergo prior open lymph node biopsy. **Results:** Of 943 referred patients, 600 records have been reviewed to date. Of these, 32 patients underwent open neck biopsy leading to HNSCC diagnosis. Only 10 of these 32 patients (31%) underwent fine needle aspiration prior to open neck biopsy. Documented indications for open biopsy included clinical history or testing suspicious for lymphoma, concern for branchial cleft cyst, lymph node characteristics on exam, and clinical suspicion for malignancy. The vast majority of patients who underwent open lymph node biopsy were treated with chemoradiation over surgery (84%). In an analysis comparing HNSCC patients with and without open neck biopsy weighted by TNM staging, only 16% of patients having undergone prior open neck biopsy were offered surgical treatment compared to 35% of patients without open neck biopsy. Further stage specific analysis is ongoing. **Conclusions:** Open lymph node biopsy in the head and neck has been discouraged as a diagnostic measure for neck mass due to the potential for oncologic spread. However, many surgeons still conduct isolated open lymph node biopsies prior to HNSCC diagnosis. Our data suggests that this may limit treatment and management options for these patients, specifically in regards to surgical management.

### **I54. A Prospective Study of the Chronic Obstructive Sialadenitis Symptoms (COSS) Questionnaire for Assessing the Impact of Sialendoscopy Assisted Surgery: A Preliminary Report**

Annick P. Aubin-Pouliot, BS, San Francisco, CA; Jolie L. Chang, MD, San Francisco, CA; William R. Ryan, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of sialoendoscopy assisted surgery for chronic obstructive sialadenitis.

**Objectives:** To assess whether treatment of chronic obstructive sialadenitis with sialoendoscopy assisted techniques leads to a measurable improvement of symptoms. **Study Design:** Prospective study. **Methods:** Between February and November 2014, 44 adult patients with chronic obstructive sialadenitis underwent a sialendoscopy assisted surgical procedure. Patients completed the newly developed chronic obstructive sialadenitis symptoms (COSS) questionnaire, scored on a scale of 0-100 with increasing severity, along with the SF-8 quality of life questionnaire, prior to surgery and three months postoperatively. **Results:** Thirty-five out of the 41 patients (85%) who have reached the 3 month postoperative time point have completed the questionnaires. Overall, the mean COSS scores improved from 36.17 (SD 20.02) preoperatively to 14.86 (SD 18.26) three months postoperatively (p=0.0002). Both parotid and submandibular gland disease showed similar improvement in COSS scores postoperatively (19.35 vs. 11.68) compared to preoperatively (33.78 vs. 37.88) (p=0.001 vs. p=0.0002). The preoperative and postoperative physical component summary and mental component summary of the SF-8 overall quality of life scores were similar (46.62 and 48.89 vs. 45.44 and 48.35) (p=0.49 and p=0.78). **Conclusions:** Obstructive sialadenitis related symptoms significantly declined three months after sialendoscopy-assisted surgery for patients with obstructive salivary disease. The COSS Questionnaire was able to capture changes in specific sialadenitis symptoms not captured in the SF-8 quality of life survey. This is the first study to prospectively survey sialadenitis-specific symptoms before and after sialendoscopy. Patients and 3 month followup questionnaire

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data are continually being accrued.

## 155. Haptic Feedback in Transoral Robotic Surgery: A Feasibility Study

Andres M. Bur, MD, Philadelphia, PA; Ernest D. Gomez, MD MTR, Philadelphia, PA; Christopher H. Rassekh, MD, Philadelphia, PA; Gregory S. Weinstein, MD, Philadelphia, PA; Bert W. O'Malley Jr., MD, Philadelphia, PA; Katherine J. Kuchenbecker, PhD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the feasibility of adding haptic feedback to transoral robotic surgery and to explain that most otolaryngologists prefer the addition of haptic feedback in transoral robotic surgery.

**Objectives:** The lack of haptic (touch) feedback in current robotic surgery systems has limited its use in many areas of otolaryngology, including skull base surgery. We review the technical challenges to implementing haptic feedback in robotic surgery, including system instability, and we assess the feasibility and utility of adding haptic feedback in transoral robotic surgery (TORS). **Study Design:** Observational study as part of a wider randomized control trial of haptic feedback in TORS. **Methods:** A previously developed vibrotactile haptic feedback system composed of accelerometer based sensors and voice coil actuators was mounted to a da Vinci robot. Using a validated simulator for transoral robotic posterior hemiglossectomy, nine otolaryngology residents, three fellows and two attending surgeons performed simulated surgeries with and without haptic feedback of instrument vibrations. Subjects then completed a questionnaire assessing whether they noticed the haptic feedback and whether they preferred operating with or without haptic feedback. **Results:** Overall, six of the fourteen subjects (42.9%) noticed the presence of haptic feedback during the simulated surgeries. Most resident trainees without prior robotic surgery experience (77.8%) were unaware of the feedback, and all fellow/attending physicians recognized the addition of haptic feedback. Of those subjects who noticed the feedback, most (83.3%) preferred having haptic feedback, and only one subject (16.7%) preferred not to have haptic feedback because he/she found it distracting. **Conclusions:** The finding that most novice robotic surgeons failed to recognize the addition of haptic feedback suggests that feedback feels natural and expected in robotic surgery. Adding haptic feedback to existing TORS platforms is feasible, and initial results indicate that most otolaryngologists prefer the addition of haptic feedback.

## 156. Novel Intraoperative Technique for Predicting Postoperative Recurrent Laryngeal Nerve Function in Thyroid Surgery

Daniela M. Burchhardt, MD, Detroit, MI; Angela Vong, MD, Detroit, MI; Cameron M. Heilbronn, BA, Detroit, MI; Ho-Sheng Lin, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the prognostic implication for postoperative vocal cord function based on recurrent laryngeal nerve stimulation using the Checkpoint stimulator during thyroid surgery.

**Objectives:** To determine the accuracy and clinical implications of Checkpoint intraoperative recurrent laryngeal nerve (RLN) stimulation during thyroid surgery compared to postoperative flexible laryngoscopy exam. **Study Design:** Retrospective chart review. **Methods:** Inclusion criteria: patients who underwent hemithyroidectomy, total thyroidectomy, completion thyroidectomy with Checkpoint RLN monitoring, with pre and postoperative laryngoscopy. Exclusion criteria: postoperative complications, lack of laryngoscopy. **Results:** Total RLN examined meeting inclusion criteria n=69. All RLNs that were identified and stimulated with Checkpoint nerve monitor at 2mA (n=53) at the conclusion of surgery were confirmed to be functional with mobile vocal cords on postoperative flexible laryngoscopy (53/53; 100%). Identified RLNs that had weak or no response on stimulation intraoperatively had corresponding hypomobility or paralysis on postoperative flexible laryngoscopy (6/6; 100%). RLNs not identified during the procedure (10/69; 14.5%) produced a response with vagus nerve stimulation (3/10) or at 20mA stimulation (7/10), and proved to be intact with mobile vocal cords. **Conclusions:** The use of Checkpoint nerve monitor is a novel technique for assessing the RLN viability during and at the conclusion of thyroid surgery. Continued accrual of data is in progress to further validate these findings. Trends show that stimulation at 20mA or vagus nerve stimulation of unidentified nerves is a positive prognostic factor for vocal cord function, while weak or no response to stimulation of identified nerves is a poor prognostic factor. Clinical implications of the Checkpoint nerve monitor include possible cost reductions and improved patient comfort via lessening the need for postoperative laryngoscopy.

## 157. **Heroic Head and Neck Surgery - Do the Ends Justify the Means?**

Egle Cepaitis, Chicago, IL; Gina D. Jefferson, MD FACS, Chicago, IL; Barry L. Wenig, MD MPH, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to gain an understanding of outcomes, including complications and survival, for patients undergoing heroic head and neck surgery and to appreciate the costs associated with it.

**Objectives:** While there have been numerous advances in the treatment of head and neck cancers over the last decade, recurrence continues to be the most significant obstacle to patient long term survival. Surgery is considered the best option for long term survival but comes at a high cost to the patient in complications and monetary charges. The objective of this study was to evaluate the accumulated experience at a large academic otolaryngology department in treating advanced or recurrent/persistent malignancies. **Study Design:** Retrospective chart review. **Methods:** From 12/1/2012 to 1/8/2014, records of 25 patients with advanced or persistent/recurrent malignancy following curative therapy were analyzed. Costs were acquired from the billing department for hospital stay, anesthesiology services, and surgeon charges. **Results:** Mean patient age was 55 (range, 21-85) and the majority male (72%). Malignancy type was predominantly squamous cell carcinoma (60%). Fifty-six percent (14/25) experienced complications, most frequently pharyngocutaneous fistula, free flap failure, wound dehiscence, and wound infections. Approximately half (12/25) of the patients required secondary surgical intervention for complications. The mean hospital stay was 11.8 days (range, 2- 36). Cost for the treatment, including hospital stay, surgeon and anesthesiologist charges averaged \$165,798 but ranged from \$38,075 to \$423,491. After mean followup of 7 months and 25 days, 4 patients were deceased, 3 were in hospice, and 3 were lost to followup. **Conclusions:** In summary, the decision to undergo heroic head and neck surgical treatment requires surgeon and patient discussion of potential complications, survival, and appreciation of costs.

## 158. **Cutaneous Metastasis of Acinic Cell Carcinoma of the Parotid Presenting as an External Auditory Canal Mass**

Ryan A. Crane, MD, Cincinnati, OH; Justin S. Golub, MD, Cincinnati, OH; Lee A. Zimmer, MD PhD, Cincinnati, OH; Ravi N. Samy, MD FACS, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify pathologic characteristics of acinic cell carcinoma and demonstrate an understanding of disease surveillance and disease recurrence.

**Objectives:** To report a case of cutaneous metastasis of acinic cell carcinoma of the parotid gland and review the relevant literature. **Study Design:** Case report. **Methods:** Single chart review and literature search using Medline database. **Results:** Acinic cell carcinoma (ACC) is a relatively uncommon salivary gland malignancy. It is considered a low grade, but can recur many years after initial diagnosis. Typical sites of metastatic involvement include lung, brain, and lymph nodes. We report a case of a sixty year old female who underwent parotidectomy, neck dissection, and postoperative radiation for regionally metastatic acinic cell carcinoma. She returned one year later complaining of gradual hearing loss and intermittent bloody otorrhea. A friable mass was discovered in her external auditory canal, not in continuity with the parotid, and biopsy demonstrated recurrent acinic cell carcinoma. She subsequently underwent a lateral temporal bone resection. Four weeks later, she reported a mass on her torso that was also positive for ACC, suggesting that the original EAC lesion was a cutaneous metastasis, not local spread of the primary tumor. While cutaneous metastasis has been frequently described in squamous cell carcinoma of the head and neck, disseminated dermal involvement is extremely rare in acinic cell carcinoma, with only one other case of reported in the literature. **Conclusions:** Cutaneous metastasis, although rare, can be the initial manifestation of recurrence of acinic cell carcinoma of the salivary glands. Recurrent disease can develop years after primary treatment, indicating the need for long term surveillance.

## 159. **Refining the Utility and Role of Frozen Section Margin Assessment in Head and Neck Squamous Cell Carcinoma Resection**

Eugenie Du, MD, Bronx, NY; Thomas J. Ow, MD, Bronx, NY; Yungtai Lo, PhD, Bronx, NY; Adam J. Gersten, MD, Bronx, NY; Bradley A. Schiff, MD, Bronx, NY; Richard V. Smith, MD, Bronx, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the factors associated with a close or positive margin despite intraoperative frozen section assessment during head and neck squamous cell carcinoma resections.

# Posters

**Objectives:** Previous studies report high accuracy rates for intraoperative frozen sections but the reliability of frozen sections in predicting the ultimate final margin status is unknown. We compared frozen and permanent reads to identify risk factors for overall discrepancies between intraoperative and final margin status. **Study Design:** Retrospective chart review. **Methods:** Pathology reports of 437 surgical resections between 2010 and 2013 were retrospectively reviewed. 253 cases met inclusion criteria and generated 1109 individual specimens. Patient demographics, treatment, recurrence and survival, as well as pathology data pertaining to the specimen were recorded. **Results:** Frozen read had an accuracy of 96.7% (83.1% sensitivity, 97.9% specificity) relative to permanent evaluation. However, 4.3% of cases had a final positive margin not detected by frozen section and 17.8% had a close margin not detected by frozen section. In 8 of 11 cases with missed positive margins, the involved margin was never sampled intraoperatively. Cases where intraoperative margins were only taken from surrounding tissue had a higher risk of missing a close or positive final margin when compared to cases where some or all margins were taken from the specimen. (odds ratio = 5.05, 95% CI (2.31, 11.07), p<0.0001). Disease subsite, risk score, prior radiation, staging and p16 expression were not significantly associated with the likelihood of missing a close or positive final margin. **Conclusions:** Individual frozen section reads are highly accurate. However, negative intraoperative margins do not guarantee margin negative resections. The process of selecting representative margins for intraoperative analysis, specifically the practice of sampling the resection bed, should be refined.

## 160. Primary Tumors of the Cervical and Brachial Plexus

Shanik J. Fernando, BS, Nashville, TN; Kelly L. Groom, MD, Nashville, TN; James L. Netterville, MD, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the various tumors involving the cervical and brachial plexus. Furthermore they should be able to compare differences in surgical management, with consideration of collaborating surgical team selection, between cervical and brachial plexus tumors.

**Objectives:** The infrequently seen tumors primarily involving the cervical and brachial plexus commonly present to the head and neck surgeon. We will review the various pathologies, presenting symptoms, surgical approaches, and patient outcomes in our series treated over the last 15 years. **Study Design:** Case series of patients having cervical or brachial plexus tumors requiring surgical intervention at a tertiary care referral center from 2000-2014. **Methods:** Chart review from EMR. **Results:** Fourteen patient charts met inclusion criteria (11 women, 3 men, age 14-73 years.) Neurofibroma (35%, 1/5 malignant) represented the most common pathology, closely followed by schwannoma (28.5%, 2/4 malignant). The remainder of pathologies included vascular lesions, chordoma, Castleman s disease, and desmoid tumor. Most present with a tender or asymptomatic mass. With no intracordal extension, the lesions of the cervical plexus were treated solely by our team via a transcervical approach. In one patient with intraforaminal extension we partnered with the neurosurgical spine team. For treatment of brachial plexus lesions we partnered with the orthopedic hand surgery team. Brachial plexus function was initially preserved in all patients, however one patient with malignant schwannoma died of recurrent disease following radiation therapy. **Conclusions:** This case series examines our surgical management of patients presenting with primary tumors of the cervical and brachial plexus. In all cases, MRI was the preferred imaging modality for preoperative evaluation of the soft tissue involvement of the tumors. In lesions of the brachial plexus or cervical plexus lesions with intraforaminal extension, it is important to form appropriate surgical teams to achieve the best outcome.

## 161. In-office Secondary Tracheoesophageal Puncture with Immediate Prosthesis Placement: A Novel Technique of Prosthesis Placement at the Time of Puncture

Tiffany A. Glazer, MD, Ann Arbor, MI; Teresa H. Lyden, MA CCC-SLP, Ann Arbor, MI; Matthew E. Spector, MD, Ann Arbor, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand in-office secondary tracheoesophageal puncture with immediate prosthesis placement is a novel, safe, and reproducible technique allowing for immediate speech.

**Objectives:** To describe a novel in-office secondary tracheoesophageal puncture technique with immediate prosthesis placement allowing for immediate speech. **Study Design:** Retrospective case series. **Methods:** The patient is given topical anesthesia in the naso-oropharynx. A transnasal esophagoscope (TNE) is placed in the proximal esophagus until it is seen transilluminating through the stoma at the desired puncture site. An 18 gauge introducer needle is used to perform the puncture under direct visualization and a guidewire is inserted. The tract is dilated using Seldinger technique up to 16 French. The prosthesis is placed over the guidewire, packed in a gel capsule and inserted directly into the TEP. Patients are instructed on prosthesis use and can often speak immediately. **Results:** Several techniques for in-office TEP with prosthesis placement have been described previously in the literature, but all have significant limitations. Transoral



or retrograde procedures have been described but are not ideal for patient comfort. Some techniques lose direct visualization of the puncture site throughout the dilation and prosthesis placement, which increases the risk of false passage. While in-office puncture has been described in the literature, prosthesis placement is typically delayed. **Conclusions:** Our technique describes a novel, safe, and reproducible technique for in-office TNE assisted secondary TEP with immediate prosthesis placement.

## 162. The Effect of Intraglandular Botox® on Salivary Glands Mitotic Rate: A Pilot Study

Javier D. Gonzalez-Castro, MD, San Juan, PR; Jeamarie Pascual, MD MPH, San Juan, PR; Carlos Gonzalez-Aquino, MD FACS, San Juan, PR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the effect of intraglandular Botox® on salivary gland mitotic rate and the potential impact that this could have in prevention of xerostomia in the head and neck cancer population. It should also generate interest in further research directed at treating this patient population.

**Objectives:** Radiotherapy induces the formation of oxygen free radicals which cause damage to both tumor and normal cell DNA most effectively when they are mitotically active. Cells in the G0 (dormant) phase of the cell cycle are affected less readily. We believe that by temporarily inhibiting salivary gland acinar cells, we can force them into G0 and thus protect them from the adverse effects of radiation. **Study Design:** Randomized blinded prospective animal experiment with control. **Methods:** The study consists of 19 CD rats, 3 sacrificed at baseline; the remaining 16 rats were divided in two groups and randomized within each group. Group 1 consisted of 8 rats, injected on day 0 and sacrificed on day 14; 3 received sham injection, 5 received Botox® injection. Group 2 was randomized and injected similarly, but sacrificed on day 28. After sacrifice, glands were stained with Ki-67 which stains positive for all cells except those in G0. **Results:** Our study did not show a difference in mitotic rate between treatment arms in those subjects that were sacrificed at 14 days. It did however show a trend towards decreased mitotic rate in salivary glands treated with Botox® when compared to those treated with sham solution for the group that was dissected on day 28. **Conclusions:** Our study shows a trend towards decreased mitotic rate in salivary glands treated with Botox® after 28 days. This decreased mitotic rate could potentially have a protective effect for salivary glands in patients receiving radiotherapy.

## 163. Surgical Management of Vagal Schwannomas

Kelly L. Groom, MD, Nashville, TN; Shanik J. Fernando, BS, Nashville, TN; James L. Netterville, MD, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss management options for vagal schwannomas to include technique and likely outcome of tumor enucleation.

**Objectives:** Review the outcomes of treatment of vagal schwannoma with an emphasis on tumor enucleation. **Study Design:** Retrospective chart review from 2003-2014. **Methods:** We reviewed the charts of all patients who underwent surgery for vagal schwannoma over an 11 year period. Patient data including operative technique, postoperative nerve function, complications, need for further surgery and imaging were reviewed. **Results:** Thirteen vagal schwannomas were removed (9 males, 4 females, age range 30-66). Postoperative followup ranged from 2-96 months with an average of 32 months.

Twelve vagal schwannomas were enucleated and 1 was excised. Of the 12 enucleations, 11 patients had near normal or normal voices at last followup. Four had normal vocal cord function and normal voices without intervention, 2 had partially mobile vocal cords with normal voices without intervention, 4 had paretic vocal cords with near normal or normal voices (two had temporizing injection laryngoplasty) and one patient had a paretic vocal cord, palatal paresis and dysphonia requiring medialization laryngoplasty, arytenoid adduction and palatal adhesion. The patient who underwent vagal schwannoma excision had a permanent paralysis requiring medialization laryngoplasty with arytenoid adduction. Four of the 12 tumor enucleations were performed with intraoperative nerve mapping. Ten patients had postoperative imaging. No patients had evidence of recurrence. **Conclusions:** The morbidity of vagal schwannoma resection is significant, but this may be spared by enucleating, rather than resecting tumors. In this series 11/13 patients had normal to near normal voices postoperatively. The sole vagal schwannoma resection was for a patient who presented with obstructive sleep apnea and a preoperative vocal cord paralysis from his lesion. We suggest that enucleation of vagal schwannomas be employed to spare the morbidity of permanent vagal paresis.

# Posters

## 164. Investigation of ESM1 Gene Suppression by siRNA: Effects on Proliferation and Migration in Primary and Metastatic Head and Neck Cancer Cell Lines

Mehmet Gunduz, MD PhD, Ankara, Turkey; Onur Bender, MS, Ankara, Turkey; Omer Faruk Hatipoglu, PhD, Ankara, Turkey; Muradiye Acar, PhD, Ankara, Turkey; Mesut Kaya, MD, Ankara, Turkey; Esra Gunduz, DMD PhD, Ankara, Turkey

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand genetic background of head and neck cancer specifically role of ESM1 gene.

**Objectives:** Despite technological advances in medicine, head and neck cancer has one of the lowest recovery rates and highest mortality levels of all cancer types. The main therapeutic modalities in head and neck cancers are surgery and chemoradiotherapy, but these treatments are problematic in part because they cause face, mouth and laryngopharyngeal deformations. Therefore, alternative diagnosis and treatment methods should be developed. It is of particular importance to understand the effects of genetic factors in cancer, which is already known to be a genetic disease and to use this understanding in cancer treatment. **Study Design:** ESM1, which is the interest of our study, is secreted from endothelial cells and is involved in tumor growth, metastasis and angiogenesis and has critical roles in different cancer types. In this study role of ESM1 gene in head and neck cancer growth and metastasis have been investigated by molecular analysis.

**Methods:** In our study, UT-SCC-74A and its metastasis UT-SCC-74B head and neck cancer cell lines were used. Transfection efficiency of the cultured cells was determined via 25nM GAPDH-siRNA-pool. Cells were then transfected with 25nM ESM1-siRNA-pool and 25nM NT-siRNA-pool. Real time PCR was used to show knock-down efficiencies. The cells were analyzed under an inverted microscope before and after transfection. To measure proliferation patterns, cell impedance was measured for 140 hours using the xCELLigence real time cell analysis system. This system enables us to acquire information about the biological status of cells including cell number, viability, morphology and movement. Migration capacity was measured using the scratch assay which was performed for 48 hours. **Results:** ESM1, which is expressed in UT-SCC-74A and UT-SCC-74B head and neck cancer cell lines, was successfully knocked down via transfection with siRNA pools. There was no difference in morphological characteristics before and after transfection. There was also no significant difference in cell proliferation when performed under optimal knock-down conditions. Similarly, there was no significant difference between ESM1 and NT siRNA after migration analysis. **Conclusions:** In this study, the proliferative and metastatic effects of ESM1 on head and neck cancer primary and metastatic cell lines have been shown. It is necessary to use advanced tests in order to get a deeper understanding regarding cell viability.

## 165. Clinical and Histological Characteristics of Oncocytic Thyroid Carcinomas

Thomas E. Heineman, BA, New York, NY; Jenna Devare, MD, Ann Arbor, MI; Theresa Scognamiglio, MD, New York, NY; David I. Kutler, MD FACS, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better understand clinical differences and similarities between oncocytic variants of follicular and papillary thyroid carcinomas.

**Objectives:** Oncocytic thyroid carcinomas, which can be categorized as oncocytic variants of follicular or papillary carcinomas, comprise 3-7% of all differentiated thyroid carcinomas, which have been thought to have a more aggressive course than other differentiated thyroid cancers, with increased lymph node and distant metastases and late recurrence. The low incidence of oncocytic thyroid carcinomas compared to other thyroid cancers has precluded its comprehensive characterization. **Study Design:** Retrospective record review at a tertiary care academic medical center. **Methods:** Patients in the study underwent thyroidectomy between 1990 and 2012. Seventy-seven patients with histologically confirmed oncocytic variants of follicular thyroid carcinoma (FTC) or papillary thyroid carcinomas (PTC) with adequate preoperative and postoperative records were analyzed, of which forty-six patients (59.7%) were variants of PTC and 31 patients (40.3%) were variants of FTC. **Results:** The average age at presentation of patients with oncocytic variants of PTC and FTC was 51.1 and 57.0 years, respectively ( $p=0.09$ ). The percentage of women with oncocytic variants of PTC was 76%, compared to 55% in FTC ( $p=0.08$ ). FTC tumors were larger than PTC tumors at presentation, with a mean of 2.7 cm compared to 1.3 cm ( $p=0.001$ ). FTC variants were more aggressive histologically with 70% and 64.3% of samples exhibiting capsular and vascular invasion respectively. This is in contrast to 10.5% and 12.8% of capsular and vascular invasion in PTC samples ( $p<0.001$  and  $p<0.001$ ). **Conclusions:** Oncocytic variants of follicular thyroid cancer were significantly larger and more aggressive histologically at presentation compared to oncocytic variants of papillary thyroid cancer, but were less common overall. Recurrence rates were low for both groups but slightly higher in FTC with oncocytic features.

**166. Thyroid and Parathyroid Dysfunction after Laryngectomy and after Laryngectomy with Postoperative Radiotherapy in Laryngeal Cancer Patients**

Ahmed Awad Hussein, MD, Cairo, Egypt; Mohamed Mosleh Ebrahim, MD, Cairo, Egypt

**Educational Objective:** At the conclusion of this presentation, the participants should be able to consider the hypothyroidism and hypoparathyroidism as a frequent postoperative complication of total laryngectomy and hemithyroidectomy especially when it is combined with radiotherapy and regularly assess the thyroid and parathyroid functions during the followup visits.

**Objectives:** To assess the incidence of thyroid and parathyroid dysfunction in a group of laryngeal cancer patients who treated with total laryngectomy and hemithyroidectomy and another group who treated with total laryngectomy and hemithyroidectomy with postoperative radiotherapy. **Study Design:** Retrospective cohort study. **Methods:** This study included 17 patients treated for laryngeal cancer, group 1 (8 patients) treated with total laryngectomy and hemithyroidectomy, group 2 (9 patients) treated with total laryngectomy and hemithyroidectomy with postoperative radiotherapy. The followup was during the period from 2000 to 2012. Thyroid stimulating hormone and free T4 evaluated to assess thyroid gland function. Serum calcium was used to assess the parathyroid gland function. The independent samples student (t) test was used for statistical analysis for all our parametric variables. P value of 0.05 or less was considered significant. **Results:** The data were collected and described statistically. In group 1, the hypothyroidism incidence was (63%, P = 0.99) and the hypoparathyroidism incidence was (34%, P = 0.78). In group 2, the hypothyroidism incidence was (88%, P = 0.96) and the hypoparathyroidism incidence was (45%, P = 0.472). **Conclusions:** Hypothyroidism and hypoparathyroidism are frequent complications after total laryngectomy and hemithyroidectomy especially when combined with radiotherapy. It is essential to meticulously dissect around thyroid gland during hemithyroidectomy and to implant the parathyroid glands if it were removed accidentally during the surgery. Also to regularly assess the thyroid gland functions and the serum calcium during the regular followup visits periodically even 10 years after treatment.

**167. Prefabricated Composite Radial Forearm Free Flap Reconstruction of Subtotal Cricoidectomy for Cricoid Chondrosarcoma**

Ryan S. Jackson, MD, Rochester, MN; Eliot J. Martin, PA-C, Rochester, MN (Presenter); Eric J. Moore, MD, Rochester, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the use of a prefabricated free flap reconstruction in laryngeal preservation for cricoid chondrosarcoma.

**Objectives:** We aim to report a case of cricoid chondrosarcoma resection followed by a two stage reconstruction with auricular cartilage using the radial forearm free flap as a vascularized carrier. **Study Design:** Report of a case. **Methods:** A 61 year old man underwent a two stage procedure for a chondrosarcoma of the cricoid cartilage. The first stage consisted of auricular cartilage harvest with subsequent implantation in a subcutaneous pocket of his radial forearm. The second stage consisted of tumor excision by means of a subtotal cricoid resection from a transcervical approach. A composite radial forearm free flap was then used to reconstruct the cricoid defect over a silastic stent. A tracheostomy tube and nasogastric (NG) tube were placed during the second stage. **Results:** The patient had an uncomplicated hospital course and was discharged home on postoperative day six. His NG tube was removed two weeks postoperatively. Three weeks postoperatively, the patient was taken to the operating room where the stent was removed and a small amount of granulation tissue was removed. He was successfully decannulated nine weeks after the second stage of the procedure. The patient is now seven months from the second stage with no evidence of granulation tissue or stenosis. He remains successfully decannulated and is eating a regular diet by mouth. He does have an ipsilateral vocal cord paresis but phonates normally. **Conclusions:** Our case further adds to the evidence that prefabricated flaps are reliable in airway reconstruction. Additionally, this provides an additional option for laryngeal preservation in patients with cricoid chondrosarcoma.

**168. Carotid Artery and Lower Cranial Nerve Exposure with Increasing Surgical Complexity to the Infratemporal Fossa**

Ana M. Lemos-Rodriguez, MD, Chapel Hill, NC; Satyan B. Sreenath, BS, Chapel Hill, NC; Rounak B. Rawal, MD, Chapel Hill, NC; Lewis J. Overton, MD, Chapel Hill, NC; Zainab Farzal, BS, Chapel Hill, NC; Adam M. Zanation, MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand and apply an anatomical algorithm to externally approach the carotid artery and lower cranial nerves of the skull base.

# Posters

**Objectives:** Our aim was to investigate the grade of carotid artery exposure attained, the external carotid branches reached, and the lower cranial nerves identified in five sequential external approaches to the skull base. An anatomical algorithm is presented. **Study Design:** Anatomical study. **Methods:** Six latex injected adult cadaver heads were dissected in five consecutive approaches: transcervical approach with submandibular gland removal, posterior extension of the transcervical approach, transcervical approach with parotidectomy, parotidectomy with lateral mandibulotomy, and parotidectomy with mandibulectomy. Carotid artery exposure attained, external carotid branches reached, and lower cranial nerves approached were documented. **Results:** In the transcervical approach, the external carotid artery (ECA) exposure achieved was 1.25 cm (SD 0.25). The superior thyroid and facial arteries were identified and cranial nerve XII revealed. After the posterior extension, the ECA was exposed 2.7 cm (SD 1.0). Occipital and ascending pharyngeal arteries were visualized. After the transparotid approach, the ECA was exposed 3.98 cm (SD 1.8). Lateral mandibulotomy revealed the internal maxillary artery, cranial nerves X, XI and the sympathetic trunk. Mandibulectomy allowed for complete ECA extension and terminal branch exposure, along with cranial nerve IX and lingual nerve identification. Internal carotid artery exposure ranged from 1.5 cm to 6.9 cm above bifurcation with these respective sequential approaches. **Conclusions:** Approaches to the infratemporal fossa must be based on anatomic and biological patient factors. This study provides a guide to the skull base surgeon for an extended approach based on the desired anatomic exposure.

## 169. Postoperative MRSA Infections in Head and Neck Surgery

Sharon J. Lin, BS, Cleveland, OH; Sami J. Melki, MD, Cleveland, OH; Rod P. Rezaee, MD, Cleveland, OH; Pierre N. Lavertu, MD, Cleveland, OH; Michelle V. Lisgaris, MD, Cleveland, OH; Chad A. Zender, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the risk factors and complications associated with MRSA surgical site infections.

**Objectives:** Surgical site infections (SSIs) are a significant source of morbidity and mortality in surgical patients. Methicillin resistant staphylococcus aureus (MRSA) is a major cause of SSIs and has been implicated in aggressive head and neck postoperative infections, resulting in prolonged hospitalization. Head and neck cancer patients may be at increased risk of postoperative MRSA SSIs, resulting from weakened host defenses, longer operating times, and prior hospitalizations. This study determines the incidence of MRSA SSIs in head and neck procedures at a tertiary medical center and compares the risk factors and complications with other SSIs. **Study Design:** Retrospective chart review. **Methods:** Of 577 patients who underwent head and neck procedures from 2008-2013, 113 were identified with SSI. Of these, 23 were found to have MRSA positive wound cultures. Risk factors and complications were identified in all groups and compared using multivariate analysis. **Results:** The only significantly different risk factor between the MRSA and non-MRSA groups was cumulative number of hospital inpatient days in the year preceding the procedure, which was 7.3 days in MRSA SSI and 2.3 days in non-MRSA SSI ( $p = 0.007$ ). Length of stay was significantly longer at 20.8 days for MRSA SSI and 11.3 in non-MRSA SSI ( $p = 0.00043$ ). **Conclusions:** Increased prior hospital exposure is a risk factor for development of MRSA SSI over non-MRSA SSI. Additionally, MRSA SSIs are associated with longer length of stay, and thus a higher cost of hospitalization. These patients may benefit from prophylactic screening and treatment to prevent SSI.

## 170. Establishment and Characterization of a Cell Line from an Oral Squamous Carcinoma in a Fanconi Anemia Patient

Kimberly A. Miller, BS, Minneapolis, MN; Beverly R. Wuertz, BA, Minneapolis, MN; Frank G. Ondrey, MD PhD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the importance of this new Fanconi anemia (FA) cell line in developing treatments for FA patients, and be able to compare the genetics and growth characteristics of this FA HNSCC with that of non-FA HNSCC.

**Objectives:** Fanconi anemia (FA) is a genetic disorder which leads to bone marrow failure and cancer due to mutations in DNA repair mechanisms. FA is also a solid tumor prone disease, affecting patients decades earlier and at a rate several hundred-fold higher than the general population necessitating regular cancer surveillance. In pursuit of our objective to better understand the features of post-BMT oral SCC tumors and assist in development of preventative, survival enhancing therapies for FA patients, we established a cell line and characterized its molecular properties. **Study Design:** Laboratory studies. **Methods:** We established a cell line from an FA patient with a T2N2bM0 oral SCC. This patient had a history of BMT at age 19, three years prior to extraction of the tumor. The tumor was harvested, and the tissues were mechanically dissociated into a single cell suspension and grown as an adherent monolayer culture, replated in sequentially larger flasks as the cells proliferated. The cell line was characterized by histological, biomarker, and molecular

assays. **Results:** Short tandem repeat genotyping indicated the cell line is discrete from any previously authenticated cell lines. Analysis via G banding and spectral karyotyping (SKY) identified chromosomal translocations consistent with patient and disease characteristics. The cell line was also analyzed via immunohistochemistry for expression of markers p53, FANCD2, and p16. **Conclusions:** As only a few cell lines from Fanconi anemia patients are available worldwide, this cell line will serve as a useful tool for future study of potential squamous carcinoma prevention strategies in this high risk population.

## 171. The Incidence and Mortality Caused by Second Primary Tumor Development in HNSCC

Kelsey P. Pendleton, BA, Pittsburgh, PA; Jonas T. Johnson, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the incidence and mortality attributable to the development of second primary tumors in HNSCC as well as discuss the possible implications on future second primary tumor screening protocols in HNSCC.

**Objectives:** Patients with head and neck squamous cell carcinoma (HNSCC) with curative treatment commonly develop second primary tumors. This study is to examine the exact incidence at which this occurs and what mortality rates can be attributed to the development of second primary tumors in order to reassess our post-HNSCC screening guidelines.

**Study Design:** Retrospective cohort study. **Methods:** Clinical data was compiled from 3,771 patients treated for HNSCC between 1996-2013. Each patient was analyzed for recurrence, metastasis, and development of a second primary tumor. Second primary tumors were defined as being separated from first primary tumors by location or time (diagnosis >2 years after curative treatment). Deceased patients were categorized as dying from their first primary tumor, second primary tumor, or from non-HNSCC causes. **Results:** Out of 3,771 patients analyzed in our HNSCC cohort, 319 (8.5%) were lost to followup. At the time of our study, 1616 were still alive and 1836 were deceased, with a 30% 5 year overall survival rate. Cause of death was determined to be from first primary in 40.2% of patients, second primary in 9.6%, and non-HNSCC causes in 40.4%. 9.8% of deaths were unable to be categorized. **Conclusions:** Second primary tumors develop in a significant number of patients, leading to the demise of 10.8% of HNSCC patients. Further research will be to determine which patient populations are at higher risk for second primaries and the peak timeframe in which this occurs. Understanding this data can guide the future development of screening protocols for second primaries in the HSNCC population.

## 172. Impact of Alternating Chemoradiotherapy for Advanced Nasopharyngeal Cancer

Satoshi Saijoh, MD, Fukushima, Japan; Takashi Matsuzuka, MD, Fukushima, Japan; Masahiro Suzuki, MD, Fukushima, Japan; Masakazu Ikeda, MD, Fukushima, Japan; Yuta Nakaegawa, MD, Fukushima, Japan; Koichi Omori, MD, Fukushima, Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand usefulness of alternating chemoradiotherapy for advanced nasopharyngeal cancer.

**Objectives:** Alternating chemoradiotherapy has been performed for patients with nasopharyngeal cancer of stage II or more advanced in our department. Objective of our current study is to evaluate the effectiveness of alternating chemoradiotherapy. **Study Design:** Retrospective design. **Methods:** Alternating chemoradiotherapy was performed; initially, chemotherapy was administered, and then radiotherapy (wide field, 36Gy), chemotherapy, radiotherapy (shrinking field, 20^30Gy), and chemotherapy were alternately performed. For chemotherapy, 5-FU (800mg/i/24h) was intravenously administered for days 1-5, and CDDP (50mg/i/24h) for 2 days was administered on day 6 and 7. 30 patients who had undergone alternating chemoradiotherapy during the period between 1999 and April, 2010, were included in this study (observation period 2M^138M, median 51M). According to the 2009 TNM classification (UICC), 6 patients were in stage II, 9 in stage III, and 15 in stage IV. Treatment completion rate, response rate and 5 year survival rate of each case were evaluated. **Results:** Between April, 1999 and April, 2010, 30 patients received alternating therapy for nasopharyngeal cancer. Treatment completion rate was 93.3% (28 of 30 cases), response rate was 100 (CR: 27 and PR: 3 cases), and the 5 year overall survival rate was 78.3%. **Conclusions:** Alternating chemoradiotherapy was considered to be an excellent treatment for advanced nasopharyngeal cancer.

## 173. Multifocal, Recurrent Microcystic Adnexal Carcinoma (MAC) of the Face: A Diagnostic and Reconstructive Challenge

Jeffrey C. Teixeira, MD, Bethesda, MD; Jeffrey N. Lackey, MD, Bethesda, MD; Joseph F. Goodman, MD, Bethesda, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the diag-

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nostic and reconstructive challenges of treating microcystic adnexal carcinoma (MAC) of the face with Mohs micrographic surgery (MMS).

**Objectives:** Outline the reconstructive challenges inherent in surgical management of MAC; compare MMS and modified Mohs for margin analysis. **Study Design:** Case report. **Methods:** A 38 year old WM presented with contralateral focus of MAC on the right zygoma three years after surgery/XRT and reconstruction for MAC of the left cheek. A separate right preauricular lesion was found on physical exam. MMS required 13 stages with 26 sections but could not clear margins, resulting in a defect size of approximately 10 x 14cm. Three subsequent OR procedures were required to clear the margin (via modified Mohs technique) and reconstruct the patient with ALT free flap to the right cheek subunit. **Results:** This case highlights the diagnostic challenges presented by MMS for large facial defects; extensive resection required the patient to have serial sections over several days, with a widening facial defect and concern for wound exposure. Traditional frozen section analysis is not sensitive enough to detect small foci of infiltrative tumor. Modified, or slow Mohs, offers benefit over traditional margin analysis in which a bread loafing technique is used. Rush processed, paraffin embedded specimens that represent en face analysis of the margin (modified Mohs) was necessary to correct both false negative and false positive margins obtained with traditional Mohs. **Conclusions:** MAC is a rare skin tumor with propensity for the central face. Typical defect size is 6-14 times the size of the original lesion. MMS has been shown to improve outcomes and spare wide margins around critical structures of the face; however modified Mohs may be necessary to clear margins prior to reconstruction of large defects.

## 174. Parathyroid Adenoma with Extracapsular Hemorrhage: A Rare Entity and Potential Surgical Emergency

Lyndy J. Wilcox, MD, Norfolk, VA; Frank S. Chen, PhD, Norfolk, VA; Mandip S. Rawla, MD, Norfolk, VA; Joseph A. Aloji, MD, Norfolk, VA; Frank R. Mihlon, MD, Norfolk, VA; Daniel W. Karakla, MD, Norfolk, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the presentation of hemorrhagic parathyroid adenoma, as well as recognize the potential need for emergent intervention and describe the appropriate workup and management of the disorder.

**Objectives:** 1) To report a rare case of a hemorrhagic parathyroid adenoma in a patient with a history of primary hyperparathyroidism; and 2) to review the literature regarding this topic and describe the management. **Study Design:** Hemorrhagic parathyroid adenoma is a rare entity, with approximately 30 cases reported in the literature, likely occurring secondary to the adenoma outgrowing its vascular supply. Extracapsular hemorrhage may lead to complications such as airway compromise, hoarseness, dysphagia, and acute hypercalcemia. Due to the potential for airway compromise, this can be a surgical emergency. **Methods:** This case presentation details the history and physical examination, imaging, laboratory studies, management plan, operative procedure, postoperative course, and pathology findings. A literature review is also presented. **Results:** A 55 year old female with a history of primary hyperparathyroidism presented to the emergency room with a three day history of left neck swelling, dysphagia, and neck pain. On exam, she had left paratracheal fullness and parasternal ecchymosis. Calcium and parathyroid hormone levels were elevated at 11.8 and 305, respectively. Computed topography scan showed a hemorrhagic mass in the left tracheoesophageal groove with tracheal deviation. The patient underwent left parathyroidectomy, hemithyroidectomy, and hematoma evacuation. Pathology confirmed the diagnosis of parathyroid adenoma with hemorrhagic infarction. The patient recovered well postoperatively with normalization of laboratory values and symptom resolution. **Conclusions:** The triad of acute neck swelling, cervicothoracic ecchymosis, and hypercalcemia should raise suspicion of hemorrhagic parathyroid adenoma. A history of parathyroid disease and imaging are useful in the diagnosis. Urgent/emergent surgical intervention may be required given the risk of airway compromise.

## 175. HPV Status and NF $\kappa$ B p65 Expression in Response to Tobacco Carcinogens

Qi Zhang, MD, Minneapolis, MN; Daniel S. Schneider, MD, Minneapolis, MN; Ryan R. Fader, MD, Minneapolis, MN; Beverly R. Wuertz, BA, Minneapolis, MN; Frank G. Ondrey, MD PhD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that NF $\kappa$ B plays a role in the carcinogenesis of HPV+ head and neck cancer.

**Objectives:** 1) Examine association between HPV status and NF $\kappa$ B p65 expression in head and neck squamous cell carcinoma (HNSCC) specimens; 2) assess NF $\kappa$ B activity in cell lines following exposure to cigarette smoke condensate (CSC); and 3) investigate invasive properties of cell lines following exposure to CSC. **Study Design:** Laboratory studies. **Methods:** Tumor specimens were obtained from 39 patients, de-paraffinized, and nucleic acids isolated. General HPV and HPV-16 status were determined by PCR. NF $\kappa$ B p65 mRNA expression was analyzed via qRT-PCR. Two cell lines

were examined, HOK 16b (HPV-16 positive) and Rhek-1A (HPV-16 negative) with luciferase reporter gene assay for NF $\kappa$ B expression following exposure to increasing CSC concentrations. To determine if HOK-16b cells exhibited more invasive properties than Rhek-1A, cells were exposed to increasing CSC concentrations in Matrigel invasion assays. Cell counts performed determined degree of invasion. **Results:** A significant association was found between HPV+ HNSCC and detectable levels of NF $\kappa$ B ( $P<0.05$ ). A stepwise increase in NF $\kappa$ B activity following CSC exposure was seen in both cell lines ( $P<0.001$ ). CSC had an increased effect on NF $\kappa$ B expression in HOK-16b in comparison to Rhek-1A cells ( $P<0.001$ ). Matrigel experiments demonstrated no increase in invasiveness following CSC exposure in either cell lines. **Conclusions:** We found an increase in relative expression of NF $\kappa$ B p65 mRNA in HNSCC specimens which were HPV+. NF $\kappa$ B activity increased following CSC exposure in both cell lines, with the HPV-16+ cell line demonstrating a higher response. HPV transformed cell lines did not develop invasive properties following exposure to a known carcinogen.

## Laryngology/Bronchoesophagology/Pediatric Otolaryngology

176. **Dynamics of Lidocaine in Topical Anesthesia for Office Based Laryngeal Procedures: A Pilot Study**  
Michael V. Amato, BS, Valhalla, NY; David M. Garber, BS, New York, NY; Neha A. Patel, MD, New York, NY; Craig H. Zalvan, MD, Sleepy Hollow, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the administration, time course, and efficacy for 4% lidocaine as a topical anesthetic for office based laryngeal procedures. With this information, participants will understand when office based procedures should commence, how much time can be allotted for laryngeal manipulation, and when patients should resume oral intake upon resumption of sensation. Additionally, patient feedback from laryngeal anesthesia will be discussed focusing on subjective symptoms during the anesthetic process and biophysical vital parameters.

**Objectives:** To study 4% lidocaine as a topical anesthetic for office based laryngeal procedures by recording onset, duration, and subjective experience of topical laryngeal anesthesia. **Study Design:** Nine healthy volunteers were anesthetized with 4% lidocaine endoscopically. Laryngeal sensitivity prior to and during anesthesia was recorded until normal sensation returned measured by air puff sensory testing. Subjective experience of the process was recorded. **Methods:** Questionnaires regarding subjective experience were completed prior to, during, and after anesthesia. Laryngeal sensitivity via air pulse trigger of the laryngeal adductor reflex (LAR) prior to and after 3 mL of 4% lidocaine via laryngeal shower was recorded at 30 second intervals until the larynx was insensate with no LAR triggered at 10mmHg. Time to anesthesia was recorded and post-endoscopy questionnaire was given. Upon subjective change in sensation, sensitivity via air pulse trigger of the LAR was recorded until baseline sensation returned. A post-anesthesia questionnaire recorded the subjective experience. **Results:** Average time to full anesthesia was 110 seconds (+/-31.2). Subjective return of sensation was noted at 10 minutes (+/-2.5), however time to return to normal LAR was 22 minutes (+/-5.8). Based on three standard deviations, 99.7% of the population will be anesthetized at 3.4 minutes, report subjective change at 18.2 minutes and regain full sensation at 40 minutes. **Conclusions:** Office based laryngeal procedures should be performed at least two minutes following topical 4% lidocaine with a window for manipulation of at least 16 minutes. Oral intake should be delayed for over 45 minutes to ensure complete return of sensation. The laryngeal shower of lidocaine is subjectively well tolerated.

177. **The Relationship of Adenoid Volume to Tonsillar Volume and Their Effects on Snoring and Apnea**  
Nebil Ark, Ankara, Turkey; Ekrem Sait Kankilic, MD, Ankara, Turkey; Alper Yuksel, Ankara, Turkey; Kadriye Serife Ugur, Ankara, Turkey; Ahmet Akkoz, MD, Ankara, Turkey; Aydin Kosus, Ankara, Turkey

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the relationship of adenoid volume to tonsillar volume and their effects on snoring and apnea.

**Objectives:** To investigate the relationship of adenoid volume to tonsillar volume and their effects on snoring and apnea. **Study Design:** Prospective. **Methods:** One hundred patients in the pediatric age group undergoing adenoidectomy and tonsillectomy with or without snoring and witnessed apnea were recruited. Their tonsil grade and the percentage of choanal obstruction by adenoid were evaluated preoperatively. The volumes of the adenoid and each tonsil tissue excised were measured separately. All the parameters compared to understand the relationship of adenoid volume to tonsillar volume and how they related with snoring and apnea. **Results:** There was a weak, statistically insignificant positive correlation among tonsil and adenoid volume ( $p>0.05$ ). However linear regression analysis showed that tonsil volume values were effective factors in predicting adenoid volume ( $p<0.05$ ). Tonsil grade and adenoid volume were found to be the most effective factors in the presence of apnea ( $p<0.05$ ). One ml increase in adenoid volume elevates apnea risk 2.3 times. In patients with tonsil grades 3 and 4, apnea risks were found to be respectively 4.5 and 5.3 times more compared with

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tonsil grades 1 and 2. ( $p < 0.05$ ). **Conclusions:** There is a weak correlation with tonsil and adenoid volume. Tonsil grade and adenoid volume are important factors in apnea formation.

## 178. Endoscopic Treatment of Zenker's Diverticulum: Surgical and Patient Outcomes

Michelle D. Barton, BA, Portland, OR; Kara Y. Detwiler, MD, Portland, OR; Joshua S. Schindler, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare endoscopic surgical techniques for Zenker's diverticulum in terms of overall patient satisfaction, swallowing function, and surgical outcomes.

**Objectives:** To describe a single surgeon's experience with endoscopic surgery for Zenker's diverticulum (ZD) and to evaluate both surgical and patient swallowing outcomes. **Study Design:** Retrospective chart review and patient surveys. **Methods:** 111 patients, who elected surgical treatment of ZD, were enrolled between 2007-2014. Medical records were reviewed to capture type of surgery, length of diverticulum, complications, and revision rate. Using a patient survey (scale of 1-10), EAT-10 Swallowing Screening Tool, and MD Anderson Dysphagia Inventory (MDADI), patient satisfaction and impact of dysphagia were reviewed on average 2.5 years postoperatively. **Results:** 107 patients (96.4%) were treated endoscopically, 87 with CO<sub>2</sub> laser (78.4%) and 20 with stapler (18.0%). There was significant difference in diverticula length (laser=1.71cm, stapler=3.80cm,  $p < .005$ ) and mean length of hospital stay (laser=1.25 days, stapler=.63 days,  $p < .005$ ). There were nine minor complications in the laser group and no complications in the stapler group ( $p < .005$ ). Twelve patients (14%) in the laser group and one patient (5%) in the stapler group required revision with an average of 20 months until revision surgery was required ( $p = .167$ ). Overall, patients reported a high level of satisfaction with surgery (laser=8.49, stapler=7.43) and felt postoperative dysphagia minimally impacted their swallowing function (laser=1.00, stapler=.86). There was a statistically significant difference in postoperative MDADI scores (laser=87.73, stapler=71.25,  $p < .005$ ). **Conclusions:** Laser and stapler assisted Zenker's diverticulotomy are comparable surgical techniques in terms of overall patient satisfaction and swallowing function. While laser assisted surgery was associated with a higher rate of minor complications, it may yield more significant improvement of dysphagia as measured by the MDADI.

## 179. Anatomical Considerations for the Endoscopic Endonasal Approach to the Orbit and Optic Nerve in the Pediatric Population

Anthony G. Del Signore, MD, Chapel Hill, NC; Rounak B. Rawal, 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 be familiar with anatomic measurements and relationships of critically important neurovascular structures encountered during the endoscopic endonasal approach to the orbit in the pediatric population.

**Objectives:** Endoscopic endonasal approaches (EEA) to the pediatric orbit are challenging secondary to highly variable sinus pneumatization patterns, volumes, and proximity to critical neurovascular structures. We therefore defined a step-wise progression of critical anatomic measurements necessary for safe dissection to the orbital apex and optic nerve (ON), with stratification by age. **Study Design:** Radioanatomic cross-sectional study. **Methods:** CT scans were examined in patients <18 years of age. Differences in horizontal strut distance to the 1) infraorbital nerve, 2) anterior ethmoidal artery, and 3) posterior ethmoidal artery were recorded. Pneumatization surrounding the ON and orbital apex, lamina papyracea area, and volumes of sinuses were measured. Results were stratified into eight age groups and compared to an adult control population. **Results:** Eighty-eight pediatric patients were included. Adult horizontal strut distances to the infraorbital nerve were greater than patients aged 2-4 ( $p = 0.049$ ). Adult horizontal strut distances to the anterior and posterior ethmoidal arteries were greater than patients aged 4-7 ( $p = 0.019$ ,  $p = 0.011$ ). Adult degree of pneumatization surrounding the orbital apex is greater than patients aged 4-7 (26.2% vs 18.3%,  $p = 0.0006$ ), while pneumatization surrounding the ON is greater than patients aged 2-4 (22.4% vs 6.33%,  $p = 0.011$ ). Sinus volume, lamina papyracea area, and drilling distances are described. **Conclusions:** Pediatric sinonasal anatomical relationships are significantly different in pediatric populations, although sinus pneumatization surrounding the orbital apex approaches adult patterns by age seven. Thorough knowledge of critical structure relationships is invaluable for safe dissection.



**180. Endoscopic Management of Posterior Graft Migration after One and a Half Stage Laryngotracheal Reconstruction**

Gillian R. Diercks, MD, Boston, MA; Christopher J. Hartnick, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the prevalence of graft migration after laryngotracheal reconstruction and management options, including the benefits of endoscopic over more traditional open techniques.

**Objectives:** Posterior cartilage graft prolapse and migration are known complications of laryngotracheal reconstruction with posterior cricoid split and costal cartilage grafting. Graft displacement can result in airway obstruction, failure to decannulate, and a need for revision open surgical procedures. The objective of this report is to describe a case in which posterior costal cartilage graft migration and prolapse after posterior cricoid split were managed endoscopically. **Study Design:** Case report and literature review. **Methods:** A 5 year old girl with an anterior glottic web and grade 3 subglottic stenosis underwent a one and a half stage laryngotracheal reconstruction with anterior and posterior cricoid splits and costal cartilage grafts. One week after surgery she was noted to have posterior graft migration and prolapse; seven days later further prolapse resulted in near complete airway obstruction. This was managed endoscopically using a carbon dioxide laser to debulk the prolapsed graft. **Results:** On one week followup the remainder of the posterior graft remained viable. On two month followup the patient had successful restoration of the airway and was decannulated. **Conclusions:** This is the first case report in the literature of endoscopic management of posterior graft migration and prolapse after laryngotracheal reconstruction. This technique restored airway patency in a minimally invasive fashion, obviating the need for open revision surgery.

**181. Transoral Endoscopic Cricopharyngeal Myotomy for Congenital Cricopharyngeal Achalasia**

John J. Faria, MD, Buffalo, NY; Mark L. Nagy, MD, Williamsville, NY (Presenter); Brandon C. Kuehlewind, BS, Buffalo, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the various treatment options for congenital cricopharyngeal achalasia and to understand the role of carbon dioxide laser assisted cricopharyngeal myotomy.

**Objectives:** To report a carbon dioxide laser assisted transoral endoscopic cricopharyngeal myotomy to treat congenital cricopharyngeal achalasia in an infant. **Study Design:** Case report. **Methods:** Review of medical record. **Results:** An infant was diagnosed with congenital cricopharyngeal achalasia soon after birth and fed via gastrostomy tube until 9 months of age. He underwent transoral endoscopic cricopharyngeal myotomy with carbon dioxide laser. There were no complications from surgery. His diet was advanced on the third postoperative day and the dysphagia improved noticeably. Shortly after surgery, the gastrostomy tube was removed and he thrived with oral feeding. **Conclusions:** Carbon dioxide laser can be used safely in infants to perform transoral endoscopic cricopharyngeal myotomy. This minimally invasive technique avoids an open surgical approach in a young child.

**182. Volumetric Analysis of Nasal Cavity in Pediatric Patients with Unilateral and Bilateral Cleft Lip and Palate**

Zainab Farzal, BS, Chapel Hill, NC; Jonathan Walsh, MD, Chapel Hill, NC; Carlton J. Zdanski, MD FACS, Chapel Hill, NC; Luiz A. Pimenta, DDS MS PhD, Chapel Hill, NC; Julia S. Kimbell, PhD, Chapel Hill, NC; Amelia F. Drake, MD FACS, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate understanding of the changes in nasal volume and side:side volume ratios in patients with unilateral and bilateral CLP when compared to controls.

**Objectives:** Pediatric patients with cleft lip and palate (CLP) often suffer from nasal obstruction which may be related to effects on nasal volume. The objective of this study is to compare nasal volume and side:side volume ratios in patients with unilateral and bilateral CLP with age matched controls. **Study Design:** Retrospective case control study with three dimensional nasal airway reconstructions. **Methods:** We analyzed 20 pediatric subjects (age range: 7-12 years; 14 males, 6 females) with unilateral or bilateral CLP from a regional craniofacial center who underwent cone beam CT (CBCT) prior to alveolar grafting. Age matched controls (5 males, 5 females) undergoing standard CT imaging were also analyzed. Mimics™ software (Materialise, Inc.) was used to create 3 dimensional reconstructions of the main nasal cavity and compute total and side specific nasal volumes. Subjects imaged during active cycling phases were excluded. **Results:** There

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was no statistically significant difference in affected:unaffected side volume ratios in unilateral CLP ( $p=0.28$ ) or left:right ratios in bilateral CLP ( $p=0.76$ ) when compared to left:right ratios in controls. Mean overall nasal volumes ( $\text{mm}^3$ ) were  $9932\pm 1807$ ,  $6954\pm 2577$ , and  $6626\pm 2135$  for control, unilateral, and bilateral CLP patients, respectively, with statistically significant decreases in volume for both unilateral and bilateral cleft subjects from controls ( $p<0.001$ ). **Conclusions:** This is the first study to analyze nasal volumes in patients with bilateral CLP. Overall nasal volume is compromised in unilateral and bilateral CLP patients by approximately 30%. Additionally, our finding of no major difference in side:side ratios in unilateral and bilateral CLP compared to controls conflicts with preexisting literature suggesting that further study is needed.

## 183. Decisional Conflict in Parents Considering Bone Anchored Hearing Device in Children with Unilateral Aural Atresia

M. Elise R. Graham, MD, Halifax, NS Canada; Rebecca A. Haworth, BSc, Halifax, NS Canada; Jill Chorney, PhD, Halifax, NS Canada; Manohar Bance, MD MSc ChB FRCS(C), Halifax, NS Canada; Paul Hong, MD FRCS(C), Halifax, NS Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an awareness of decisional conflict in parents considering elective surgery with equivocal outcomes and discuss possible tools to facilitate the decision making process.

**Objectives:** The benefits of bone anchored hearing devices (BAHD) in children with unilateral aural atresia are controversial. We sought to determine whether there is parental decisional conflict surrounding elective placement of BAHD for this indication. **Study Design:** Prospective cohort study. **Methods:** Caregivers of pediatric patients with unilateral aural atresia and normal contralateral ear undergoing BAHD consultation were prospectively enrolled. All consultations were carried out by one pediatric otolaryngologist in a consistent manner. Afterwards, the participants completed a demographic form and the Decisional Conflict Scale (DCS). **Results:** Our preliminary results included 23 caregivers; 17 mothers and 6 fathers of 15 male (65.2%) and 8 female (34.8%) children (mean age 5.65 years). The median DCS score was 15.63 (SE = 4.21). Significant decisional conflict (score  $>25$ ) was found in 10 participants (43.5%). The median DCS score in the group choosing surgery was 5.47, and 28.13 in those who did not choose surgery (Mann Whitney U = 34.5, Z = -1.45,  $p = 0.147$ ). The median DCS score for mothers was 25 and for fathers the median score was 3.91. **Conclusions:** Many parents experienced significant decisional conflict when considering BAHD in children with unilateral aural atresia in our study population. Future research should explore the impact of significant decisional conflict on health outcomes.

## 184. Results of Mission Based Tympanoplasty in Children

Glenn C. Isaacson, MD, Philadelphia, PA; Abebe Melaku, MD PhD, Addis Ababa, Ethiopia

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the effects of the surgical mission on results of tympanoplasty in children.

**Objectives:** Some have questioned the safety and quality of care provided by mission based surgical teams. Fatigue from travel, unfamiliar setting, and language barriers may degrade surgical performance and continuity of care is hard to maintain. Disease is often chronic and advanced. Few published studies compare the safety of mission based surgery with established norms and almost none systematically analyzes results. We critically review the results of our pediatric tympanoplasty program in Africa. **Study Design:** Prospective observational study in a collaborative university setting. **Methods:** We accrued patient data including medical condition, pre and postoperative hearing, and graft success in a computerized Excel database for children undergoing tympanoplasty with or without mastoidectomy during 6 consecutive surgical missions to the same site over a 3 year period. Graft success and change in pure tone average (PTA) were compared with US and European standards. The effect of HIV status and surgeon experience was independently assessed. **Results:** There were no major medical complications or deaths in this series. Of 44 evaluable ears, 27 had complete pre and postoperative audiometric data. 24/44 surgeries resulted in an intact tympanic membrane. 12/44 markedly reduced the perforation size. 7/44 grafts failed. The mean improvement in PTA was 14dB (range 0-30dB). Mean postoperative PTA was 35dB. HIV+ patients had a higher rate of graft failure (3/4). Surgeon training and years of experience did not predict outcome. **Conclusions:** Mission based tympanoplasty results in lower rates of graft success and less hearing improvement than anticipated. Tympanoplasty is an option for hearing rehabilitation where hearing aids are not available.

- 185. Laryngeal Electromyography Findings in Patients with Vocal Fold Motion Asymmetry**  
Tova F. Isseroff, MD, New York, NY; Arjun K. Parasher, MD, New York, NY; Amanda L. Richards, MBBS FRACS, Australia; Mark A. Sivak, MD, New York, NY; Peak Woo, MD, New York, NY

**Educational Objective:** At the conclusion of this participation, the participants should be able to identify laryngeal EMG findings associated with vocal fold paresis.

**Objectives:** Vocal fold motion asymmetry is often attributed to vocal fold paresis or an anatomical variant. While laryngeal electromyography (LEMG) may be used to evaluate patients with vocal fold paresis, electrodiagnostic findings in these patients have not been well defined. **Study Design:** Retrospective case series. **Methods:** Twenty-five symptomatic patients with vocal fold motion asymmetry suspected to have vocal fold paresis on clinical examination were examined by laryngeal electromyography. The LEMG findings were correlated to the site and side of suspected paresis based on clinical examination alone. **Results:** Although all were thought to have unilateral recurrent laryngeal nerve paresis, LEMG showed only 19 to have unilateral recurrent nerve paresis. There were 4 with vagal paresis, 4 with bilateral paresis, and two were normal. Reduced total number of units, reduced recruitment, abnormal motor unit firing patterns, and polyphasic units were correlated to LEMG diagnosis of paresis (mn=64%) while fibrillation potentials, fasciculation, positive sharp waves and complex repetitive discharges were not (mn=6%). The LEMG findings most often indicated chronic static neuropathic dysfunction. **Conclusions:** Patients with vocal fold motion asymmetry have a high incidence of vocal fold paresis that can be better defined by LEMG. The site and side of paresis is often wrong based on clinical findings alone. The LEMG findings of paresis appear to be consistent with old healed neuropathy rather than acute injury.

- 186. Short Term Outcomes after Open and Endoscopic Repair of Esophageal Diverticulum**  
Joseph A. Ivey III, BA, Charleston, SC; Brendan P. O'Connell, MD, Charleston, SC; Marion B. Gillespie, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss open and endoscopic approaches as viable options for repair of pharyngoesophageal diverticulum in light of the data presented on short term postoperative outcomes.

**Objectives:** Compare short term postoperative outcomes between open and endoscopic repair of pharyngoesophageal diverticula using a national database. **Study Design:** Retrospective review of national database. **Methods:** Patients who had undergone either an open or endoscopic repair of a pharyngoesophageal diverticulum between 2005 and 2012 were identified in the ACS NSQIP (American College of Surgeons National Surgical Quality Improvement Program) database. Patients with a diagnosis of esophageal diverticulum (ICD9 code 530.6) were identified. Those undergoing diverticulectomy of the hypopharynx or esophagus, with or without myotomy, cervical approach (CPT 43130) or cricopharyngeal myotomy (CPT 43030) were included for analysis. Intraoperative variables and postoperative outcomes were analyzed and compared between groups. **Results:** 347 patients met inclusion criteria; 79 underwent endoscopic repair and 268 underwent open repair. Open and endoscopic approaches did not differ in regards to operative time (90.5 vs. 82.6 minutes,  $p=0.90$ ). Postoperative wound infections were observed in 1.3% of endoscopic cases and 2.6% of open cases ( $p=0.69$ ). Specifically, the rate of superficial incisional, deep incisional, and organ/space infections did not differ between approaches ( $p=1.00$ ,  $p=0.54$ , and  $p=1.00$  respectively). The overall rate of return to the operating room within thirty days of surgery was 3.8% for endoscopic cases and 6.0% of open cases ( $p=0.13$ ). No difference in the length of postoperative hospital stay was observed between groups ( $p=0.46$ ). **Conclusions:** The data demonstrates low rates of adverse outcomes after both endoscopic and open repair of pharyngoesophageal diverticula. The type of approach did not impact the outcome measures assessed, confirming that both are viable options for repair of diverticula.

- 187. Treatment of Chronic Cough: Retrospective Review at a Tertiary Care Center**  
Nausheen Jamal, MD, Philadelphia, PA; Resha S. Soni, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare various treatment strategies employed in the treatment of chronic cough as well as discuss a practical treatment algorithm.

**Objectives:** Chronic cough, with notably high rates of psychosocial burden, is treated using various strategies without a standardized algorithm. We describe the treatment paradigm employed for patients presenting with chronic cough at a tertiary care institution. We assess response rates with a standard regimen and conduct a review of the current literature regarding management. **Study Design:** A retrospective observational study of patients treated for chronic cough over a one year period. **Methods:** A chart review was conducted to identify patients treated for a primary complaint of chronic

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cough within the study period. Patient treatment responses were recorded. The relevant literature was reviewed to help identify a standardized treatment algorithm. **Results:** 19 patients were treated for chronic cough within the study period. 10 (52%) had a satisfactory response with management of acid reflux. 3 patients (15%) had a partial but inadequate response to reflux management alone; 2 were tried on neuromodulator therapy. 4 patients (21%) had no response to reflux management; 3 went on to try neuromodulator therapy. Of the 5 patients on neuromodulator therapy, 1 exhibited a complete response, 2 a partial response, and 1 was lost to followup. **Conclusions:** Chronic cough is a challenging condition facing otolaryngologists. Reflux management remains a mainstay of treatment, as does moderating pulmonary and sinus disease. A minority of patients require neuromodulator therapy, which is helpful in a subset of refractory patients. A treatment algorithm is presented based on these findings and a review of the literature.

## 188. Socioeconomic Barriers to Speech Therapy

Aaron J. Jaworek, MD, Philadelphia, PA; Lauren N. Lindigrin, MS CF-SLP, Philadelphia, PA; Amanda C. Hu, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the socioeconomic barriers preventing patients from obtaining speech therapy (SLP) for voice/swallowing disorders.

**Objectives:** To identify the socioeconomic barriers preventing patients from obtaining speech therapy (SLP) for voice/swallowing disorders. **Study Design:** Retrospective chart review. **Methods:** Adult patients evaluated for voice/swallowing complaints from March 2013 to May 2014 and referred to SLP were included in this study. Patient demographics, Voice Handicap Index-10 (VHI-10), employment status, occupation, median household income from zip code, health insurance coverage, travel distance to SLP, and SLP attendance were recorded. Outcome measures were pursuit of SLP (defined as attending an initial evaluation) and compliance with SLP (defined as  $\geq 2$  visits). **Results:** Two hundred and thirty patients (32.6% male, mean age  $47.1 \pm 17.7$  years) were eligible for the study. Demographics included: Caucasian 57%, English speaking 90%, employed 53%, professional voice users 37%, private insurance coverage 70%, median household income  $\$55,689.45 \pm 27,651.65$  and mean VHI-10  $18.3 \pm 11.2$ . Forty-six percent pursued SLP and 36.5% were compliant. Of the patients who pursued SLP, 79% were compliant. The patients less likely to pursue and comply with SLP were: older aged ( $p=0.006$ ;  $p=0.005$ ), non-professional voice users ( $p=0.003$ ;  $p=0.003$ ), non-Caucasian (compliance only,  $p=0.0001$ ), non-English speaking ( $p=0.0007$ ;  $p=0.01$ ), unemployed ( $p=0.005$ ;  $p=0.01$ ), lower median household income ( $p=0.0002$ ;  $p=0.0001$ ), and lack of private insurance ( $p=0.0005$ ;  $p=0.0009$ ). Gender, travel distance to SLP, and VHI-10 were not significant. **Conclusions:** Multiple socioeconomic factors have been identified which influence a patient's ability to follow through with speech therapy. Recognizing these barriers is the first step towards finding solutions that will improve patient compliance and functional outcomes.

## 189. Diversity in Genetic Workup of Nonsyndromic Pediatric SNHL

Christen J. Lennon, MD, Nashville, TN; Robert F. Labadie, MD PhD FACS, Nashville, TN; Tracy L. McGregor, MD MSCI, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better comprehend the process of genetic testing in children with sensorineural hearing loss. Participants will understand the screening process involved in this workup, including variation in testing. The range of tests presented will include EKG evaluating for Jervell and Lange-Neilsen, ophthalmology exam evaluating for Usher, TSH evaluating for Pendred, renal ultrasound evaluating for brachio-oto-renal, and genetic testing either for specific entities (e.g., connexin) or panels. We will present our findings of variability of each geneticist's unique algorithm.

**Objectives:** For children who present with profound SNHL, etiologic evaluation can vary from minimal--detailed family history with history and physical--to comprehensive, including EKG, ophthalmology exam, thyroid studies, renal ultrasound, and genetic testing either for common genes (e.g. GJB2) or multigene panels. Our objective is to study variability in the workup of pediatric SNHL by geneticists. **Study Design:** Survey. **Methods:** A survey of five clinical geneticists who workup pediatric SNHL was performed at a tertiary care center. **Results:** All five geneticists worked up pediatric nonsyndromic SNHL differently. All recommended genetic testing with four starting with testing for connexin 26/32 or Pendred. Two of these reflexed to the multigene panel if initial testing was negative, while the other two rarely if ever sent the panel. The fifth geneticist initially sent a multigene panel. All recommended an EKG, ophthalmology exams were recommended by four in the context of family history, and the fifth recommend exams when indicated by results or negative genetic testing. Thyroid studies were recommended by one at presentation and a second geneticist recommended screening thyroid levels in the teenage years. Renal ultrasound was routinely recommended by one geneticist with another recommending such only if genetic screening was negative. **Conclusions:** Even at a single institution great variability exists in the work-

up of apparent nonsyndromic pediatric SNHL. Evidence informed approaches may provide a more clinically consistent and economical workup.

**190. Using External Distraction Devices for Mandibular Distraction Eliminates the Need for Preoperative Computed Tomography in Infants with Isolated Pierre Robin Sequence**

Katie M. Mingo, BS, Minneapolis, MN; Andrew R. Scott, MD, Boston, MA; Robert J. Tibesar, MD, Minneapolis, MN; Timothy A. Lander, MD, Minneapolis, MN; Daniel E. Sampson, DDS MD, Minneapolis, MN; James D. Sidman, MD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss the reasons for obtaining preoperative CT prior to mandibular distraction; 2) compare the outcomes of Pierre Robin syndrome patients who underwent mandibular distraction with preoperative imaging against those without imaging; and 3) discuss the pros and cons of external distraction devices.

**Objectives:** To determine whether use of preoperative computed tomography (CT) affects airway, feeding, and aesthetic outcomes following mandibular distraction osteogenesis (MDO) with externally applied distraction devices in infants with isolated Pierre Robin sequence (PRS). **Study Design:** Case series and chart review at two tertiary children's hospitals.

**Methods:** Infants who underwent mandibular distraction between 1998 and 2014 were identified from billing databases using procedure codes. Inclusion criteria were isolated Pierre Robin syndrome, age less than nine months at time of distraction, lack of preoperative imaging, and use of external distraction devices. Patients with Stickler syndrome were included in the isolated PRS group. **Results:** Fifty-three patients with isolated PRS underwent MDO; 42 patients did not receive preoperative imaging. Mean age at MDO was 35 days (6 days - 7 months). Followup ranged from 5 days to 8 years. All 42 patients successfully avoided tracheostomy or achieved decannulation. Two patients (4.8%) required postoperative gastrostomy tube placement. Two patients (4.8%) had minor intraoperative complications that might have been anticipated with preoperative CT. Two patients (4.8%) demonstrated malocclusion at the end of the distraction phase; asymmetry occurred in one patient (2.4%). **Conclusions:** This series suggests that lack of preoperative CT prior to MDO does not compromise functional and aesthetic outcomes when using externally applied devices in infants with isolated PRS or Stickler syndrome. This has implications for cost containment and patient safety through reduction of radiation exposure.

**191. The Branchial Cleft Fistula: Use of a Fistulogram and Guidewire to Facilitate Complete Removal. A Review of 5 Cases**

Mark L. Nagy, MD, Buffalo, NY; Dean V. Yacobucci, MD, Buffalo, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the use of a preoperative fistulogram and intraoperative guidewire placement for removal of a branchial cleft fistula compared to more traditional techniques.

**Objectives:** Branchial cleft anomalies occurring in the pediatric population can present a challenge. With the presentation of a pit along the anterior border of the sternocleidomastoid muscle, it is not possible on physical examination alone to determine the extent of the tract. This paper will look at the use of a preoperative fistulogram to determine the extent of the tract and the utility of intraoperative guidewire placement through the fistula tract to assist in complete removal, even through a single small incision. **Study Design:** Retrospective chart review. **Methods:** Review of medical records. **Results:** This paper will review 5 pediatric patients, ranging in age from 15 months to 12 years, who presented with a fistula opening at the anterior border of the sternocleidomastoid muscle. The patients had a preoperative fistulogram, and in all 5 cases, dye was noted to tract from the cutaneous opening in the neck to the oropharynx in the tonsillar area. At the time of surgery, a guidewire was placed with fluoroscopic assistance. In 4 of the 5 cases, the wire traveled from the opening in the neck all the way into the oral cavity. In 1 case the wire stopped at the pharynx, just short of the oropharynx. **Conclusions:** In children with a draining opening along the sternocleidomastoid muscle, a preoperative fistulogram has been found to better determine the extent of the tract. Additionally, in the cases of a complete fistula, preoperative placement of a guidewire through the fistula helps to facilitate complete removal with the smallest incision possible.

**192. Paclitaxel Blocks Posterior Cricoarytenoid Reinnervation in a Canine Model**

Andrea M. Park, MD, St. Louis, MO; Randal C. Paniello, MD PhD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the possible use of paclitaxel to improve adductor functional recovery in patients with acute unilateral vocal fold paralysis, by injecting it into the posterior cricoarytenoid muscle.

# Posters

**Objectives:** Vincristine has been shown to increase laryngeal adductor strength in recovery when injected into the canine posterior cricoarytenoid (PCA) muscle shortly after recurrent laryngeal nerve (RLN) injury. Paclitaxel has a similar mechanism of action and a wider safety profile, and it blocked reinnervation in a rat posterior tibial nerve injury model. In this study, the canine vincristine experiment was repeated in a canine RLN injury model using paclitaxel as the blocking agent.

**Study Design:** Animal experiment. **Methods:** Laryngeal adductor function was measured at baseline and at 6 months following complete RLN transection/reanastomosis injuries. The PCA was injected with paclitaxel at the time of RLN injury (T0, n=8) or three months later (T3, n=8). The functional results were compared with similar vincristine experiments and with non-injected controls. **Results:** For the T0 group, the mean laryngeal adductor pressure (LAP) 74.2% of baseline, significantly higher than controls ( $p = 0.049$ ) and similar to the T0 vincristine group (NS). For the T3 group, the mean LAP was 83.1%, higher than controls ( $p=0.003$ ) and similar to vincristine (NS). Plasma levels showed 26.3% of the injected paclitaxel entered the systemic circulation, and it was cleared within 48 hours. **Conclusions:** Intramuscular paclitaxel has similar efficacy to vincristine in blocking PCA reinnervation following RLN injury, resulting in increased laryngeal adductor function. Paclitaxel may offer a safer alternative for blockade of laryngeal abductor reinnervation, resulting in improved recovery of adductor function in patients with unilateral vocal fold paralysis.

## 193. Petromastoid Pneumatization - Utilizing a Novel Method for Volumetric Assessment

Shazia Peer, MBBCh, Toronto, ON Canada; Adrian Lewis James, MA DM FRCS, Toronto, ON Canada; Nikolaus Ernst Wolter, MD MSc, Toronto, ON Canada; Jonathan Yip, MD, Toronto, ON Canada; Sharon L. Cushing, MD MSc FRCSC, Toronto, ON Canada; Blake Croll Papsin, MD MSc FRCSC, Toronto, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand a new method of measuring the volume and surface area of petromastoid pneumatization; 2) discuss the relevance of mastoid pneumatization within the context of middle ear disease and its contribution to prognosis in cholesteatoma; and 3) describe the appropriate methodology for evaluation of the reliability of clinical tests.

**Objectives:** To accurately quantify petromastoid pneumatization in the normal pediatric population and in children who have been diagnosed with cholesteatoma with the aim of improving understanding of its clinical relevance to the development of cholesteatoma. **Study Design:** Comparative study of petromastoid pneumatization surface area and volume between children with and without cholesteatoma. **Methods:** A semi-automated process was developed to extract measurements of bone volume, pneumatization volume, and pneumatization surface area from CT scans of petrous bones, using Analyze 11.0 software. This process was applied to forty high resolution scans of children, 20 with surgically confirmed cholesteatoma and 20 controls with no ear disease. Inter-rater reliability of measures was calculated using intraclass correlation coefficients (ICCs). Demographic and measurement data were then compared between the two study groups using appropriate Mann-Whitney U and t-tests. **Results:** The mean age at CT scan was 9.5 (SD 4.3) years, with no difference in age between the cholesteatoma and control groups ( $p = 0.39$ ). Pneumatization volume ( $p < 0.0001$ ) and surface area ( $p = 0.03$ ) were statistically lower among patients with cholesteatoma than controls. In general, ICCs indicated agreement and reliability of measurements to be almost perfect ( $>0.8$ ). **Conclusions:** Mastoid bone volume, pneumatization and surface area can be measured objectively and reliably with this semi-automated process, confirming less rigorous observations that poor pneumatization of the mastoid is associated with development of cholesteatoma. Further study may enhance patient care by prognosticating for the risk of recurrent cholesteatoma and the risk of developing subsequent contralateral disease.

## 194. Palatopharyngoplasty with Bilateral Buccal Mucosal Graft Repair to Alleviate Oropharyngeal Stenosis

Jared J. Tompkins, MD, Memphis, TN; Cory A. Vaughn, MD, Little Rock, AR; Faisal A. Shaikh, MD, New York, NY; Rose M. Stocks, MD PharmD, Memphis, TN; Jerome W. Thompson, MD MBA, Memphis, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand a potential severe complication of tonsillectomy procedures and have a useful technique in their armamentarium for treating this condition.

**Objectives:** Oropharyngeal stenosis is a rare, but known complication that may result from tonsillectomy procedure causing cicatricial scar formation between the soft palate, lateral pharyngeal walls, and base of tongue. A 15 year old female patient presented to our otolaryngology clinic with refractory dyspnea, mild obstructive sleep apnea, and dysphagia to solid food. Her medical history was significant for recurrent strep pharyngitis and the tonsillectomy she underwent 3 years prior to presentation. On examination, there was noted to be a severe cicatricial oropharyngeal scar involving the soft

palate, anterior tonsillar pillars, and base of tongue. This cicatricial palatopharyngeal scar band resulted in a 1-cm<sup>2</sup> airway. **Study Design:** Case report. **Methods:** Surgical Technique: The palatopharyngeal scar bands were released bilaterally, using Bovie electrocautery. Harvesting bilateral buccal mucosal grafts and securing them using interrupted circumferential Vicryl sutures repaired the resultant oropharyngeal defects. The buccal mucosa donor sites were addressed using chromic suture to reduce the wound distance roughly in half by tacking the remaining mucosal edge to the underlying muscle. **Results:** The patient is now 1 year postoperative intervention for severe oropharyngeal stenosis. She no longer complains of difficulty breathing or dysphagia. Her oropharynx has healed well, with no complications. **Conclusions:** Lysis of scar with immediate reconstruction represents a viable option in treating severe oropharyngeal scar bands that may result from tonsillectomy misadventures. Buccal mucosa grafting represents a useful tool in the otolaryngologist's armamentarium for the closure of oropharyngeal defects.

## **Otology/Neurotology**

- 195. Interobserver Agreement for Computed Tomography Diagnosis of Sigmoid Sinus Wall Anomaly**  
Kristen V.H. Angster, MD, Baltimore, MD; Robert Morales, MD, Baltimore, MD; Prashant Raghavan, MD, Baltimore, MD; David J. Eisenman, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should demonstrate the ability to critically evaluate studies which report interobserver agreement, define and identify sigmoid sinus wall anomalies and discuss their clinical importance.

**Objectives:** To assess interobserver agreement in diagnosis of sigmoid sinus wall anomalies on computed tomography in patients treated for pulse synchronous tinnitus. **Study Design:** Preoperative CT scans from 40 subjects with sinus wall anomalies (SWA) who underwent sinus wall reconstruction for pulsatile tinnitus were retrospectively evaluated by 2 independent neuroradiologists blinded to the clinical diagnosis and outcome. A predetermined set of criteria were used to determine the presence and type of sinus wall anomaly. The radiographic diagnoses were then compared to the prospective clinical findings of the treating neurotologist and operative outcomes for each patient. **Methods:** Correlation coefficients were calculated to determine interobserver agreement. **Results:** The agreement between the two radiologists was 86% with a Cohen's kappa of 0.225, which is considered fair agreement. The Fleiss kappa between the 3 reviewers was 0.218, which is also considered fair agreement. There was a 78% agreement between the reviewers on initial diagnosis. For 43% (3 of 7) of subjects upon which one of the neuroradiologists initially disagreed, a consensus diagnosis was obtained which agreed with the neurotologist's clinical diagnosis. **Conclusions:** Identification of sinus wall anomalies using objective radiographic criteria is reproducible with fair interobserver agreement. However, even when all three expert reviewers agreed upon the radiographic findings this was not sufficient to predict surgical outcome. For 2 out of 4 surgical non-responders, there was complete agreement on the presence of abnormal radiographic findings, and for the other 2 at least one of the neuroradiologists agreed with the clinical neurotologic diagnosis.

- 196. Petrous Internal Carotid Aneurysm Masquerading as Pulsatile Tinnitus**  
Samaneh Ashktorab, MD, Washington, DC; Michael Hoa, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to distinguish a differential for pulsatile tinnitus. In addition to learn about this unusual cause for pulsatile tinnitus.

**Objectives:** Carotid artery dissection occurs most commonly in the middle aged with an incidence of 0.003% 1. More than 70% of patients present with a TIA (transient ischemic attack) 1, 2. Other manifestations include ischemic stroke, headache, neck pain, Horner syndrome, cranial nerve palsy and pulsatile tinnitus. **Study Design:** N/A **Methods:** N/A **Results:** We describe a case of a 32 year old female with a left petrous internal carotid artery dissection who presented with left sided pulsatile tinnitus for four months as her sole symptom. **Conclusions:** We describe the patient's physical exam findings, review typical clinical presentation in the literature and describe treatment of this condition.

- 197. Basal Cell Carcinoma of the External Auditory Canal and Temporal Bone**  
Joseph T. Breen, MD, Houston, TX; Paul W. Gidley, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the important clinical features and outcomes of a cohort of patients who underwent treatment for basal cell carcinoma of the external auditory canal and temporal bone.

# Posters

**Objectives:** To review the presenting features, treatment courses, and clinical outcomes for patients with basal cell carcinoma (BCC) involving the external auditory canal (EAC) and temporal bone. **Study Design:** Retrospective case series. **Methods:** All cases of BCC involving the EAC or temporal bone treated at a single institution were reviewed. Included patients all underwent surgical resection, with selected patients receiving neoadjuvant or adjuvant radiation therapy, chemotherapy, or concurrent chemoradiation therapy. Primary outcome measures were rates of overall, disease specific, and disease free survival at 5 years. **Results:** Forty-two patients met inclusion criteria (mean age 67), with a mean followup time of 3.2 years. Five year overall, disease specific, and disease free survival were 84%, 100%, and 77%, respectively. The most common presenting symptoms were hearing loss (15 patients, 36%) and otorrhea (11, 26%). Seven (17%) patients had preoperative facial weakness - five of these were after previous surgery or nerve sacrifice. Ten patients (24%) underwent partial or total facial nerve sacrifice with their initial surgery at our institution. Three (7%) developed regional nodal disease. Lateral temporal bone resection was required in 30 (71%) patients for disease clearance. Twenty-four (57%) patients underwent radiation therapy. Amongst those who received adjuvant radiation after surgery for EAC or temporal bone involvement, there was a trend towards better disease free survival ( $p=0.06$ ). **Conclusions:** Basal cell carcinoma originating from the external ear or extending to the temporal bone can exhibit a wide range of behavior, ranging from superficial lesions readily managed with surgery to extensive locally invasive tumors with a propensity for recurrence requiring multimodality therapy.

## 198. Long Term Outcomes of Surgical Management of Patulous Eustachian Tube Dysfunction

Wei-Chieh Chao, MD, Boston, MA; Tali Rasooly, BA, Boston, MA; Peter Forbes, PhD, Boston, MA; Dennis Poe, MD PhD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare different surgical management of patulous eustachian tube dysfunction and demonstrate the long term outcomes.

**Objectives:** To examine the long term effectiveness of three surgical procedures for patulous eustachian tube (pET), in order to determine the duration of symptom relief. **Study Design:** Prospective study of 23 patients operated for pET in a tertiary medical center between 2006-2013. **Methods:** Patients with medically intractable pET underwent one of following transnasal endoscopic procedures; 1) shim (catheter) insertion (SI) into the full length of the eustachian tube (ET); 2) Radiesse injection (RI) for augmentation of the cartilaginous ET; or 3) patulous ET reconstruction with graft (PETR). The primary outcome measure was the reported level of autophony present after surgery. Patients were asked to rate their current patulous symptoms, (level of autophony). Patients who reported treatment failure were asked for the duration of symptom relief following surgery. Analysis was done with a Kaplan-Meier survival curve for duration of symptom relief. **Results:** Out of 81 cases operated, 58 were eligible for the study and 23 patients (29 ETs) participated in the study. Mean followup was  $3.1 \pm 2.4$  years. The procedures included 18 SI, 7 RI, and 4 PETR. The postoperative overall survival rate at two years was 76.2% for all cases. The two year survival rates were 70% for SI cases, 86% for RI cases, and 100% for ETR cases, but the differences were not statistically significant. ( $P=.663$ ). Eleven cases reported having ventilation tubes (8 SI and 3 RI). **Conclusions:** Three procedures, SI, RI, PETR demonstrated long term improvement of pET and longer term studies with larger cohorts are indicated.

## 199. Effect of Cochlear Implant Ground Electrode Position on Intraoperative Telemetry and Facial Nerve Stimulation

Maura K. Cosetti, MD, Shreveport, LA; David R. Friedmann, MD, New York, NY; William H. Shapiro, AuD, New York, NY; Susan B. Waltzman, PhD, New York, NY; J. Thomas Roland Jr., MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to assess the effect of ground electrode position on intraoperative neural response telemetry (tNRT) and threshold for facial nerve stimulation during cochlear implantation.

**Objectives:** In current cochlear implant device design, the ground electrode provides a return pathway for stimulation current when coupled with an intracochlear electrode measuring neural response telemetry. The objective of this study was to assess the effect of ground electrode position on intraoperative NRT and threshold for facial nerve stimulation during cochlear implantation. These findings may allow for modification of the ground electrode in future cochlear implant device design. **Study Design:** Prospective case series in a tertiary referral center. **Methods:** Adults ( $N=16$ ) over 18 years of age with normal cochlear anatomy who received a CI512 device with full insertion of electrode array were included. Following electrode insertion, tNRT and presence of facial nerve stimulation were recorded with the ground electrode in the standard location (under the temporalis muscle) and in three alternate locations within the surgical field. **Results:** No correlation existed between tNRT responses or threshold for facial nerve stimulation and position of the ground electrode ( $p > 0.05$ ).



Telemetry data from 3 alternative locations did not differ significantly from data obtained in the standard position. **Conclusions:** Intraoperative telemetry is a well established and valued aspect of contemporary cochlear implantation, conveying information about device function, response of the auditory system to electrical stimulation and preliminary programming data. This study suggests that ground electrode position had no effect on intraoperative recording of tNRT or the threshold for facial nerve stimulation. This data may inform future cochlear implant device design, including alternate placement or elimination of the ground electrode.

## **I100. Surgical Workflow Considerations for Mastoidectomy Using a Bone Attached Robot**

Neal P. Dillon, BS, Nashville, TN; Ramya Balachandran, PhD, Nashville, TN; Robert J. Webster III, PhD, Nashville, TN; Thomas J. Withrow, PhD, Nashville, TN; George B. Wanna, MD, Nashville, TN; Robert F. Labadie, MD PhD, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand how a bone attached robot for mastoidectomy would fit in with the existing surgical workflow and discuss the benefits of robotic mastoidectomy compared to the current manual procedure.

**Objectives:** Evaluate the effectiveness of a bone attached robot for mastoidectomy within existing surgical workflow. **Study Design:** To date, use of autonomous robots in surgery has been limited due to concerns regarding the impact on existing workflow and limited improvement over standard of care, manual procedures. We have developed a compact, bone affixed robot capable of performing skull base approaches and have demonstrated its use for cortical mastoidectomy on cadavers. **Methods:** A four degrees of freedom robot (x, y, z, angular tilt) was constructed. Five temporal bone specimens were CT scanned after affixing bone attached fiducial markers to be used for both registration to the anatomy and attaching the robot. The volume of surgical dissection was delineated in CT space, and the robot was programmed to remove the tissue within those boundaries. Time of intervention as well as efficiency of tissue removal (segmented versus removed) was calculated. **Results:** Average time for setup, scanning, and intervention was 78.8 minutes. Postoperative CTs were examined by an expert surgeon and revealed no violation of critical anatomy. Efficiency of excavation exceeded 90%. Video of the intervention will be presented. **Conclusions:** Robotic mastoidectomy, while technically feasible, at present takes more time than typically achieved by a surgeon. However, an accurate robotic system can potentially reduce the risk of damage to critical structures and minimize the invasiveness of the procedure by allowing the surgeon to delineate only the volume that is required to be removed. Integration of a robot into operative workflow will depend upon both improved intervention time as well as demonstration of benefit over manual interventions.

## **I101. 3D-CT Analysis on the FMT Angle to RW/OW after VSB Surgery - Its Correlation to the Hearing Performances**

Katsumi Doi, MD PhD, Osaka-Sayama, Japan; Takamitsu Kobayashi, MD, Osaka-Sayama, Japan; Mitsuo Sato, MD, Osaka-Sayama, Japan; Kazuya Saito, MD, Osaka-Sayama, Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate that the hearing performance (BC-V threshold) after VSB surgery tended to be better as the FMT angle to RW became larger (more perpendicular to the surface of RWM) and suggest that the measurements of the FMT angle to RW/OW during VSB surgery should be promising and very useful procedure in future to predict much better hearing performances with VSB.

**Objectives:** In Japan, the clinical trial of VSB (Vibrant Soundbridge®, Med-El) implantation has just been ended, and the data concerning on the effectiveness and the safety of VSB surgery has now been under the judgement by PMDA of the Ministry of Health, Labor and welfare. The present study was designed to see whether to not 3D-CT analysis on the FMT angle to RW/OW should be useful to predict the hearing performances with VSB. **Study Design:** Retrospective analysis of 3D-CT images reconstructed from 2D-CT images after VSB surgery. **Methods:** After VSB implantation, thin sliced 2D-CT images (0.625 mm slice) with GE Discovery CT750 HD® (GE, USA) were collected and 3D-CT images were reconstructed by using Zio station® (Amin, Japan). The locations of round window (RW) and oval window (OW) were identified, and the angle of FMT to RW/OW (FMT angle) was measured. The correlation between FMT angle and BC-V (bone conduction vibrogram) threshold was finally evaluated. **Results:** The FMT angle was scattered from 36.9 degree to 71.5 degree. The BC-V threshold (averaged at 1-4 kHz) was scattered from 15 to 31.7 dB (n=8, RWV). The correlation between FMT angle and BC-V threshold did not reach to the significant level (P=0.15, Spearman rank correlation), however a weak negative correlation between them was suggested ( $y = -0.3035x + 39.047$ ,  $R^2 = 0.31464$ ). **Conclusions:** The hearing performance (BC-V threshold) after VSB surgery tended to be better as the FMT angle to RW became larger (more perpendicular to the surface of RWM). If the measurements of the FMT angle to RW/OW during VSB surgery could be possible in future, it might be able to contribute to the achievement of much better hearing performances with VSB.

# Posters

## 1102. Cochlear Implantation in Children with CHARGE Syndrome

Katsumi Doi, MD PhD, Osaka-Sayama, Japan; Takamitsu Kobayashi, MD, Osaka-Sayama, Japan; Mitsuo Sato, MD, Osaka-Sayama, Japan; Kazuya Saito, MD, Osaka-Sayama, Japan; Yumi Oota, MD, Suita, Osaka Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate that a connection to the outside world with CI can facilitate the habilitation programs and significantly improve their quality of life. Children diagnosed to have CHARGE syndrome should not be deprived of the possibility to receive an adequate auditory input, such as CI.

**Objectives:** The most common malformations in CHARGE syndrome at CT scans and on the surgical records were ossicular malformations, semicircular canal aplasia, cochlear hypoplasia, oval window/round window atresia, aberrant course of facial nerve, and IAC narrowing, and so on. In the present study, we evaluated the effectiveness and the safety of CI (cochlear implantation) surgery in children with CHARGE syndrome. Appropriate surgical approach was also discussed. **Study Design:** Retrospective analysis on clinical records of six children with CHARGE syndrome who received CI surgery in our institute. **Methods:** Between 2010 and 2014, six children diagnosed with CHARGE syndrome were submitted to CI surgery because of bilateral profound deafness. They were 4 girls and 2 boys. Age at the surgery ranged from 34 to 85 months and the mean age at the surgery was 48.2 months. In most cases the suprameatal approach was selected while the classical technique with mastoidectomy and posterior tympanotomy was carried out in one case. **Results:** Complete insertion of the electrode array was obtained in all cases. No perioperative and postoperative complication was noted. After the insertion, NRT was recorded and in two cases good responses were obtained at most electrodes. In other cases partial responses were obtained at some electrodes and in one case no NRT response was detected at the surgery. **Conclusions:** An accurate preoperative radiological assessment and adequate counseling with the parents are necessary in relation to the variable benefits from CI and the surgical risk. A connection to the outside world with CI can facilitate the habilitation programs and significantly improve their quality of life. Children diagnosed to have CHARGE syndrome should not be deprived of the possibility to receive an adequate auditory input, such as CI.

## 1103. Cochlear Implantation in Patients with Cochlear Facial Dehiscence

Christina H. Fang, BS, Newark, NJ; Leila J. Mady, MD PhD MPH, Pittsburgh, PA; Nicole Raia, ScD, Newark, NJ; Huey-Jen Lee, MD, Newark, NJ; Yu-Lan Mary Ying, MD, Newark, NJ; Robert W. Jyung, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the risks and outcomes of patients with cochlear facial dehiscence who undergo cochlear implantation.

**Objectives:** To describe patients with cochlear facial dehiscence (CFD) who develop facial nerve stimulation (FNS) after cochlear implantation (CI). **Study Design:** Case series. **Methods:** The medical charts and imaging of three patients with bilateral sensorineural hearing loss (SNHL) presented for CI evaluation were reviewed. **Results:** Patient 1 (P1) had a history of Meniere's disease. Patient 2 (P2) had a history of medulloblastoma treated with surgery and chemoradiation. Patient 3 (P3) had a history of progressive SNHL. Audiometry showed moderate to severe SNHL in P1, severe to profound SNHL in P2 and profound SNHL in P3. All had poor speech discrimination ability. Temporal bone CT coronal cuts were suspicious for bilateral dehiscence between the superior basal turn of the cochlea and labyrinthine segment of the facial nerve in P2 and P3, with maximum dehiscence lengths of 2.0 mm on the left in P2, and 1.8 mm on the right in P3. A thin bony partition was visualized bilaterally in P1. The left ear of P1, right ear of P2 and right ear of P3 were implanted. FNS occurred immediately upon activation in P1 and P2, which resolved by decreasing the dynamic range of the offending electrodes. No FNS was observed in P3. **Conclusions:** CFD can predispose patients to post-implant FNS. Prior temporal bone irradiation may carry a higher risk of FNS. We recommend scrutiny for CFD in CTs of CI candidates and appropriate risk counseling for FNS if CFD is discovered.

## 1104. Otologic Pathology and Barriers to Care in a Nepalese Refugee Population

Shannon C. Fraser, MD, Pittsburgh, PA; Yael Raz, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be familiar with common otologic pathology in Nepalese refugees and to discuss specific challenges and barriers to care facing refugee populations.

**Objectives:** To identify common otologic pathology and barriers to providing care in an urban Nepalese refugee population. **Study Design:** Retrospective chart review. **Methods:** We collected demographic, otologic and audiologic data

on Nepali refugees presenting to our otology clinic between October 2012 and April 2014. **Results:** A total of 51 Nepali patients were identified for inclusion. The most common otologic pathology identified was sensorineural hearing loss (28 of 51 patients). Additional common pathologies included conductive hearing loss, chronic otitis media/cholesteatoma and TM perforation. The degree of hearing loss among this group of patients tended to be quite severe. Measurement of pure tone averages revealed that over half of the patients had greater than 41dB hearing loss. The combination of hearing loss with a language barrier posed a significant challenge to evaluating this patient group especially with regard to audiologic testing. Nepali refugees were also noted to have a significantly higher no show rate when compared to the general otology clinic population (14.2% vs. 5.1%;  $p < 0.05$ ). **Conclusions:** Caring for the Nepalese refugee population in our city has posed unique challenges to healthcare providers. Failure of communication is a recurring barrier to properly caring for this population. Both a language barrier and severe hearing loss contributes to communication failures. The most common otologic pathologies in this population include hearing loss, TM perforation and chronic OM/cholesteatoma. Proper care of the Nepalese refugee population requires a third party interpreter and adjustments in standard protocols for ordering tests, imaging, followup appointments and surgical scheduling.

## **I105. Hearing Outcomes after Repair of Superior Semicircular Canal Dehiscence**

Sachin Gupta, MD, Dallas, TX; Brandon Isaacson, MD, Dallas, TX; Joe W. Kutz, MD, Dallas, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe vertigo and hearing outcomes after repair of superior semicircular canal dehiscence.

**Objectives:** To assess hearing outcomes after repair of superior semicircular canal dehiscence. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review was performed of patients who underwent repair of superior semicircular canal dehiscence at a tertiary academic center between January of 2010 and July of 2014. Vertigo control outcomes were assessed. Preoperative and postoperative audiometric results were compared. **Results:** Nineteen patients were identified for inclusion into the study. Seventeen patients (89%) underwent repair with a middle fossa craniotomy. Two patients (11%) underwent repair with a transmastoid approach. Eighteen (95%) underwent plugging of the superior semicircular canal with bone wax and resurfacing with bone cement. One patient (5%) had a near dehiscence that was solely resurfaced with bone cement. Two patients (11%) had a concurrent encephalocele, and 5 patients (26%) had defects in the tegmen mastoideum and/or tegmen tympani. The mean followup time was 9.6 months. Fourteen patients (74%) had relief of their vestibular and auditory symptoms. Five patients (26%) had recurrence of vestibular and/or auditory symptoms. At a mean time of 3.4 months postoperatively, there were minimal changes seen in bone pure tone average (+2 dB), air pure tone average (+0.9 dB), air bone gap (-1.1 dB), and speech discrimination score (-3.6%). One patient (5%) suffered sensorineural hearing loss. **Conclusions:** Repair of superior semicircular dehiscence appears to have minimal effects on hearing. Patients with superior semicircular canal dehiscence often have concurrent encephalocele or tegmen defects. Superior semicircular canal plugging is a safe technique with a low risk of postoperative sensorineural hearing loss.

## **I106. Outcomes in the Management of Middle Ear Myoclonus**

Zhen J. Huang, MD, Houston, TX; Jeffrey T. Vrabec, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss clinical presentations of middle ear myoclonus and to compare management outcomes, both surgical and medical, with the intent of defining an optimal treatment algorithm.

**Objectives:** This study intends to review clinical presentations of middle ear myoclonus, with emphasis on refining diagnostic criteria, as well as to compare management outcomes with the intent of defining an optimal treatment algorithm. **Study Design:** The study is a retrospective chart review of patients diagnosed with objective tinnitus as identified by ICD9 diagnoses of unspecified tinnitus (code 388.3) and focal myoclonus (code 333.2) spanning the period of January 2000 to April 2013. Those patients with objective tinnitus of other etiologies such as vascular anomalies, palatal myoclonus, etc. were excluded. **Methods:** Primary analysis was descriptive, conducted using Excel as well as standard SPSS software, providing detailed information on presentation, duration, in addition to the natural history of untreated symptoms and effectiveness of both pharmacological and surgical intervention. **Results:** A total of 60 patients met criteria for middle ear myoclonus. 45% of them had transient symptoms, and 55% had sustained symptoms with a mean duration of 12.8 months, described most commonly as a fluttering sound. Majority of symptoms were ameliorated with pharmacological treatment such as Trileptal. Six patients underwent surgical intervention of stapedia and tensor tympani tendon lysis (mean age = 58.5). On followup, only 2 postoperative patients had resolution of symptoms. **Conclusions:** Half of middle ear myoclonus cases spontaneously resolve, and the other half requires a combination of pharmacological and surgical

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therapies. However, surgical intervention has not proved to be as successful as suggested in the current literature, and more effective management modalities need to be elucidated.

- 1107. Semi-implantable Active Bone Conduction Devices in Adults: Clinical and Quality of Life Outcomes**  
Euna Hwang, MD, Toronto, ON Canada; Ken Williams, MSc, Toronto, ON Canada; Leah Smith, MA, Toronto, ON Canada; Ohad Hilly, MD, Toronto, ON Canada; Vincent Y.W. Lin, MD, Toronto, ON Canada; Joseph M. Chen, MD, Toronto, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss both clinical and quality of life outcomes in patients with a semi-implantable active bone conduction device in their first year of use.

**Objectives:** To measure hearing and qualitative outcomes for adults with conductive hearing loss (CHL), mixed hearing loss (MHL), and single sided deafness (SSD) who received a semi-implantable active bone conduction device (ABCD) as a recent alternative to bone anchored or contralateral routing of signal hearing aids. **Study Design:** Prospective case series. **Methods:** All patients who received a semi-implantable ABCD (N=22) underwent pure tone audiometry and questionnaire assessments (Health Utilities Index Mark 3 [HUI3]; Speech, Spatial and Qualities of Hearing Scale [SSQ]; and Tinnitus Handicap Inventory [THI]) preoperatively and at 1, 6, and 12 months post-activation. Patients with SSD also completed the adaptive Hearing in Noise Test paradigm. **Results:** 15 patients had CHL or MHL and 7 had SSD. Significant functional gain was demonstrated across all testing frequencies from 500 to 4,000 Hz in both CHL/MHL and SSD groups postoperatively (p-values<0.0001). For SSD patients, the mean signal to noise ratio also significantly improved postoperatively (by 3.56 dB at 6 months post-activation, p<0.0001). Additionally, following surgery, mean HUI3 scores significantly improved in all patients (p-values<0.0001) and significant improvements were realized in all subsets of the SSQ in all patients (p-values<0.0001). The mean tinnitus handicap measured by the THI significantly improved in the 7 patients reporting preoperative tinnitus (p=0.03). At this time, not all patients have reached their 6 or 12 months post-activation status and a more complete set of data will be presented. **Conclusions:** According to our data to date, the semi-implantable ABCD is a new option for patients with CHL, MHL, and SSD that provides both objective and subjective benefits.

- 1108. Matrix Metalloproteinase 13 Is Required for Osteocytic Perilacunar Remodeling and Bone Quality in the Cochlea**  
Emmanuel J. Jauregui, BA, San Francisco, CA; Omar Akil, PhD, San Francisco, CA; Faith Hall-Glenn, PhD, San Francisco, CA; Betty S. Tsai, MD, Oklahoma City, OK; Lawrence R. Lustig, MD, San Francisco, CA; Tamara Alliston, PhD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of MMP13 in osteocyte mediated perilacunar remodeling in cochlear bone maintenance and hearing.

**Objectives:** The material quality of cochlear bone is crucial for hearing. Although the mechanisms controlling bone quality are unclear, recent studies implicated osteocyte mediated perilacunar remodeling (PLR) in the maintenance of bone quality. Since cochlear bone is protected from remodeling by osteoclasts, the role of PLR in the cochlea remains uncertain. This study seeks to determine whether osteocyte mediated PLR is important for cochlear bone maintenance and hearing, or whether cochlear bone is protected from PLR. **Study Design:** To test this hypothesis we examined PLR in cochlear bone and hearing in mice deficient in matrix metalloprotease 13 (MMP13), an important PLR enzyme. **Methods:** We employed qPCR and immunohistochemical analyses to measure levels of PLR enzyme expression (e.g. MMPs, TRAP). To determine if defects in osteocyte mediated PLR of MMP13<sup>-/-</sup> cochlear bone impair hearing, we performed auditory brainstem responses (ABR), distortion product otoacoustic emissions (DPOAE), as well as microcomputed tomography and second harmonic microscopy. **Results:** Cochlear bone from MMP13<sup>-/-</sup> mice show several hallmarks of defective PLR. Histological staining of MMP13<sup>-/-</sup> cochlea showed aberrant canalicular networks, whereas micro-CT and second harmonic microscopy showed heterogeneous mineral and collagen deposition in cochlear bone ECM. Although ABR testing showed no significant hearing loss (n=5 p>0.05), ABR and DPOAE in MMP13<sup>-/-</sup> mice (n=5) showed increased variability relative to wild type littermates. Sensorineural structures were histologically normal. **Conclusions:** Our study shows that cochlear bone is remodeled by osteocyte mediated PLR via MMP13. MMP13 deficiency leads to irregular bone matrix and possibly impaired hearing. Ongoing studies examine the ability of other PLR enzymes to compensate for MMP13 deficiency to preserve hearing.

**1109. FleQ, a Deficient Biofilm Forming Mutant of P. Aeruginosa Does not Influence Cholesteatoma Growth and Expansion in the Gerbil Model**

Wee Tin K. Kao, MD, St. Louis, MO; Patricia L. Gagnon, MS, St. Louis, MO; Richard A. Chole, MD PhD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the steps in biofilm formation, fleQ as a deficient biofilm forming mutant, mechanism of fleQ action and that the capacity to form biofilms/the presence of biofilms does not contribute to aggressive features of a cholesteatoma.

**Objectives:** Hearing loss and chronic bacterial infection in the ear are consequences of cholesteatomas which grow from the tympanic membrane. A gerbil model has shown that P. aeruginosa infection exacerbates cholesteatomas. The objective of this study is to determine if the biofilm phenotype contributes to this phenomenon. **Study Design:** Cholesteatomas were induced in gerbils and infected with PAO1, (wild type) or fleQ (deficient biofilm forming mutant). The animals were euthanized eight weeks postoperatively and cholesteatoma size and extent evaluated. **Methods:** Cholesteatomas were induced in the right ear by canal ligation and inoculated with  $10^6$  bacteria (PAO1 or fleQ). One week after canal ligation, a 7 week course of ciprofloxacin was started. After 8 weeks, the gerbils were euthanized and evaluated using a microCT scanner. The CT scans were analyzed for tissue density within the bulla, erosion of the external auditory canal (EAC), and thickness of the ventral bulla wall. **Results:** There was no significant difference in tissue density between PAO1 and fleQ groups. The average canal width in the uninfected control, PAO1 and fleQ group was 3.24 mm (SD 0.94 mm), 4.1mm (SD=0.34 mm) and 4.3 mm (SD=0.34 mm) respectively. The average thickness of the ventral bulla wall in the PAO1 and fleQ groups were 0.30 mm (SD=0.07mm) and 0.32mm (SD=0.14 mm) respectively. **Conclusions:** Cholesteatomas induced by ear canal ligation and infected with PAO1 and fleQ did not demonstrate appreciable differences in extent of cholesteatoma formation, erosion of the EAC and bulla wall remodeling. This suggests that while general infection results in more bone resorption, remodeling and cholesteatoma enlargement, biofilm formation within the cholesteatoma does not.

**1110. Role of NLRP3 Inflammasome in Cholesteatoma**

Shin Kariya, MD PhD, Okayama, Japan; Mitsuhiro Okano, MD PhD, Okayama, Japan; Yuko Kataoka, MD PhD, Okayama, Japan; Takaya Higaki, MD PhD, Okayama, Japan; Kazunori Nishizaki, MD PhD, Okayama, Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the expression of NLRP3, ASC, caspase-1, and AIM2 in human middle ear cholesteatoma.

**Objectives:** Inflammasome is multi-protein complexes that regulate maturation of the interleukin  $1\beta$  related cytokines (IL- $1\beta$  and IL-18) through activation of the cysteine proteinase caspase-1. NOD like receptor family, pyrin domain containing 3 (NLRP3) protein is a key component of inflammasome that assemble in response to a wide variety of endogenous and pathogen derived danger signals. The NLRP3/apoptosis associated speck-like protein containing a caspase recruitment domain (ASC)/caspase-1 axis has been reported to regulate the IL- $1\beta$  processing in some inflammatory diseases. However, no previous study shows the role of NLRP3 inflammasome in cholesteatoma. The purpose of this study is to examine the expression of NLRP3 inflammasome in human middle ear cholesteatoma. **Study Design:** Clinical study. **Methods:** Samples of cholesteatoma tissue were taken from informed consented patients with middle ear cholesteatoma. Control middle ear samples were obtained from patients with normal middle ear findings who received cochlear implant. The expressions of NLRP3, ASC, caspase-1, and absent in melanoma 2 (AIM2) were examined by real time reverse transcription polymerase chain reaction (RT-PCR) and immunohistochemistry. **Results:** NLRP3, ASC, caspase-1, and AIM2 were detected in middle ear epithelium and inflammatory granulation tissue by immunohistochemistry. The levels of RNA of NLRP3, ASC, and caspase-1 in cholesteatoma were significantly higher than that in normal control samples. In contrast, RT-PCR showed that the mRNA level of AIM2 in cholesteatoma was significantly decreased compared to normal controls. **Conclusions:** These findings suggest that NLRP3 inflammasome has an important role in the pathophysiology of cholesteatoma.

**1111. Challenges for Novel Combined Endoscopic and Navigation Assisted Surgical Transcanal Approach to the Inner Ear**

Judith S. Kempfle, MD, Boston, MA; Elliott D. Kozin, MD, Boston, MA; Andreas H. Eckhard, MD, Boston, MA; Aaron K. Remenschneider, MD, Boston, MA; Albert S. Edge, PhD, Boston, MA; Daniel J. Lee, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand ad-

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vantages and disadvantages of a transcanal endoscopic approach; 2) recognize endoscopic middle ear anatomy and correlate with navigation assisted CT imaging; and 3) describe challenges and possibilities of combined endoscopic and navigation assisted surgery of the inner ear.

**Objectives:** The promise of drug or cellular therapy for hearing restoration requires minimally invasive approaches to the inner ear to preserve residual auditory function. Transcanal endoscopic ear surgery (EES) provides a high definition, wide field view of the middle and inner ear surface anatomy compared to the operating microscope. Recent reports describe the use of EES techniques to remove small schwannomas from the cochlea and internal auditory canal (IAC). We hypothesize that a navigation assisted transcanal EES approach could be used to more precisely target the cochlea or IAC for drug delivery or cell transplantation. **Study Design:** Cadaveric anatomical and radiographic study. **Methods:** Navigation protocol computed tomography (CT) was used to image cadaveric heads. Standard rigid endoscopes and instrumentation were used to perform transcanal soft tissue and navigation assisted bony dissection of the middle ear, cochlea and IAC. Direct visualization, surgical dyes and histologic processing of the temporal bone were used to demonstrate successful surgery. **Results:** We accessed the middle ear via a standard endoscopic transcanal approach. Otologic navigation was then utilized to direct access to the IAC. We correlated critical landmarks and target structures seen on endoscopy and with navigation. Access to the internal auditory canal was limited by challenging angles and instrumentation not designed for endoscopic dissection around the cochlea. **Conclusions:** We successfully demonstrated proof of concept of combined otologic endoscopy and navigation to access the inner ear. Navigation assisted EES to target the cochlea or IAC is feasible. Future work to optimize navigational instrumentation for transcanal dissection is critical as delivery of therapeutics to regenerate the inner ear is contingent on structure preservation.

## 1112. Off Vertical Axis Rotational Assessment of Transdermal Scopolamine for Motion Sickness Glenn W. Knox, MD, Jacksonville, FL; Daniel L. Woodard, MD, Kennedy Space Center, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss and explain how off vertical axis rotation is useful in the laboratory analysis of motion sickness medications.

**Objectives:** Evaluation of off vertical axis rotation in the laboratory analysis of motion sickness medications; and, evaluation of transdermal scopolamine for motion sickness prophylaxis. **Study Design:** Randomized, prospective double blind. **Methods:** Setting: Vestibular research laboratory. Patients: 12 patients, 7 male, 5 female, ages 21 to 57, normal auditory/vestibular function. Intervention(s): Off vertical axis rotation 20 degrees in the dark after administration of transdermal scopolamine or placebo. Main Outcome Measures: Duration of tolerated off vertical rotation; subjective symptom reporting during rotation at one minute intervals on a 0 to 4 scale. **Results:** Patients treated with transdermal scopolamine had statistically significant improved tolerance time to off vertical axis rotation. Reported symptomatology on the 0-3 subjective symptom scale was significantly improved as compared to placebo and was dose dependent. **Conclusions:** Off vertical axis rotation is a useful modality for the evaluation of motion sickness medications. Transdermal scopolamine showed statistically significant dose dependent effects in mitigating OVAR induced motion sickness symptomatology and was well tolerated.

## 1113. Auditory and Otologic Phenotypic Manifestations in Alström Syndrome Spencer E. Lindsey, MD, Washington, DC; Olga Stakhovskaya, PhD, Bethesda, MD; Hung J. Kim, MD, Washington, DC; Kelly A. King, PhD, Bethesda, MD; Chris Zalewski, PhD, Bethesda, MD; Carmen C. Brewer, PhD, Bethesda, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the otologic and auditory characteristics found in patients with Alstrom syndrome, a rare autorecessive congenital syndrome characterized by auditory, visual, and metabolic abnormalities. Participants will be able to discuss the auditory phenotype with patients and compare it with other ciliopathies.

**Objectives:** To expand and comprehensively characterize the auditory phenotype and clinical manifestations in Alström syndrome. **Study Design:** Prospective case series. **Methods:** 37 patients (20 female, 17 male) aged 1.6-38 years with Alström syndrome had comprehensive audiology and clinical evaluation at a clinical research center. **Results:** The average age of hearing loss (HL) detection occurred at 7.45 years (range 1.5-15). All had retinal dystrophy and nystagmus that preceded hearing changes. At the most recent hearing evaluation, mean pure tone averages were 47.53 (SD=19.9) and 46.41 (SD=19.63) dBHL in the right and left ears, respectively. Degree of HL was mild or better in 17/74 ears, moderate in 40/74 ears, and severe in 6 ears. 54/74 ears had sensorineural HL, while 3 ears had mixed loss, no ears had conductive loss, and the remaining were indeterminate. Serial audiograms available for 33 patients showed HL progression

of approximately 10-15 dB/decade. Word recognition scores were often better than expected and none were disproportionate to degree of HL. DPOAEs were absent in 54/72 ears, while ABRs were more robust than expected for degree of HL and were only abnormal in 6/60 ears. The correlation between the presence of ALMS1 mutations and recurrent otitis media was statistically significant ( $p=0.0024$ ). **Conclusions:** HL associated with Alström syndrome begins in childhood and is a predominantly symmetric, progressive sensory HL of moderate severity that benefits from amplification. There is a higher incidence of recurrent otitis media among patients with ALMS1 mutations. Absent DPOAEs, disproportionately normal ABRs, and previously reported animal models suggest an outer hair cell site of lesion.

## 1114. The Comprehensive Cochlear Implant Questionnaire (CCIQ) on Adults with Unilateral Cochlear Implants and Their Reasons for Not Choosing Bilateral Implantation

Christopher J. Linstrom, MD, New York, NY; Carol A. Silverman, PhD MPH, New York, NY; Ana H. Kim, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) explain the aspects of quality of life examined by the Comprehensive Cochlear Implant Questionnaire (CCIQ); 2) discuss the aspects of quality of life that show greater versus lesser benefit with sequential bilateral cochlear implantation versus unilateral cochlear implantation in adults; and 3) explain the reasons that adults with unilateral cochlear implants commonly offer for not choosing bilateral amplification and possible implications for the transtheoretical model of health behavior change.

**Objectives:** To examine quality of life (QoL) using the Comprehensive Cochlear Implant Questionnaire (CCIQ) on adults with unilateral cochlear implants (CI1), to compare the CI1 results with those of King et al. (2014) on adults with sequential bilateral cochlear implantation (CI2), and to identify reasons that the CI1 group did not choose bilateral implantation.

**Study Design:** Retrospective case series with planned data collection. **Methods:** The CCIQ was mailed to adults with CI1 from a cochlear implant center. CCIQ scores were adjusted to exclude item 28 (appropriate only for CI2 patients). The following written query also was posed: I chose not to have a second implant for these reasons; 6 reasons plus another reason were listed. **Results:** 22 CI1 patients completed the surveys (mean age = 58 years, SD  $\pm 18$ ). The CI2 group obtained significantly better performance ( $p < .05$ ) than the CI1 group on the physical and psychological domains, and for the speech perception in noise and music subdomains. Response frequency was highest for doing well enough with one implant (6), waiting for technology to improve (5), not ready (5), and another reason (9). **Conclusions:** As with the CI2 group, best performance occurred on the psychological and social domains, and on the vestibular and speech perception in quiet subdomains. These findings support the previously proposed application of the CCIQ to document QoL changes pre versus post CI1 and CI2. Since 5 respondents indicated lack of readiness for CI2, future research should investigate the application of the transtheoretical model of health behavior change to adults with CI1.

## 1115. Sigmoid Sinus Diverticulum/Dehiscence: Surgical Approaches to the Correction of Pulsatile Tinnitus

Douglas E. Mattox, MD, Atlanta, GA; Jason P. Calligas, MD, Atlanta, GA (Presenter); Anita S. Deshpande, BS, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the surgical techniques for managing pulsatile tinnitus attributed to sigmoid sinus diverticulum or dehiscence.

**Objectives:** Describe the surgical techniques for managing pulsatile tinnitus attributed to computed tomography confirmed sigmoid sinus diverticulum or dehiscence. **Study Design:** Retrospective case series. **Methods:** Among the patients seen for complaints of unilateral or bilateral pulsatile tinnitus, 19 patients were identified with either diverticulum or dehiscence of the sigmoid sinus on computed tomography of the temporal bone. In all cases, this finding was concordant with the side of tinnitus. All patients had normal in-office otoscopic and tympanometric examinations and preoperative audiometric evaluations. All 19 patients were managed via a transmastoid approach. **Results:** All 19 patients were successfully treated with complete resolution of pulsatile tinnitus. One patient had persistence of symptoms after surgery and another had recurrence of symptoms 11 months after first procedure. Both were successfully treated with revision surgery. The surgical management used a combination of pedicled muscular flaps, pedicled periosteal flaps, free muscle grafts, abdominal fat grafts, and bone cement. Titanium plates were introduced to permanently reduce large diverticula. No adverse outcomes occurred with any of the surgical techniques. **Conclusions:** Various surgical techniques can be used with similar efficacy to provide lasting symptom relief for patients with pulsatile tinnitus and computed tomographic evidence of sigmoid sinus wall diverticulum or dehiscence.

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## 1116. Otic Barotrauma Resulting from Continuous Positive Airway Pressure: Case Report and Literature Review

Justin P. McCormick, BS, Mobile, AL; Douglas M. Hildrew, MD, New Orleans, LA (Presenter); Claire M. Lawlor, MD, New Orleans, LA; Jesse A. Guittard, MBA, New Orleans, LA; N. Knight Worley, MD, New Orleans, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand the traditional treatment algorithm for the control of obstructive sleep apnea (OSA); 2) accept that the gold standard treatment for OSA is the application of continuous positive airway pressure (CPAP); and 3) appreciate that otic barotrauma is an increasingly prevalent complication of CPAP therapy.

**Objectives:** The objective of this case report is to review an increasingly prevalent complication CPAP for the treatment of OSA otic barotrauma. Clinical presentation, a detailed explanation of the pathophysiology, and a review of all current literature is presented. **Study Design:** Case report and review of the literature. **Methods:** A patient's case was reviewed. A Medline search was performed using the terms: continuous positive airway pressure AND CPAP AND obstructive sleep apnea AND OSA AND otic barotrauma AND hearing loss. **Results:** This case report describes the detailed clinical course and outcome for a patient with otic barotrauma as a result of excessive continuous positive airway pressure therapy. We also discuss the pathophysiology of otic barotrauma and present a review of all current literature on the topic. **Conclusions:** While there are many adverse effects to the use of CPAP, most are relatively benign. Here we discuss a case of significant sudden sensorineural hearing loss in relation to a suspected perilymphatic fistula, caused by traumatic barotrauma resulting from excessive self-titration of CPAP in an in-home setting. We also present a detailed explanation of the pathophysiology for otic barotrauma, as well as a review of all current literature on the topic.

## 1117. Speech Recognition and Quality of Life for Adult Cochlear Implant Users

Aaron C. Moberly, MD, Columbus, OH; Natalie Renee Capretta, BS, Columbus, OH; Susan N. Nittrouer, PhD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to relate speech perception outcomes for adults with cochlear implants to quality of life.

**Objectives:** Current postoperative clinical outcome measures for adults receiving cochlear implants (CIs) consist of testing speech recognition, primarily under quiet conditions. However, it is strongly suspected that results on these measures may not adequately reflect patients' quality of life (QOL) using their implants. This study aimed to evaluate whether speech recognition outcomes correlated with (QOL) for adult CI users. **Study Design:** Twenty-five postlingually deafened adults with CIs underwent assessment. **Methods:** Participants were tested for speech recognition (CID word and AzBio sentence recognition in quiet) and completed three QOL measures: the Nijmegen Cochlear Implant Questionnaire (NCIQ), either the Hearing Handicap Inventory for Adults or the Hearing Handicap Inventory for the Elderly (HHIA or HHIE), and the Speech, Spatial and Qualities of Hearing Scale (SSQ) questionnaires, to assess a variety of QOL factors. Demographics of age, audiologic history, and socioeconomic status were also collected as potential covariates. Correlations were sought between speech recognition measures and QOL scores. **Results:** Quality of life scores on only the NCIQ correlated with sentence recognition in quiet ( $r = .48$ ). Otherwise, QOL and speech recognition scores did not correlate. QOL on the NCIQ negatively correlated with age when hearing loss began ( $r = -.49$ ) and age of implantation ( $r = -.39$ ). Scores on the HHIA/HHIE and the SSQ did not correlate with speech recognition, demographic, or audiologic measures. **Conclusions:** For adult, postlingually deafened CI users, clinical speech recognition measures in quiet generally do not correlate with QOL. Results suggest the need for additional clinical outcome measures.

## 1118. Variability in Word Recognition by Adults with Cochlear Implants: The Role of Phonemic Awareness

Aaron C. Moberly, MD, Columbus, OH; Susan N Nittrouer, PhD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand phonemic awareness and its role in word recognition for adults with cochlear implants.

**Objectives:** Cochlear implants (CIs) do not automatically restore speech perception for postlingually deafened adults. Average word recognition remains at 60%, and enormous variability exists. Understanding speech requires storing speech in working memory using phonological codes, representations of the basic units of language. Hearing loss diminishes access to acoustic structure supporting these codes, and CIs may not completely restore this access. This investigation examined whether abilities to access and manipulate phonological representations (phonemic awareness skills) are de-



graded for CI users. Additionally, phonemic awareness was examined as a predictor of variability in a clinically useful measure, word recognition in quiet. **Study Design:** Thirty adults with CIs and 20 normal hearing (NH) controls underwent testing. **Methods:** Participants were assessed for word recognition in quiet, along with three phonemic awareness skills: access to phonemic structure by selecting the word with the same starting (or ending) sound as a target word--initial (or final) consonant choice--ICC or FCC, and the ability to manipulate phonemes by repeating words' phonemes backwards--backwards words--BW. **Results:** Phonemic awareness scores were poorer for CI users than for NH controls for ICC (82% versus 98% correct, respectively) and FCC (63% versus 87%), whereas scores for BW were not significantly different (58% versus 67%). For CI users, ICC and FCC scores predicted approximately 25 and 45 percent of the variance in word recognition, respectively. **Conclusions:** Phonemic awareness skills are degraded for adults with CIs and predict variability in word recognition. Findings suggest the need for efforts to restore phonemic awareness for CI users.

## 1119. Langerhans Cell Histiocytosis of the Temporal Bone: A Review of 17 Cases

Mara C. Modest, MD, Rochester, MN; Colin L. Driscoll, MD, Rochester, MN; Brian A. Neff, MD, Rochester, MN; Matthew L. Carlson, MD, Rochester, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain that Langerhans cell histiocytosis (LCH) can mimic otomastoiditis. Participants should also be able to demonstrate that there are several different treatment options for LCH which should be tailored to the patient and extent of the disease.

**Objectives:** To evaluate the presentation, management, and clinical outcome in patients with Langerhans cell histiocytosis (LCH) of the temporal bone. **Study Design:** Retrospective case series. **Methods:** 17 cases (12 patients) with temporal bone LCH that presented to a tertiary academic hospital between 1990 and 2014 were included. Presentation, disease course, and clinical outcomes were reviewed. **Results:** A total of 12 patients (8males; median age 42 years, range 1.25-88 years) between 1992-2014 were diagnosed with temporal bone LCH, representing 4% of all patients with a diagnosis of LCH at our institution during that time. Seven patients presented purely with head and neck disease (58%), five patients with bilateral temporal bone involvement (42%), six patients with intracranial involvement (50%), and six patients with systemic disease (50%). The most common presenting otologic symptoms were otorrhea (n=6; 50%) and hearing loss (n=6; 50%). Treatment included primary chemotherapy or radiation alone (n=4; 33%), local resection alone (n=1; 8%), and chemotherapy or radiation with surgery (n=7; 58%). Eight patients had no local progression of disease (67%). One patient suffered a local relapse (8%; time to relapse 10m). Median followup for all patients was 23 months. No cranial neuropathies were experienced by any patients, and no patients died secondary to disease. **Conclusions:** LCH is an uncommon histiocytic disorder with a wide range of clinical manifestations and disease severity. Otologic involvement is rare and frequently manifests with symptoms similar to otomastoiditis. Treatment should be tailored to the patient and extent of disease. Multiple treatment modalities can offer an effective cure.

## 1120. Trends in Vestibular Schwannoma Management from 2001-2012 Using HCUP Database

Brian D. Nicholas, MD, Syracuse, NY; Terrance E. Imbery, MD, Syracuse, NY; Parul Goyal, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the changing rates of surgical treatment of vestibular schwannoma, in addition to rapidly increasing charges for both surgery and stereotactic radiotherapy.

**Objectives:** To assess trends in surgical management of vestibular schwannoma over an eleven year period, 2001-2012. **Study Design:** Cross-sectional analysis. **Methods:** National Inpatient Sample (NIS) of Healthcare Cost and Utilization Project (HCUP) database was searched for both ICD diagnosis and procedures related to treatment of vestibular schwannoma. Spearman correlation coefficients were calculated. **Results:** Data was extracted for 20,780 patients undergoing surgical resection of vestibular schwannoma. The number of patients undergoing vestibular schwannoma resection has decreased from 2807 in 2001 to 1900 in 2012. The Spearman's  $\rho$  revealed a significant relationship between year and number of patients undergoing surgery ( $\rho = -0.63$ ,  $p = .048$ ). Charges increased by 156% from 39,093 to 100,231 ( $\rho = .97$ ,  $p < .0001$ ). Length of hospital stay between 2001 and 2012 has remained stable (5.23 days versus 5.22). Over the same time period, charges for stereotactic radiation have increased by 258% from \$12,750 to \$45,710 ( $\rho = .97$ ,  $p < .0001$ ). **Conclusions:** Surgery rates have declined over the past decade. In addition, while length of hospital stay after surgery has remained stable, overall charges for surgery have increased. There has been an even greater increase in charges associated with stereotactic radiotherapy over the studied timeframe.

# Posters

## 1121. **Systematic Review of Outcomes following Superior Canal Dehiscence Surgery: Determining Best Surgical Candidates**

Marlien E.F. Niesten, MD PhD, Utrecht, The Netherlands; Inge Stegeman, PhD, Utrecht, The Netherlands; Sarah Lookabaugh, MD, Boston, MA; Vedat Topsakal, MD PhD, Utrecht, The Netherlands; Daniel J. Lee, MD, Boston, MA; Wilko Grolman, MD PhD, Utrecht, The Netherlands

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain which signs and symptoms are expected to improve most following superior canal dehiscence repair and to explain the postoperative change in diagnostic indicators. In addition participants should be able to discuss the importance of a standardized reporting approach utilizing prospective data collection.

**Objectives:** To determine the change in reported signs and symptoms, hearing outcomes and vestibular evoked myogenic potential (VEMP) thresholds following surgery for superior canal dehiscence (SCD) syndrome, to help determine which patients are best surgical candidates. **Study Design:** Systematic review using the PubMed and Embase databases. **Methods:** We performed a systematic search by retrieving studies with original data and assessed these on relevance and risk of bias. Data was extracted on SCD signs and symptoms, audiometric testing, VEMP testing and recurrence of symptoms. **Results:** A total of 247 unique studies were retrieved. Nineteen studies were included following screening on title and abstract, full text screening and cross reference checking. One study with, according to our definition, low relevance was excluded. Fourteen studies reported an initial improvement of postoperative SCD signs and symptoms in 223/233 patients (96%, range 91-100%). Preoperative average air bone gap (ABG) of 18dB (range 14-26dB) improved postoperatively to an 11dB average ABG (range 6-21dB). Two studies showed deterioration of bone conduction thresholds => 10dB following surgical repair in 25-33% of patients. Preoperative VEMP thresholds (range 61-73 dB normal hearing level) were elevated to 80-88dB nHL following SCD repair. **Conclusions:** Surgical repair of SCD is associated with improvement of auditory and/or vestibular signs and symptoms (especially autophony and sound and pressure induced vertigo) and reversal of diagnostic indicators. Large heterogeneity in 1) description of surgical repair methods and 2) reporting of outcomes was found among the studies. A more standardized reporting approach utilizing prospective data collection is needed to better understand the long term outcomes.

## 1122. **Seven Cases Illustrating Difficulties in the Treatment of MPO-ANCA Positive Refractory Otitis Media**

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

**Educational Objective:** At the conclusion of this presentation, the participants should be able to check for the presence of ANCA in such cases as soon as possible.

**Objectives:** There are increasing reports of patients with refractory otitis media caused by anti-neutrophil cytoplasmic antibody (ANCA) associated vasculitis (AAV), especially myeloperoxidase (MPO)-ANCA positive middle ear disease. However, making a definitive treatment can be difficult, which can adversely affect early diagnosis and treatment. In this study, we reviewed the diagnostic features of MPO-ANCA positive middle ear disease and discussed the difficulties of the treatment. **Study Design:** Retrospective case review. **Methods:** We reviewed the cases of MPO-ANCA positive patients who initially complained of otologic symptoms and were referred to our institute between May 2007 and September 2014. **Results:** Seven cases (6 women, 1 man; aged 57-83 years) were eligible and all were MPO-ANCA positive, proteinase 3 (PR3)-ANCA negative. Patients were referred to our institute for the intractable otitis media (2/7), progressive hearing loss (7/7) with facial palsy (1/7) and high MPO-ANCA titer (5/7). All patients underwent tapering steroid therapy and their MPO-ANCA titer was monitored. There were refractory ones in MPO-ANCA positive otitis media, and 4 of 7 cases showed improvement with tapering steroid therapy, but the others were not cured. **Conclusions:** This study showed the difficulties of the diagnosis and the treatment of localized AAV. Early diagnosis and treatment can improve the prognosis of patients with AAV. Further cases should be reviewed and prospectively examined to establish the treatment for MPO-ANCA positive middle ear disease.

## 1123. **Tinnitus following Treatment for Sporadic Acoustic Neuroma**

Jonathan B. Overvest, MD PhD, San Francisco, CA; Seth E. Pross, MD, San Francisco, CA; Andrew T. Parsa, MD PhD, Chicago, IL; Steven W. Cheung, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the impact of demographic, tumor size, residual hearing, treatment modality, and time after treatment as factors affecting tinnitus dis-

tress in patients with sporadic acoustic neuromas.

**Objectives:** To evaluate the impact of tumor size, treatment modality, time from therapy, and residual hearing in the tumor ear on tinnitus distress measured by the Tinnitus Functional Index (TFI) in a cohort of patients with sporadic acoustic neuromas. **Study Design:** Cross-sectional survey. **Methods:** A web based 44 question online survey was made available on the Acoustic Neuroma Association website for 3 months. Of 154 unique surveys that were completed in entirety, further screening resulted in 143 study participants. Questions included the TFI, demographic features, tumor size, treatment modality, and hearing status of the tumor ear. **Results:** Tinnitus distress among treated acoustic neuroma patients closely mirrors the severity profile of the general population reported in the pivotal TFI instrument validation study. Tinnitus is not a problem or a small problem in 22% of respondents, a small or moderate problem in 29%, a big problem in 22%, and a very big problem in 27%. TFI score is independent of age, gender, tumor size or laterality, type of treatment, or elapsed time after treatment. Subscale analysis suggests acoustic tumor patients struggle most with tinnitus intrusiveness and loss of control. **Conclusions:** Whereas tinnitus is a common symptom in patients with acoustic neuromas in both the preoperative and postoperative settings, clinicians can provide counsel that tumor size, choice of treatment modality, and long term hearing outcomes have little to no bearing on post-treatment tinnitus distress level. For those patients with a moderate or more troublesome problem with tinnitus, early therapy directed at mitigating intrusiveness and loss of control should be considered.

**1124. Detection of Vestibular Schwannoma Tumors among Veterans with Asymmetrical Sensorineural Hearing Loss**

Israel Pena Jr., MD, Houston, TX; Barcleigh P. Sandvall, BS, Houston, TX; Jose P. Zevallos, MD MPH, Chapel Hill, NC; Jeffrey T. Vrabec, MD, Houston, TX

**Educational Objective:** At the conclusion of the presentation, the participants should be able to understand the incidence of asymmetrical sensorineural hearing loss (ASNHL) and vestibular schwannomas (VS) tumor, the utility of using MRI as a screening modality to detect VS, and the management of these tumors among the veteran population. The findings from this study will help define a new screening algorithm among the unique veteran population with ASNHL that is potentially more effective and less costly.

**Objectives:** To investigate the prevalence of vestibular schwannoma in veterans and evaluate efficiency of screening studies for diagnosis in a population with significant noise exposure. **Study Design:** Retrospective review of VISN 16 VA hospitals. **Methods:** Record query for ICD-9 codes for ASNHL or VS between 2000 and 2012. Patient demographics, signs and symptoms at presentation, audiogram and imaging data, and management data were collected and analyzed. **Results:** The prevalence of VS was 1:10, 000 in this population with average age of 63, and male gender preference (97%). Audiograms from tumor patients were compared with controls matched for age, gender, ethnicity, and combat experience. Typical criteria for defining hearing asymmetry showed intermediate sensitivity. The majority of patients were observed, while 38% had surgery. Patients who had XRT were older than those with surgery or those observed ( $p=0.036$ ). Patients with VS had a greater difference in pure tone average, speech discrimination and threshold at 3kHz than controls, and presented more often with facial weakness ( $P=0.010$ ). However, the number of patients with each variable was small, limiting the sensitivity as a screening criterion. **Conclusions:** Symptoms of imbalance and facial weakness are more common in patients with VS compared to controls. Sensitivity of audiometric screening is intermediate, while many tumors are incidentally discovered.

**1125. Outcomes following Primary and Revision Auditory Brainstem Implant Surgery in Children**

Sidharth V. Puram, MD PhD, Boston, MA; Parth Shah, BS, Boston, MA; Barbara S. Herrmann, PhD, Cambridge, MA; Ann Christine Duhaime, MD, Boston, MA; Fred G. Barker, MD, Boston, MA; Daniel J. Lee, MD FACS, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe non-NF2 pediatric candidates suitable for ABI surgery, identify the major steps in the approach to ABI surgery in children, and discuss the major outcomes (perioperative complications, electrophysiologic and behavioral audiologic responses, and speech development) following pediatric ABI surgery.

**Objectives:** The auditory brainstem implant (ABI) was developed for patients with neurofibromatosis type 2 (NF2). Emerging data suggest a role for ABIs in deaf non-NF2 children who are not candidates for the cochlear implant (CI). However, experience in the U.S. with pediatric ABI surgery is limited. Here, we review outcomes following three primary ABI surgeries and one revision ABI surgery for device failure. **Study Design:** Retrospective single institution case series.

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**Methods:** Infants with congenital deafness who 1) were not candidates for CI due to cochlear or auditory nerve hypoplasia/aplasia or 2) failed CI surgery and 3) underwent ABI surgery via retrosigmoid craniotomy were reviewed. Outcome measures included perioperative complications, electrophysiologic and behavioral audiologic responses, and speech development. **Results:** Four pediatric ABI surgeries were performed (3 primary, 1 revision) in children with profound hearing loss associated with cochlear and auditory nerve hypoplasia. Mean age at primary ABI surgery was 14 months. Intraoperatively, multiphasic evoked auditory brainstem responses (EABRs) were obtained on multiple electrodes. There were no intraoperative complications, with an average length of stay of four days. EABRs used to guide placement of the ABI electrode were variable. Behavioral thresholds of 30-40 dB were attained in all cases, including one patient who required revision surgery after device failure. **Conclusions:** Based on our early experience, primary and revision ABI surgery can be a safe and effective means to provide auditory perception to infants who are not candidates for the CI. Long term follow-up is needed to determine the speech and language outcomes with the ABI in this pediatric cohort.

## 1126. Ceruminous Adenocarcinoma: An Analysis of the Surveillance Epidemiology and End Results (SEER) Database

Douglas S. Ruhl, MD, Honolulu, HI; Joseph B. Golden, MD, Honolulu, HI; Tyler P. Swiss, DO, Honolulu, HI; Philip D. Littlefield, MD, Honolulu, HI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to characterize the behavior, treatment and prognosis of ceruminous adenocarcinomas of the ear. Participants should also be able to explain how the data within the SEER database is used to further elucidate this rare diagnosis.

**Objectives:** Ceruminous adenocarcinoma is a rare malignancy involving the ceruminous glands in the external auditory canal. Its prognosis is thought to be poor. However, due to the paucity of cases, this has been difficult to study. Using a population based national database, our objective was to describe patient demographics and survival trends to further characterize this rare tumor's behavior, treatment, and prognosis. **Study Design:** Cohort study using a national database. **Methods:** The SEER-18 database was queried for patients diagnosed with ceruminous adenocarcinoma between 1973 and 2010. Data analyzed included patient demographics, treatment modality, and survival. **Results:** Twenty-two patients were identified in the database. The average age of diagnosis was between 60-64 years of age. All of the patients underwent surgical resection of the primary malignancy. Eight (36%) patients also had postoperative radiation. These patients survived fewer months compared to the surgery alone group, but this was not significant ( $p=0.252$ ). Nine (41%) patients are still alive with an average survival of 157 months since diagnosis. Two (9%) patients died of their malignancy with an average survival of 45 months. Eleven (50%) patients died of other causes. **Conclusions:** This malignancy is uncommon but may not have the poor prognosis previously thought. Surgical resection alone was pursued for the majority of patients with ceruminous adenocarcinoma. However, since tumor staging was often absent in this database, postoperative radiation should be considered for advanced or aggressive disease. This remains an extremely rare pathology.

## 1127. Improvement in Balance with Auditory Input in Bimodal Cochlear Implantees

Madelyn N. Stevens, BA, Durham, NC; Timothy E. Hullar, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize that auditory inputs from cochlear implants can aid in maintaining balance.

**Objectives:** To demonstrate the beneficial effect of wearing cochlear implants on balance. **Study Design:** Prospective crossover design. **Methods:** Balance performance, measured as sway velocity (cm/sec), was measured in a group of bimodal cochlear implant recipients with eyes closed and on a solid surface. Sway was measured once in silence and again in the presence of four external sound sources arrayed around the patient. In the silent condition, subjects wore ear defenders to eliminate all external sound. In the sound condition, subjects wore their standard hearing equipment (cochlear implant and contralateral hearing aid.) **Results:** 14 people participated. Their average age was 55 years. Four subjects were unable to stand either with or without sound. Sway velocity improved (decreased) in four subjects and worsened (improved) in one patient. Four subjects were unable to stand in the silent condition but were able to stand in the presence of sound. One subject could stand in silence but fell in the presence of sound. **Conclusions:** Auditory input can assist bimodal cochlear implant users in maintaining posture. Audition can provide external spatial landmarks useful as reference points for maintaining balance. Cochlear implants and hearing aids may function to improve balance as well as hearing.

## I128. Fungal Skull Base Osteomyelitis: Diagnostic Challenges and Experimental Microbial Identification Techniques

Peter G. Volsky, MD, Pittsburgh, PA; Todd A. Hillman, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the potential application of molecular and genomic diagnostic technologies to infectious diseases of the skull base and head and neck.

**Objectives:** First, review cases that illustrate the challenge of obtaining clinically valuable culture data for skull base osteomyelitis (SBO), particularly regarding fungal SBO; second, describe emerging and experimental microbiologic techniques that may aid in pathogen identification. **Study Design:** Case series of three diabetics diagnosed with severe non-pseudomonas SBO; review of the literature with a focus on emerging technologies. **Methods:** Chart review. **Results:** Initial culture results (coagulase negative staphylococci, 2 cases; *E. faecalis* and diphtheroids, 1 case) were misleading in all three patients with disease progression in spite of adequate treatment. Empiric antifungal therapy was associated with clinical and scintigraphic improvement. Isolation of a fungus by culture was successful only in one case (*Candida parapsilosis*). Unconventional diagnostic techniques revealed fungal elements using confocal fluorescence laser microscopy in one patient, and the Fungitell® assay and the Ibis T-5000 universal biosensor in a second patient. Two patients survived debilitating and complicated clinical courses with multiple cranial neuropathies until scintigraphic resolution of disease, 13 and 24 months after symptom onset. **Conclusions:** Fungal skull base osteomyelitis is a life threatening infectious disease for which timely management is plagued by delays in diagnosis and the low yield of culture data. The spectra of microorganisms and pathogens in this condition may be better understood as molecular and genomic diagnostic technologies encounter greater clinical application.

## I129. A Tool to Facilitate Perilymph Sampling Via Round Window Membrane

Hirobumi Watanabe, PhD, New York, NY; Luis Cardoso, PhD, New York, NY; Jeffrey W. Kysar, 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 discover a minimally invasive tool for the diagnosis of the inner ear disease by perilymph sampling.

**Objectives:** The era of personalized medicine in otology would be greatly aided by the availability of a tool to sample cochlear fluid. **Study Design:** Personalized medicine has evolved tremendously due to significant advances in immunologic, proteomic and genomic analysis. However, precise diagnosis of inner ear disease is hampered by absence of tools to safely sample inner ear fluids. We report on the development of minimally invasive technology suitable to sample perilymph and deliver therapeutics into the cochlea through RWM. **Methods:** The geometry and variation of human RWM anatomy was investigated with a  $\mu$ CT scanner. Based on the mechanical properties of the RWM, a 31 gauge needle with customized dual wedge tip was designed to penetrate RWM and sample perilymph with minimal damage. Using a microneedle array, guinea pig and human RWM was perforated and fluorescent dye soaked Gelfoam was applied to the RWM for prescribed duration. After washing the gel away, perilymph was sampled using the dual wedge tip sampling needle. The concentration of the dye was determined and the protein constituents were analyzed via BioTek plate reader. **Results:** Using the  $\mu$ CT and 3D printer, a surgical applicator was prototyped to access the human RWM via ear canal. The dual wedge needle made linear incision parallel to collagen fibers within the RWM and allowed consistent sampling of 1  $\mu$ L perilymph. **Conclusions:** The double wedge needle can perforate the RWM in line with fibers and consistently and reliably aspirate inner ear fluid. Further in vivo studies are needed to assess the physiological consequences.

## I130. A Novel Therapeutic Strategy for Ramsay Hunt Syndrome: Evaluation of the Regeneration Facilitating Effects of Novel Facial Nerve Treatment Using Basic Fibroblast Growth Factor

Hiroyuki Yamada, Toon, Ehime Japan; Naohito Hato, Toon, Ehime Japan; Takashi Fujiwara, Toon, Ehime Japan

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the regeneration facilitating effects of novel facial nerve treatment using basic fibroblast growth factor in patients with severe Ramsay Hunt syndrome and discuss the treatment of severe Ramsay Hunt syndrome including the novel facial nerve treatment.

**Objectives:** The purpose of this study was to determine the regeneration facilitating effects of novel facial nerve treatment using basic fibroblast growth factor (bFGF) promoting the regeneration of denervated nerves in patients with severe Ramsay Hunt syndrome. **Study Design:** Prospective clinical study. **Methods:** Ten patients with Ramsay Hunt syndrome after more than 2 weeks following the onset of severe or complete paralysis corresponding to degree of denervation ex-

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ceeding 90% by electroneuronography (ENoG) were treated with the new procedure. The facial nerve between tympanic and mastoid segments was exposed via the mastoid. A bFGF impregnated biodegradable gelatin hydrogel was placed around the exposed nerve. Regeneration of the facial nerve was evaluated by the House-Brackmann (H-B) grading system. The outcomes were compared with the authors' previous study, which reported outcomes of the patients who underwent conservative treatment (n = 37) or conventional decompression surgery (n = 20). **Results:** The good recovery (H-B grade 1 or 2) rate of the novel treatment (100.0%) was significantly better than the rate of conservative treatment (67.6%) and conventional surgery (65.0%). Every patient in the novel treatment group improved to H-B grade 2 or better even when undergone between 24 and 104 days after onset. **Conclusions:** Advantages of this novel treatment are efficacy in the cases of severe Ramsay Hunt syndrome and long effective period after onset of the paralysis. To the authors' knowledge, this is the first clinical report of the efficacy of bFGF using a new drug delivery system in patients with severe Ramsay Hunt syndrome.

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* 1947	Harry W. Lyman, MD	1994	Richard R. Gacek, MD
* 1948	Lyman G. Richards, MD	* 1995	Patrick J. Doyle, MD
* 1949	John J. Shea, MD	* 1996	William R. Hudson, MD
* 1950	Robert C. Martin, MD	1997	H. Bryan Neel, MD
* 1951	Louis H. Clerf, MD	1998	Stanley M. Blaugrund, MD
* 1952	C. Steward Nash, MD	* 1999	Mansfield F. W. Smith, MD
* 1953	Francis E. LeJeune, MD	2000	Charles W. Gross, MD
* 1954	Leroy A. Schall, MD	2001	Edward L. Applebaum, MD
* 1955	Kenneth M. Day, MD	2002	Gerald B. Healy, MD
* 1956	Dean M. Lierle, MD	2003	Roger L. Crumley, MD
* 1957	Percy E. Ireland, MD	* 2004	Robert A. Jahrsdoerfer, MD
* 1958	Lawrence R. Boies, MD	* 2005	Patrick E. Brookhouser, MD
* 1959	Gordon D. Hoople, MD	2006	Stanley M. Shapshay, MD
* 1960	Theodore E. Walsh, MD	2007	David F. Wilson, MD
* 1961	Fletcher D. Woodward, MD	2008	Harold C. Pillsbury, MD
* 1962	John R. Lindsay, MD	2009	Myles L. Pensak, MD
* 1963	Howard P. House, MD	2010	Frank E. Lucente, MD
* 1964	John E. Bordley, MD	2011	Gerald S. Berke, MD
* 1965	George E. Shambaugh, Jr., MD	2012	Robert H. Ossoff, DMD MD
* 1966	Francis W. Davison, MD	2013	Jesus E. Medina, MD
* 1967	Shirley H. Baron, MD	2014	Jonas T. Johnson, MD FACS
* 1968	G. Slaughter Fitz-Hugh, MD	2015	Derald E. Brackmann, MD
* 1969	Jerome A. Hilger, MD		
* 1970	Joseph L. Goldman, MD		
* 1971	Victor Goodhill, MD		

\* deceased

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## Guests of Honor Since 1947

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1947	J. McKenzie Brown, MD	1982	Harold Schuknecht, MD
1948	Harold Walker, MD		Ugo Fisch, MD
1949	Claude C. Cody, Jr., MD	1983	Walter Work, MD
1950	Harris P. Mosher, MD		Roy B. Cohn, MD
1951	Duncan McPherson, MD	1984	Beverly Armstrong, MD
1952	D.C. Jarvis, MD	1985	G.O. Proud, MD
1953	Charles A. Thigpan, MD	1986	Daniel Miller, MD
1954	J. Parsons Schaeffer, MD	1987	Paul Ebert, MD
1955	Edward P. Fowler, MD	1988	Robert W. Brown, MD
1956	Harold L. Lillie, MD	1989	Hallowell Davis, MD
1957	Not Available	1990	George Reed, MD
1958	Arnold S. Diehl, MD	1991	Victor Goodhill, MD
1959	Frederick T. Hill, MD	1992	Roger Boles, MD
1960	Terence Cawthorne, MD	1993	C. Ryan Chandler, MD
1961	Milton J. Robb, MD	1994	John Conley, MD
1962	Thomas C. Galloway, MD	1995	Paul H. Ward, MD
1963	Robert C. Martin, MD	1996	Bobby Ray Alford, MD
1964	C. Stewart Nash, MD	1997	Robert Cantrell, MD
1965	Georges Portmann, MD	1998	Patrick J. Doyle, MD
1966	Gordon D. Hoople, MD	1999	Richard L. Goode, MD
1967	Albery C. Furstenberg, MD	2000	A. Paul Keller, MD
1968	Francis E. LeJeune, MD	2001	Charles W. Cummings, MD
1969	Lawrence R. Boies, MD	2002	Stanley M. Shapshay, MD
1970	Victor Alfaro, MD	2003	Brian F. McCabe, MD
1971	Vern O. Knudsen, PhD	2004	Byron J. Bailey, MD
1972	Carlos Munoz-MacCormick, MD	2005	Robert H. Miller, MD MBA
1973	Dean Lierle, MD	2006	Gerald B. Healy, MD
1974	Raymond Jordon, MD	2007	William F. House, MD
1975	Frank Lathrop, MD	2008	Patrick E. Brookhouser, MD
1976	John Bordley, MD	2009	Harry R. van Loveren, MD
1977	Max Soni, MD	2010	Gady Har-El, MD
	W.E.N. Harrison, MD	2011	Harold C. Pillsbury, MD
1978	Moses Lurie, MD	2012	Paul A. Levine, MD
1979	Shirley Baron, MD	2013	Robert H. Mathog, MD
1980	Frank Lathrop, MD	2014	Michael M.E. Johns, MD
	Harry Rosen-Wasser, MD	2015	Gerald S. Berke, MD FACS
1981	Ben Senturia, MD		

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## Joseph H. Ogura, MD Lecturers

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1986	Hugh F. Biller, MD	2001	Richard R. Gacek, MD
1987	Paul H. Ward, MD	2002	David G. Nathan, MD
1988	John Conley, MD	2003	Arnold G. D. Maran, MD
1989	George A. Sisson, MD	2004	Ernest A. Weymuller, Jr., MD
1990	Sir Donald F.N. Harrison	2005	Gerald B. Healy, MD
1991	Robert W. Cantrell, MD	2006	Jonas T. Johnson, MD
1992	Michael E. Johns, MD	2007	Byron J. Bailey, MD
1993	John A. Kirchner, MD	2008	Paul A. Levine, MD
1994	John Lewis, MD	2009	Robin T. Cotton, MD
1995	Eugene Myers, MD	2010	Marvin P. Fried, MD
1996	Charles W. Cummings, MD	2011	Lord Bernard Ribeiro Kt CBE FRCS FACS (Hon.)
1997	Harold C. Pillsbury III, MD	2012	James L. Netterville, MD
1998	Frank E. Lucente, MD	2013	Randal S. Weber, MD
1999	Haskins Kashima, MD	2014	David E. Eibling, MD FACS
2000	Christopher Perry, MD	2015	Uttam K. Sinha, MD FACS

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## **Fifty Year Club**

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- 1948**  
Edgar A. Thacker, MD .....Everett, WA,
- 1949**  
Ernest R.V. Anderson, MD .....Camarillo, CA  
F. Johnson Putney, MD ..... Charleston, SC  
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
- 1959**  
Seymour J. Brockman, MD .....Pacific Palisades, CA  
L. Reed Cranmer, MD FACS..... Birmingham, MI  
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. Fariior, 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  
Wallace Rubin, MD.....Metairie, LA  
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. Chalot, 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  
William C. Morgan Jr., MD FACS ..... Charleston, WV  
Richard C. Parsons, MD .....Hartwell, GA

**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 2014 Annual Program.

	<b>Elected</b>	<b>Died</b>
Thomas J. Benda Sr., MD FACS . . . . . Dubuque, IA . . . . .	1975 . . . . .	2013
Hugh F. Biller, MD . . . . . Wells, ME . . . . .	1972 . . . . .	2015
Roger Boles, MD . . . . . San Francisco, CA . . . . .	1974 . . . . .	2014
Francis I. Catlin, MD . . . . . Houston, TX . . . . .	1964 . . . . .	2014
D. Thane R. Cody, MD . . . . . Jacksonville, FL . . . . .	1968 . . . . .	2014
Nathan A. Geurkink, MD . . . . . Lebanon, NH . . . . .	1975 . . . . .	2010
William R. Hudson, MD . . . . . Durham, NC . . . . .	1969 . . . . .	unknown
Myron W. Lockey, MD . . . . . Madison, MS. . . . .	1976 . . . . .	2014
Robert H. Mathog, MD FACS . . . . . Rochester, MI . . . . .	1976 . . . . .	2014
David A. Murphy, MD. . . . . Littleton, CO . . . . .	1978 . . . . .	2015
Jack W. Pou, MD. . . . . Shreveport, LA . . . . .	1958 . . . . .	2013
Mansfield F. W. Smith, MD . . . . . Davis, CA . . . . .	1972 . . . . .	2014
Bob E. Stout, MD. . . . . Houston, TX . . . . .	1976 . . . . .	2015



## Active Fellows

Mona M. Abaza, MD  
Elliot Abemayor, MD PhD FACS  
Kenneth W. Altman, MD PhD FACS  
Ronald G. Amedee, MD FACS  
Vijay K. Anand, MD FACS  
Vinod K. Anand, MD FACS  
Simon I. Angeli, MD  
Jack B. Anon, 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  
Thomas J. Balkany, 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  
Stephen P. Becker, 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  
Michael J. Biavati, MD FACS  
Merrill A. Biel, MD FACS  
Steven A. Bielamowicz, MD FACS  
Brian W. Blakley, MD PhD FACS  
Andrew Blitzer, MD DDS FACS  
Joel H. Blumin, MD FACS  
Emily Frances Boss, MD  
Derald E. Brackmann, 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  
Joseph M. Chen, MD  
Steven W. Cheung, MD FACS  
Dinesh K. Chhetri, 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  
Seth M. Cohen, MD  
Stephen F. Conley, MD FACS  
Steven P. Cook, MD FACS  
Susan Rachelle Cordes, MD FACS  
Peter D. Costantino, MD FACS  
Robin T. Cotton, 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. DelGaudio, MD FACS  
M. Jennifer Derebery, MD FACS  
Ellen S. Deutsch, MD  
Anand Devaiah, MD FACS  
Laurence J. DiNardo, MD FACS  
Elizabeth A. Dinces, MD  
H. Peter Doble II, MD 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. Edelstein, 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  
Joseph B. Farrior III  
Jose N. Fayad, MD  
Joseph G. Feghali, MD FACS  
Berrylin J. Ferguson, MD FACS  
Robert L. Ferris, MD PhD FACS  
Bruce L. Fetterman, MD FACS  
Douglas G. Finn, MD FACS  
Cynthia B. Fisher, MD  
Samuel R. Fisher, MD FACS  
Valerie A. Flanary, MD FACS  
Paul W. Flint, MD  
L. Arick Forrest, MD  
Howard W. Francis, MD

Ramon A. Franco Jr., MD  
Marvin P. Fried, MD FACS  
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  
Thomas J. Gal, MD FACS  
Bruce J. Gantz, MD FACS  
Glendon M. Gardner, MD  
C. Gaelyn Garrett, MD  
Eric M. Genden, MD FACS  
Soha Nadim Ghossaini, MD FACS  
Gerard J. Gianoli, MD FACS  
Paul W. Gidley, MD FACS  
William Giles, MD  
Marion 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  
W. Jarrard Goodwin, MD FACS  
Christine G. Gourin, MD FACS  
Jennifer Rubin Grandis, MD FACS  
J. Douglas Green Jr., MD FACS  
John Herman Greinwald Jr., MD  
Patrick J. Gullane, MD FACS  
Thomas J. Haberkamp, MD FACS  
Joseph Haddad Jr., MD FACS  
Theresa A. Hadlock, MD  
Stephen F. Hall, MD  
Stacey L. Halum, MD  
Joseph K. Han, MD  
Matthew M. Hanasono, MD FACS  
Steven D. Handler, MD MBE FACS  
Marlan R. Hansen, MD  
Gady HarEl, MD FACS  
Willard C. Harrill, MD FACS  
Jeffrey P. Harris, MD PhD FACS  
Christopher J. Hartnick, MD FACS  
George T. Hashisaki, MD FACS  
Bruce H. Haughey, MBChB FACS  
Richard E. Hayden, MD 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 E. Hoffer, MD FACS  
Henry T. Hoffman, MD FACS  
Norman D. Hogikyan, MD FACS  
Eric H. Holbrook, MD  
David B. Hom, MD FACS

# Member Directory

## Active Fellows

Larry A. Hoover, MD FACS  
Karl L. Horn, MD  
Steven M. Houser, MD FACS  
Gordon B. Hughes, MD FACS  
Timothy E. Hullar, MD FACS  
Peter H. Hwang, MD FACS  
Glenn C. Isaacson, MD FACS  
Stacey L. Ishman, MD MPH  
Carol A. Jackson, MD  
Abraham Jacob, MD  
John R. Jacobs, MD FACS  
Joseph B. Jacobs, MD  
Anthony F. Jahn, 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  
Gary D. Josephson, MD FACS  
Ashutosh Kacker, MD FACS  
Jan L. Kasperbauer, MD FACS  
George P. Katsantonis, MD  
David M. Kaylie, MD FACS  
Robert M. Kellman, MD FACS  
Margaret A. Kenna, MD FACS  
David W. Kennedy, MD FACS  
Thomas L. Kennedy, MD FACS  
Robert C. Kern, MD FACS  
Joseph E. Kerschner, MD FACS  
Bradley W. Kesser, MD  
Eric J. Kezirian, MD  
Sid Khosla, MD  
Harold H. Kim, MD  
Hung Jeffrey Kim, MD  
Barry P. Kimberley, MD  
Charles P. Kimmelman, MD MBA FACS  
Glenn Knox, MD FACS  
Wayne M. Koch, MD FACS  
Darius Kohan, MD  
Arnold Komisar, MD DDS MS FACS  
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. Krempf, MD FACS  
Yosef P. Krespi, MD FACS  
John H. Krouse, MD PhD FACS  
Wesley W. O. Krueger, MD 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  
Donald A. Leopold, MD FACS  
Mark J. Levenson, MD FACS  
Roger J. Levin, MD FACS  
Samuel C. Levine, MD FACS  
Kasey K. Li, MD FACS  
Judith E.C. Lieu, MD MSPH  
HoSheng Lin, MD FACS  
Sandra Y. Lin, MD  
Robin Williams Lindsay, MD BA  
William H. Lindsey, MD FACS  
Christopher J. Linstrom, MD FACS  
Philip D. Littlefield, MD  
Todd A. Loehrl, MD  
Thomas B. Logan, MD FACS  
Larry B. Lundy, MD  
Daniel D. Lydiatt, MD FACS  
Corey S. Maas, MD FACS  
Carol J. MacArthur, MD FACS  
John D. Macias, MD FACS  
John Maddalozzo, MD FACS  
J. Scott Magnuson, MD  
Aditi H. Mandpe, MD FACS  
Scott C. Manning, MD FACS  
Steven C. Marks, MD FACS  
Sam J. Marzo, MD FACS  
Bruce H. Matt, MD FACS  
Douglas E. Mattox, MD  
Ted Mau, MD PhD  
Michael D. Maves, MD MBA FACS  
Jennifer L. Maw, MD  
John S. May, MD FACS  
Judith C. McCaffrey, MD FACS  
Thomas V. McCaffrey, MD PhD FACS  
John T. McElveen Jr., MD  
Michael McGee, MD  
Brian J. McKinnon, MD MBA FACS  
Jesus E. Medina, MD FACS  
Cliff A. Megerian, MD FACS  
Albert L. Merati, MD FACS  
Anna Hopeman Messner, MD  
Ralph B. Metson, MD FACS  
Tanya Kim Meyer, MD  
Alan G. Micco, MD FACS  
Steven J. Millen, MD  
Robert H. Miller, MD MBA FACS  
Lloyd B. Minor, MD FACS  
Natasha Mirza, MD FACS  
Ron B. Mitchell, MD  
Kris S. Moe, MD FACS  
Edwin M. Monsell, MD PhD  
Eric J. Moore, MD FACS  
Gary F. Moore, MD FACS  
William H. Moretz Jr., MD  
Randall P. Morton, MD  
J. Paul Moxham, MD  
Terrence P. Murphy, MD FACS  
Andrew H. Murr, MD FACS  
George L. Murrell, MD  
Charles M. Myer III, MD FACS  
Jeffrey N. Myers, MD FACS  
David Myssiorek, MD FACS  
Robert M. Naclerio, MD FACS  
CherieAnn Nathan, MD FACS  
Julian M. Nedzelski, MD  
H. Bryan Neel III, MD PhD FACS  
Brian A. Neff, MD  
Erik G. Nelson, MD FACS  
James L. Netterville, MD FACS  
Shawn D. Newlands, MD PhD FACS  
Quyen T. Nguyen, MD PhD  
John Kim Niparko, MD  
Jacob Pieter Noordzij, MD  
Brian Nussenbaum, MD FACS  
John S. Oghalai, MD FACS  
Kerry D. Olsen, MD FACS  
Bert W. O'Malley Jr., MD  
Robert C. O'Reilly, MD FACS  
Richard R. Orlandi, MD FACS  
Laura J. Orvidas, MD FACS  
Ryan F. Osborne, MD FACS  
Robert H. Ossoff, DMD MD FACS  
Randal A. Otto, MD FACS  
Fred D. Owens, MD  
Robert M. Owens, MD  
John F. Pallanch, MD FACS  
Randal C. Paniello, MD  
Dennis G. Pappas Jr., MD  
Blake C. Papsin, MD FACS  
Kourosh Parham, MD PhD  
Sanjay Rajendra Parikh, MD BSc FACS  
Albert H. Park, MD  
Stephen S. Park, MD  
Lorne S. Parnes, MD  
Steven M. Parnes, MD FACS  
Phillip K. Pellitteri, DO FACS  
Myles L. Pensak, MD FACS  
Sean B. Peppard, MD  
Brian Philip Perry, MD FACS  
Mark S. Persky, MD FACS  
B. Robert Peters, MD  
Glenn E. Peters, MD FACS  
Jay Piccirillo, MD FACS  
Harold C. Pillsbury, MD FACS  
Karen T. Pitman, MD FACS  
Michael J. Pitman, MD  
Randall L. Plant, MD FACS  
Dennis S. Poe, MD PhD FACS  
J. Christopher Post, MD PhD MSS FACS  
Michael F. Pratt, MD FACS  
Diego Alfonso Preciado, MD PhD  
Edmund DeAzevedo Pribitkin, MD FACS  
G. Mark Pyle, MD  
Reza Rahbar, MD FACS  
Hassan H. Ramadan, MD FACS  
Steven D. Rauch, MD  
Edward J. Reardon, MD FACS  
James S. Reilly, MD FACS  
Anthony Reino, MD FACS  
John S. Rhee, MD MPH FACS  
Mark A. Richardson, MD FACS  
Jeremy David Richmon, MD FACS  
William J. Richtsmeier, MD PhD FACS  
Wm. Russell Ries, MD FACS



## Active Fellows

Nestor R. Rigual, MD FACS  
K. Thomas Robbins, MD FACS  
David W. Roberson, MD FACS  
Peter S. Roland, MD  
J. Thomas Roland Jr., MD  
Clark A. Rosen, MD FACS  
Seth Rosenberg, MD FACS  
Richard M. Rosenfeld, MD  
Eben L. Rosenthal, MD FACS  
Brian William Rotenberg, MD MPH  
Adam D. Rubin, MD  
Michael J. Ruckenstein, MD FACS  
Leonard P. Rybak, MD FACS  
Miriam I. SaadiaRedleaf, MD  
Ghassan J. Samara, MD FACS  
Perry M. Santos, MD MS FACS  
Robert T. Sataloff, MD DMA FACS  
James E. Saunders, MD  
Steven D. Schaefer, MD FACS  
Stimson P. Schantz, MD FACS  
Richard L. Scher, MD FACS  
David R. Schramm, MD FACS  
Mitchell K. Schwaber, MD  
John M. Schweinfurth, MD  
Vanessa G. Schweitzer, MD FACS  
Anthony P. Sclafani, MD FACS  
Andrew R. Scott, MD FACS  
Allen M. Seiden, MD FACS  
Michael D. Seidman, MD FACS  
Samuel H. Selesnick, MD FACS  
Brent A. Senior, MD FACS  
Merritt J. Seshul, MD FACS  
Rahul K. Shah, MD FACS  
Udayan K. Shah, MD  
Ashok R. Shaha, MD FACS  
Nina L. Shapiro, MD FACS  
Paul F. Shea, MD  
Clough Shelton, MD FACS  
Terry Y. Shibuya, MD FACS  
Alan H. Shikani, MD FACS  
Mark J. Shikowitz, MD FACS  
William W. Shockley, MD FACS  
Sally R. Shott, MD FACS  
Kevin A. Shumrick, MD FACS  
James D. Sidman, MD  
Jeffrey Philip Simons, MD FACS  
C. Blake Simpson, MD  
Bhuvanesh Singh, MD FACS  
Uttam K. Sinha, MD FACS  
Aristides Sismanis, MD  
Marshall E. Smith, MD FACS  
Richard J. H. Smith, MD FACS  
Timothy L. Smith, MD MPH FACS  
Eric E. Smouha, MD FACS  
Joseph C. Sniezek, MD FACS  
Ahmed M.S. Soliman, MD  
C. Daniel Sooy, MD  
Douglas M. Sorensen, MD FACS  
Jeffrey H. Spiegel, MD FACS  
Joseph R. Spiegel, MD FACS  
Jeffrey D. Spiro, MD  
Maie A. St. John, MD

Robert J. Stachler, MD FACS  
Hinrich Staecker, MD PhD  
J. Gregory Staffel, MD  
James A. Stankiewicz, MD FACS  
David L. Steward, MD FACS  
Michael G. Stewart, MD MPH FACS  
Sandro J. Stoeckli, MD  
Scott E. Strome, MD FACS  
Erich M. Sturgis, MD FACS  
Lucian Sulica, MD  
Krishnamurthi Sundaram, MD FACS  
Mark James Syms, MD FACS  
Abtin Tabae, MD  
Thomas A. Tami, MD FACS  
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