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## Message from the President, Jonas T. Johnson, MD FACS

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Welcome to Las Vegas! Thank you for attending our 117th 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, Robert Ferris, MD and our Program Committee. Some of the highlights include a presentation on “Don’t Fear Change” which will be given by my Guest of Honor, Michael M.E. Johns, MD and Dr. David Eibling’s Ogura Lecture “When More than the Patient Is Ill: Healing Sick Systems”. Our Thursday panels include “Technology and Tools for Lifelong Learning”; “Robotics – Luxury or Necessity”. Our Friday panels include “HPV in Different Subsites - Clinical Importance and Effect on Therapy”; “Migrainous Vertigo – Pathophysiology, Diagnosis and Treatment”; “Allergy, Immunotherapy: Shots, Drops or Tablets?”; “Fluctuating and Progressive Sensorineural Hearing Loss in Children”; “Healthcare Delivery/Affordable Care Act—What Do We Know and What Can We Do?”; “Issues You Cannot Ignore in Your Older Patients”. 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.

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### Thursday - Florentine Ballroom

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noon	Business Meeting (Fellows Only) <b>New Fellow Ceremonies/Reception</b>
1:00 - 5:00	Scientific Session
1:00	Welcome & Presidential Citations
1:15	Introduction of Guest of Honor and Guest of Honor Address <i>Don't Fear Change</i>
1:35	Presidential Address <i>The Real Challenges of Health Care Reform</i>
2:11	Ogura Lecture When More Than the Patient Is Ill: Healing Sick Systems
2:35	Panel: <i>Technology and Tools for Lifelong Learning</i>
3:15	Break/Poster Viewing
3:40 - 5:00	Robotics Session
3:40	Panel: <i>Robotics - Luxury or Necessity</i>
4:25	Papers
5:00	Adjourn
5:30	Meet the Authors Poster Reception

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### Friday - Florentine Ballroom

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7:00	Business Meeting (Fellows Only)
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### Friday - Concurrent Session I - Florentine Ballroom

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8:00 - 10:00	Laryngology/Head and Neck Session
8:00	Panel: <i>HPV in Different Subsites - Clinical Importance and Effect on Therapy</i>
9:15	Papers

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## **Friday - Concurrent Session I - Florentine Ballroom**

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10:00	Break/Poster Viewing
10:30 - 12:00	Pediatric Otolaryngology
10:30	Panel: <i>Fluctuating and Progressive Sensorineural Hearing Loss in Children</i>
11:15	Papers
12:00	Lunch in Exhibit Hall

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## **Friday - Concurrent Session II - Roman II/IV**

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8:00 - 10:00	Otology/Neurotology Session
8:00	Panel: <i>Migrainous Vertigo - Pathophysiology, Diagnosis and Treatment</i>
9:15	Papers
10:00	Break/Poster Viewing
10:30 - 12:00	Rhinology/Allergy and Facial Plastics Session
10:30	Panel: <i>Allergy Immunotherapy: Shots, Drops or Tablets?</i>
11:15	Papers
12:00	Lunch in Exhibit Hall

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## **Friday - Scientific Session - Florentine Ballroom**

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1:00	Panel: <i>Healthcare Delivery/Affordable Care Act - What Do We Know and What Can We Do?</i>
2:10	Papers
2:45	Break/Poster Viewing
3:15 - 5:00	Geriatrics/Head and Neck Session
3:15	Panel: <i>Issues You Cannot Ignore in Your Older Patients</i>
4:15	Papers
5:00	Meeting Adjourns

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# 117TH ANNUAL MEETING

## CAESARS PALACE

### LAS VEGAS, NEVADA

### MAY 15-16, 2014

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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:

- Understand the controversy over robotic surgery for cancer and sleep apnea and the role of image guidance and balloon sinuplasty during sinus surgery;
- Appreciate the nuances of geriatric otolaryngology and how this population has some unique disease patterns;
- Gain additional information on fluctuating and progressive SNHL in the pediatric population;
- Be updated on the MOC process under ABMS;
- Understand the role of HPV infection in different head and neck subsites and its effect on outcome and treatment selection;
- Be exposed to the intricacies of electronic medical records and how they can be most efficiently utilized in the new ACA law
- Understand the latest in diagnosing and managing vestibular migraine

## **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 sponsorship of the American College of Surgeons and the Triological Society. The American College 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 - Jonas T. Johnson, MD FACS**  
Pittsburgh, PA

Karen M. Kost, MD  
Montreal, QC

**Program Chair - Robert L. Ferris, MD PhD FACS**  
Pittsburgh, PA

Dennis H. Kraus, MD FACS  
New York, NY

Karen H. Calhoun, MD FACS  
Columbus, OH

John P. Leonetti, MD  
Maywood, IL

Dinesh K. Chhetri, MD  
Los Angeles, CA

Sandra Y. Lin, MD  
Baltimore, MD

Sukgi S. Choi, MD FACS  
Pittsburgh, PA

Todd A. Loehrl, MD  
Milwaukee, WI

David E. Eibling, MD FACS  
Pittsburgh, PA

Cherie-Ann Nathan, MD FACS  
Shreveport, LA

Andrew N. Goldberg, MD MSCE FACS  
San Francisco, CA

Lorne S. Parnes, MD  
London, ON

Theresa A. Hadlock, MD  
Boston, MA

William W. Shockley, MD FACS  
Chapel Hill, NC

Christopher J. Hartnick, MD FACS  
Boston, MA

Debara Lyn Tucci, MD FACS  
Durham, NC

Michael M. Johns III, MD  
Atlanta, GA

Mark K. Wax, MD FACS  
Portland, OR

Eric J. Kezirian, MD  
Los Angeles, CA

Kathleen L. Yaremchuk, MD  
Detroit, MI

**Disclosure Information**  
**Triological Society 117th Annual Meeting**  
**May 15-16, 2014**  
**Las Vegas, Nevada**

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 sponsorship 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)
Samer Al-khudari, MD	X	
Ellis M. Arjmand, MD MMM PhD	X	
Karam W. Badran, BSc	X	
Emily M. Barrow, BS	X	
Kent L. Burton, BS	X	
Karen H. Calhoun, MD FACS	X	
John P. Carey, MD		Otonomy (principal investigator-grant); Pfizer (principal investigator-grant)
Kyle J. Chambers, MD	X	
Dinesh K. Chhetri, MD	X	
Sugki S. Choi, MD FACS	X	
Daniel I. Choo, MD FACS	X	
Thomas K. Chung, MD	X	
Michael B. Cohen, MD	X	
Marion E. Couch, MD PhD MBA FACS	X	
David W. Cuthbertson, MD	X	
Nichole R. Dean, DO	X	
Adam S. DeConde, MD	X	
Anthony G. Del Signore, MD	X	
Craig Derkay, MD	X	
Jacob K. Dey, BS	X	
David E. Eibling, MD FACS	X	
Danielle F. Eytan, BS	X	
Daniel L. Faden, MD	X	
Carole Fakhry, MD MPH	X	
David Folk, MD	X	
Joel Franco, MS	X	

<b>SPEAKERS/MODERATORS/ CHAIRS/DISCUSSANTS</b>	<b>NOTHING TO DISCLOSE</b>	<b>DISCLOSURE (As it pertains to the content of the presentation)</b>
Andrew N. Goldberg, MD MSCE FACS		Patent pending 61/624,105-sinus diagnostics and therapeutics
Steven A. Gordon, MPH	X	
Andrew Griffith, MD PhD	X	
Michael L. Hinni, MD FACS		My employer has licensed my design for a new laryngoscope to Karl Storz instrument company for manufacture. I have received no royalties from this in the past 12 months but could in the future.
Jordan B. Hochman, MD		patent printing algorithm applied to a numbered company (patent holder)
Benjamin L. Hodnett, MD PhD	X	
Paul T. Hoff, MD	X	
Neal M. Jackson, MD	X	
Sarah B. Jacob, MD	X	
Gina D. Jefferson, MD	X	
Michael M. Johns III	X	
Michael M.E. Johns, MD	X	
Jonas T. Johnson, MD FACS	X	
Victoria A. Jordan, MS4	X	
Alissa A. Kanaan, MD	X	
David M. Kaylie, MD FACS	X	
Eric J. Kezirian, MD		Apnex Medical (medical advisory board-consulting fee, research funding); Berendo Scientific (member-intellectual property rights, ownership interest); Inspire Medical Systems (consultant-consulting fee); ReVENT Medical (medical advisory board-ownership interest); Split Rock Scientific (consultant-ownership interest)
Karen M. Kost, MD		Cook Medical (consultant-no financial remuneration for the past 3 years)
Dennis H. Kraus, MD FACS	X	
Kaelyn A. Krook, MD	X	
John H. Krouse, MD PhD FACS	X	
Jafri Kuthubutheen, MBBS FRACS	X	
John P. Leonetti, MD	X	
Marci M. Lesperance, MD FACS	X	
Sandra Y. Lin, MD	X	
J. Scott Magnuson, MD		Intuitive Surgical Inc. (teaching-honoraria); Lumenis Inc. (teaching-honoraria); Medrobotics (advisory panel-consulting fee)
Mohammed Mamdani, BS MS	X	
Jeremy D. Meier, MD	X	
Anna H. Messner, MD	X	
Cherie-Ann Nathan, MD FACS	X	
Angelia S. Natili, MD	X	
Brian A. Neff, MD	X	
Brent G. Nichols, MD	X	
Blake C. Papsin, MD FACS	X	
Lorne S. Parnes, MD	X	
Hetal H. Patel, MD	X	
Cedric V. Pritchett, MD	X	
James W. Rocco, MD PhD		Onyx (advisory meeting- honoraria); Quintile (speaking and teaching-honoraria)
Michael J. Ruckenstein, MD FACS	X	
Rodney J. Schlosser, MD	X	
Andrew Richardson Scott, MD*	X	
Ashok R. Shaha, 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>
David Shamouelian, MD	X	
Robert J. Stachler, MD FACS	X	
Hinrich Staecker, MD PhD		Novartis Inc. (grant support)
Daniel C. Sukato, BA	X	
David J. Terris, MD FACS		Johnson & Johnson (thyroid course director-honorarium)
Erica R. Thaler, MD FACS		Intuitive (departmental compensation for work on FDA approval)
Elina Toskala, MD		Merck, (advisory board member-honorarium)
Debara L. Tucci, MD FACS	X	
Ozlem E. Tulunay-Ugur, MD	X	
Andrew J. Victores, MD	X	
George B. Wanna, MD	X	
Edward M. Weaver, MD MPH FACS	X	
Randal S. Weber, MD FACS	X	
Gregory J. Wiet, MD FACS		Medtronic (research support-donation of mastoidectomy burrs)
B. Tucker Woodson, MD FACS	X	
Kathleen L. Yaremchuk, MD	X	
Joshua C. Yelverton, MD	X	
<b>PLANNING COMMITTEE</b>	<b>NOTHING TO DISCLOSE</b>	<b>DISCLOSURE (All commercial relationships)</b>
Karen H. Calhoun, MD FACS	X	
Dinesh K. Chhetri, MD	X	
Sukgi S. Choi, MD FACS	X	
David E. Eibling, MD FACS	X	
Robert L. Ferris, MD PhD FACS		Bristol Myers Squibb (honorarium-consultant)
Andrew N. Goldberg, MD MSCE FACS		Apnicure (stock options-consultant); Siesta Medical (stock options-consultant); patent pending 61/624, 105; sinus diagnostics and therapeutics
Theresa A. Hadlock, MD	X	
Christopher J. Hartnick, MD FACS	X	
Michael M. Johns III, MD	X	
Jonas T. Johnson, MD FACS	X	
Eric J. Kezirian, MD		Apnex Medical (salary support-co-PI, advisory board); Inspire Medical Systems (consulting fee-consultant); Magnap (intellectual property rights-co-inventor); Revent Medical (consulting fee-advisory board); Split Rock Scientific (ownership interest-consulting)
Karen M. Kost, MD		Cook Inc. (no honoraria to date-consultant)
Dennis H. Kraus, MD FACS	X	
John P. Leonetti, MD	X	
Sandra Y. Lin, MD	X	
Todd A. Loehrl, MD	X	
Cherie-Ann Nathan, MD FACS		patent through University on Curcumin (patent intellectual and property rights)
Lorne S. Parnes, MD	X	
William W. Shockley, MD FACS	X	
Debara Lyn Tucci, MD FACS		Glaxo Smith Kline (spouse salary-employee); Otonomy Inc. (consultant)
Mark K. Wax, MD FACS	X	
Kathleen L. Yaremchuk, MD	X	

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## Honorees

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### GUEST OF HONOR

**Michael M.E. Johns, MD**



Dr. Johns is currently Professor of Medicine and Public Health at Emory University. Dr. Johns received his medical degree and subsequent residency training in Otolaryngology at the University of Michigan. Following a brief stint in the service of the US Army, Dr. Johns joined the faculty at the University of Virginia, Department of Otolaryngology. He subsequently served as Chairman of the Department of Otolaryngology-Head and Neck Surgery and then Dean of the Medical Faculty and Vice President for Medical Affairs at the Johns Hopkins School of Medicine.

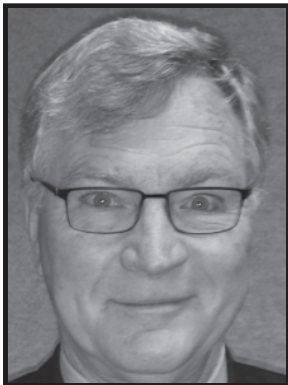
In 1996, Dr. Johns became Chairman of the Board of Emory Health Care and Executive Vice President for Health Affairs. He served as University Chancellor from 2007 to 2012. Dr. Johns was elected to the Institute of Medicine in 1993. He has served Americans and American medicine through service on the American College of Surgeons' Health Policy Institute. Through the Institute of Medicine, he has participated in the roundtables on evidence-based medicine and co-chaired the Committee on Best Practices Innovation Collaborative. He serves on the Board of Visitors at the University of Pittsburgh School of Medicine.

Dr. Johns has served Otolaryngology as a member of the American Board of Otolaryngology and as its President, 2000-2003. He has chaired the Board of Directors of the Association of Academic Health Centers and served on the Executive Council of the Association of Academic Medical Centers.

Dr. Michael Johns continues to make meaningful contributions in Otolaryngology while influencing the evolution of healthcare reform. Through leadership and teaching, he is a role model for all.

### SPECIAL HONORED GUEST

**David N. Johnson, MD**



David Johnson, MD, began his medical career in Italy and completed his studies at New York Medical College. Dr. Johnson is board certified in Family Medicine and Geriatrics. Following two years in the Indian Health Service in Bemidji, MN, Dr. Johnson moved his family to Buffalo, NY, where he has served that community ever since.

His first trip to Nepal was the spring of 2000. The healthcare situation in rural eastern Nepal was a real eye opener. Very few professions are available and no hospital existed. He returned later the same year and trekked to Ilam with the founder of the Himalaya Healthcare Foundation. The idea developed to find a way to build a hospital in Ilam, a mountain village 6 hours from Katmandu serving over 1 million people.

In the ensuing years, Dr. Johnson has returned to Nepal 14 times. Working through Rotary International and his local community in Buffalo, NY, funding was secured and the hospital in Ilam opened in April 2004. Efforts continue today to train local healthcare providers to sustain this vital activity.

This special honor award is intended to recognize Dr. David Johnson and the many other physicians around the country and worldwide who have worked tirelessly to establish enduring improvement in healthcare for the populations of rural, underserved areas.

## **PRESIDENTIAL CITATION AWARDEE**

### **Barton F. Branstetter IV, MD**



Barton F. (Char) Branstetter IV, MD, is a graduate of the University of California at San Diego. He subsequently completed residency training in radiology and a combined fellowship in Neuroradiology, ENT Radiology, and Radiology Informatics at the University of Pittsburgh, where he remains on staff as a Professor of Radiology, Otolaryngology, and Biomedical Informatics and chief of Neuroradiology. His research interests include topics in head and neck imaging, particularly the use of PET/CT in head and neck cancer.

Dr. Branstetter has served in many leadership roles including chairing the Education Committee for the Society for Imaging Informatics in Medicine. He chaired the Education Committee for the American Society of Neuroradiology, and chairs the Research Committee of the American Society for Head and Neck Radiology. Dr. Branstetter has contributed nearly 100 manuscripts to the peer review literature. His work has helped develop a better understanding of the evidence basis for modern imaging in the head and neck.

Dr. Branstetter and his colleagues in Neuroradiology are essential participants in patient care. His subspecialty skills, clear understanding of diseases of the head and neck combined with his willingness and availability to serve on the health care team have made him an invaluable part of the University of Pittsburgh's efforts in patient care, research, and education.

## **PRESIDENTIAL CITATION AWARDEE**

### **Barry Schaitkin, MD**



Barry Schaitkin, MD, attended the University of Rochester as an undergraduate and went to medical school at Penn State University. He completed his residency at the Penn State Hershey Medical Center and served on the faculty after graduation. He moved to Pittsburgh in 1991 and joined Dr. Mark May in private practice at Shadyside Hospital where his practice was mostly endoscopic sinus surgery and facial reanimation. In 1996, he joined the faculty at the University of Pittsburgh.

Dr. Schaitkin traveled to Switzerland to learn salivary endoscopy in 2005 when the devices became FDA approved and established a busy salivary gland practice. He has written numerous papers and book chapters and taught courses on the subjects of sinus surgery, facial nerve, and salivary endoscopy.

In addition to his busy practice, Dr. Schaitkin is a gifted and energetic educator at the University of Pittsburgh. He has received the Outstanding Teacher Award on many occasions.

Dr. Schaitkin is the residency program director in Otolaryngology at the University of Pittsburgh. His efforts have transformed graduate medication education in the department.

Dr. Schaitkin has three children who are extremely accomplished in the performing arts. He is married to Dr. Sally Carty, an endocrine surgeon, who is the president of the American Association of Endocrine Surgeons.

**PRESIDENTIAL CITATION AWARDEE**

**Carl H. Snyderman, MD**



Dr. Snyderman is a graduate of the University of Chicago Pritzker School of Medicine. He subsequently completed his residency training in otolaryngology, as well as his fellowship in cranial base surgery at the University of Pittsburgh. In the ensuing 25 years, Carl Snyderman has introduced minimally invasive endoscopic endonasal approaches to the world of surgery of the paranasal sinuses and skull base. He is a tireless educator who teaches multiple courses on endoscopic endonasal surgery annually while traveling worldwide in his role as educator. Through innovation and education, his work has expanded the opportunity for improved clinical outcomes and reduced morbidity.

Dr. Snyderman continued his education and received a Masters of Business Administration (2012) from the University of Pittsburgh. He currently serves as Professor of Otolaryngology and Neurologic Surgery, as well as Vice Chair for Quality and Safety in the Department of Otolaryngology at the University of Pittsburgh. He shares his life with four children and his wife, Miki, who practices internal medicine.

**PRESIDENTIAL CITATION AWARDEE**

**Tamara Wasserman-Wincko, MS**

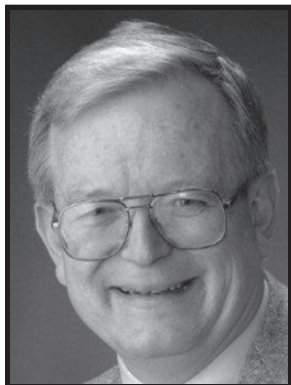


Tamara Wasserman-Wincko earned her Master's in Speech Pathology in Nova Southeastern University of Florida. She subsequently came to University of Pittsburgh as a clinical fellow. In the ensuing years, Ms. Wasserman-Wincko assumed a leadership position, serving the Department of Otolaryngology in helping to manage head and neck cancer patients with swallowing disorders. She joined the faculty of the University of Pittsburgh as a clinical instructor in 2001.

As the responsibilities at UPMC were expanded, Ms. Wasserman-Wincko was charged with the management of a growing team of speech language pathologists providing both inpatient and outpatient services to UPMC. In 2009, she completed a mini-MBA in the Physician Services Division Leadership and Management Program. Today, she oversees the provision of clinical services in 6 hospitals serving over 55,000 annual admissions. She has spearheaded efforts to screen for and prevent aspiration in the inpatient population while overseeing a growing program of outpatient therapy. Her personal contributions to the field of head and

neck and to the care of patients with swallowing disorders in our region serve to remind us all of the essential contributions our colleagues make in our efforts to provide outstanding healthcare.

**JOSEPH H. OGURA, MD, LECTURER**  
**David E. Eibling, MD FACS**



David E. Eibling, MD, completed his medical education at the Ohio State University and residency training at Yale-New Haven Hospital. As an active duty serviceman, Dr. Eibling was chief of Otolaryngology Services at the Travis Air Force Base in California and the Wiesbaden Air Force Base in Germany. His service to the USAF was completed as Chair and Residency Program Director at the Wilford Hall USAF Medical Center in Texas.

Dr. Eibling completed fellowship training in Advanced Oncologic Head and Neck Surgery at the University of Pittsburgh School of Medicine. Upon retirement from the Air Force, he returned to Pittsburgh where he served as Chief of Otolaryngology at the VA Medical Center. Dr. Eibling is the recipient of the Teacher of the Year Award from the David Grant USAF Medical Center, Travis AFB, and has been on two occasions named Teacher of the Year in the Department of Otolaryngology at the University of Pittsburgh. He has received the Dean's Award for Master Educator at the University of Pittsburgh.

Dr. Eibling currently serves as Vice Chairman for Education in the Department of Otolaryngology at the University of Pittsburgh. He is deeply involved in the study of human factors in ergonomics and has participated often in symposiums and roundtables to enhance surgical simulation, patient safety, and quality. Dr. Eibling has served as Past President of the Society of Military Otolaryngologists. He is a founding member of the American Society of Geriatric Otolaryngology and has served the Triological Society as an elected member of Council.

Through service to the United States Air Force, the Veteran's Administration Medical Center, the Air Force Surgeon General, and the University of Pittsburgh, Dr. Eibling brings a unique perspective on health care in the United States and offers insight into the potential for improvement.

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## **2014 Thesis Award Winners**

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### **Edmund Prince Fowler Award**

**Hinrich Staecker, MD PhD, Kansas City, KS**

*Optimizing atoh1 Induced Vestibular Hair Cell Regeneration*

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

**George B. Wanna, MD FACS, Nashville, TN**

*The Impact of Electrode Type and Surgical Approach on Scalar Electrode Location and Hearing Outcomes in Cochlear Implantation*

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

**Kenneth H. Lee, MD PhD, Plano, TX**

*Ephs and Ephrins in Cochlear Innervation and Implications for a Biological Approach to Advancing Cochlear Implant Function*

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

**Andrew Richardson Scott, MD FACS, Boston, MA**

*Regional Variations in the Presentation and Surgical Management of Pierre Robin Sequence*

### **With Distinction Award**

**Howard W. Francis, MD, Baltimore, MD**

*Hearing Outcomes in Older Patients with Cochlear Implants: A Retrospective Study of Clinical and Psychosocial Risk Factors*

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## **New Fellows to Be Inducted**

New Fellow Ceremonies followed by the reception with Triological Fellows is scheduled on Thursday, May 15th from 12:00 - 12:55 in Florentine Ballroom

Robert Arthur Buckmire, MD ..... Chapel Hill, NC  
Susan Rachelle Cordes, MD FACS ..... Indianapolis, IN  
Howard W. Francis, MD ..... Baltimore, MD  
Kevin Fung, MD FRCS(C) FACS ..... London, ON  
Marion Boyd Gillespie, MD MSc FACS ..... Charleston, SC  
Stacey Lynn Ishman, MD MPH ..... Cincinnati, OH  
Kenneth H. Lee, MD PhD ..... Plano, TX  
Scott Lungchi Lee, MD BA FACS ..... Renton, WA  
Brian Philip Perry, MD FACS ..... San Antonio, TX  
Jeremy David Richmon, MD FACS ..... Baltimore, MD  
Brian William Rotenberg, MD MPH ..... London, ON Canada  
Andrew Richardson Scott, MD FACS ..... Boston, MA  
Jeffrey Philip Simons, MD FACS ..... Pittsburgh, PA  
Hinrich Staecker, MD PhD ..... Kansas City, KS  
Travis T. Tollefson, MD MPH FACS ..... Sacramento, CA  
George B. Wanna, MD FACS ..... Nashville, TN

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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 Fourteen.

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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		

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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 Fourteen.

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## Recipients

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

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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  
117TH ANNUAL MEETING PROGRAM  
MAY 15-16, 2014  
CAESARS PALACE, LAS VEGAS, NEVADA**

**THURSDAY, MAY 15, 2014**

**12:00**      *Business Meeting/New Fellow Ceremony (Members only) - Florentine*

**1:00 - 5:00 SCIENTIFIC SESSION  
FLORENTINE**

- 1:00**      **WELCOME/OPENING REMARKS BY PRESIDENT**  
Jonas T. Johnson, MD FACS\*, Pittsburgh, PA
- PRESIDENTIAL CITATION AWARDEES INTRODUCTIONS**  
Barton F. Branstetter IV, MD, Pittsburgh, PA  
Barry Schaitkin, MD, Pittsburgh, PA  
Carl H. Snyderman, MD, Pittsburgh, PA  
Tamara Wasserman-Wincko, MS, Pittsburgh, PA
- 1:15**      **GUEST OF HONOR INTRODUCTION/PRESENTATION**  
**Don't Fear Change**  
Michael M.E. Johns, MD\*, Atlanta, GA
- 1:30**      **SPECIAL HONORED GUEST INTRODUCTION**  
David N. Johnson, MD, Buffalo, NY
- 1:35**      **PRESIDENT'S ADDRESS**  
**The Real Challenges of Health Care Reform**  
Jonas T. Johnson, MD FACS\*, Pittsburgh, PA
- 1:55**      **MOSHER AWARD for Triological Society Thesis**  
**The Impact of Electrode Type and Surgical Approach on Scalar Electrode Location and Hearing Outcomes in Cochlear Implantation**  
George B. Wanna, MD FACS\*, Nashville, TN
- 2:03**      **FOWLER AWARD for Triological Society Thesis**  
**Optimizing atoh1 Induced Vestibular Hair Cell Regeneration**  
Hinrich Staecker, MD PhD\*, Kansas City, KS
- 2:11**      **JOSEPH H. OGURA, MD LECTURE**  
**When More than the Patient Is Ill: Healing Sick Systems**  
David E. Eibling, MD FACS\*, Pittsburgh, PA
- 2:35 - 3:15**      **PANEL: TECHNOLOGY AND TOOLS FOR LIFELONG LEARNING**  
**Moderators:**      Karen H. Calhoun, MD FACS\*, Columbus, OH  
                         Kathleen L. Yaremchuk, MD\*, Detroit, MI  
**Panelists:**      **Maintenance of Certification**  
                         Randal S. Weber, MD FACS\*, Houston, TX  
                         **Adult Learning**  
                         Anna H. Messner, MD\*, Stanford, CA  
                         **Simulators in Training**  
                         Gregory J. Wiet, MD FACS\*, Columbus, OH
- 3:15 - 3:40**      **BREAK/POSTER VIEWING**

\*Denotes Fellow

## 3:40 - 5:00 ROBOTICS SESSION

3:40 - 4:25

### PANEL: ROBOTICS - LUXURY OR NECESSITY

**Moderators:** Dennis H. Kraus, MD FACS\*, New York, NY  
Cherie-Ann Nathan, MD FACS\*, Shreveport, LA

**Panelists:** **TORS or TLM for HPV Positive OPSCC**  
J. Scott Magnuson, MD\*, Celebration, FL  
Michael L. Hinni, MD FACS\*, Phoenix, AZ  
**Thyroidectomy: Rules for the Tools**  
David J. Terris, MD FACS\*, Augusta, GA  
Ashok R. Shaha, MD FACS\*, New York, NY  
**Sleep Apnea: Leonardo vs da Vinci for BOT Reduction**  
Erica R. Thaler, MD FACS\*, Philadelphia, PA  
B. Tucker Woodson, MD FACS\*, Milwaukee, WI

**Moderators: Dennis H. Kraus, MD FACS\*, New York, NY**  
**Cherie-Ann Nathan, MD FACS\*, Shreveport, LA**

4:25

### Transoral Robotic Surgery for Oropharyngeal and Tongue Cancer in the United States

Thomas K. Chung, MD, Birmingham, AL; Eben L. Rosenthal, MD\*, Birmingham, AL; Jeffery Scott Magnuson, MD\*, Celebration, FL; William R. Carroll, MD, Birmingham, AL

**Educational Objective:** At the conclusion of this presentation, the participants should understand the cost effectiveness of transoral robotic surgery (TORS) compared to open in a nationwide data set.

**Objectives:** To compare the clinical and cost effectiveness of TORS versus open procedures following FDA approval in December 2009. **Study Design:** Retrospective analysis of the Nationwide Inpatient Sample from 2010 to 2011. Primary endpoints included median length of stay, charge, cost, same stay complication, and coincident tracheostomy or gastrostomy tube placement. **Methods:** Elective partial pharyngectomies and partial glossectomies for neoplasm were identified by ICD-9-CM code. Patients were risk adjusted by Diagnosis Related Group severity of illness. Charge and cost data were inflation adjusted to 2013 equivalents. **Results:** TORS represented 2.1% in 2010 and 2.2% in 2011 of all transoral ablative procedures. Patients undergoing open partial pharyngectomy for oropharyngeal neoplasms (n=1426) had more severe illness compared to TORS (n=641). However, after controlling for minor to moderate severity of illness, open partial pharyngectomy was associated with longer hospital stay (5.2 vs 3.7 days, p<0.001), higher charge (\$98,228 vs \$67,317, p<0.001), higher cost (\$29,365 vs \$20,706, p<0.001), higher rates of tracheostomy and gastrostomy tube placement and more wound and bleeding complications. TORS was associated with a higher rate of dysphagia (19.5% vs 8.0%, p<0.001). The cost effectiveness of TORS remained significant in the major to extreme severity of illness group but was associated with higher complication rates when compared to open cases of the same severity of illness. A similar analysis of TORS partial glossectomy revealed longer hospital stays and no benefit in charge or cost compared to open. **Conclusions:** Early data demonstrate cost effectiveness of TORS partial pharyngectomy and no benefit in partial glossectomy. Anatomic accessibility and extent of surgery likely factor into the effectiveness of TORS.

4:32

### Factors Influencing Performance on Robotic Surgery Simulation

Hamad Chaudhary, MD MS, Detroit, MI; Samer Al-khudari, MD, Chicago, IL (Presenter); Catherine Lumley, MD, Georgetown, DC; Tamer Ghanem, MD PhD, Detroit, MI; Francis Hall, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the strengths and weakness of two different cohorts in their performance with a robotic surgery simulator. They will also be able to explain why certain subjects had superior performance with the robotic surgery simulator.

**Objectives:** The objective is to understand what factors and habits influence performance on a robotic surgery simulator. **Study Design:** Prospective cohort study. **Methods:** Nineteen third year medical students and 9 attending staff surgeons (n=28) were included in this and participated in five exercises on the robotic surgery skills simulator which utilizes the actual robotic surgeon console. Outcome measures included time to completion, economy of motion, instrument collisions, excessive instrument force, missed targets as well as others. Following each session the subjects completed a survey composed of demographics, level of surgical training, video game exposure, and motion controlled video game use. A Wilcoxon rank sum test was performed to evaluate the various relationships between the surgeon factors and experience levels. **Results:** When reviewing overall scores and category performance no significant difference was found between attending physicians and medical students. Both attending surgeons and medical students exhibited a statistically significant similar degree of improvement during the testing period. Motion controlled video game use was the only statistically significant factor that correlated with superior performance. **Conclusions:** In conclusion, previous surgical training did not correlate with superior performance of robotic skills. The only factor that is correlated with improved performance among all subjects was a history of motion controlled video game use.

## 4:39 Transoral Robotic Surgery for Obstructive Sleep Apnea

David Folk, MD, New Haven, CT; Boris Paskhover, MD, New Haven, CT; Stewart I. Adam, MD, New Haven, CT; Mark D'Agostino, MD, New Haven, CT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the role and efficacy of robotics in the treatment of obstructive sleep apnea.

**Objectives:** To evaluate the safety and efficacy of partial base of tongue (BOT) resection via transoral robotic surgery (TORS) for obstructive sleep apnea (OSA). **Study Design:** Case series. **Methods:** Between July 2010 and May 2013, TORS BOT resection was performed in 70 patients as part of single or multi level surgery. Patients were excluded if data was incomplete or if surgery was performed for a diagnosis other than OSA. **Results:** Fifty patients who underwent TORS were included in the study. The mean age was 47.7 (SD 10.3). There were thirty-eight males and twelve females. The mean BMI was 32.3 (SD 4.1) and the mean volume of tissue removed was 9.94 milliliters. The mean apnea-hypopnea index (AHI) was  $41.3 \pm 17.4$  preoperatively and  $18.1 \pm 9.7$  postoperatively. There was a statistically significant decrease in the AHI of  $23.2 \pm 12.6$  ( $P < 0.001$ ). Statistically significant improvements were attained in somnolence levels measured by the Epworth Sleepiness Scale ( $12.7 \pm 3.4$  preoperatively vs.  $5 \pm 2.6$  postoperatively,  $P < 0.001$ ) as well as minimum oxygen saturations ( $81.4\% \pm 5.8$  preoperatively vs.  $85.6\% \pm 3.7$  postoperatively,  $P < 0.001$ ). There were no intraoperative or perioperative complications. Success was defined as final AHI  $< 20$  with a  $> 50\%$  reduction in AHI. By this definition, 40 (80%) patients were treated successfully. **Conclusions:** This represents one of the largest series of TORS for OSA. TORS with BOT resection individually or as part of multilevel surgery provides a high success rate with minimal complications and warrants a prominent position in the spectrum of OSA treatment.

## 4:46 Outcomes following Transoral Robotic Surgery for Treatment of Obstructive Sleep Apnea

Nichole R. Dean, DO, Birmingham, AL; Kirk P. Withrow, MD, Birmingham, AL; Lisa K. Clemons, RN, Birmingham, AL; Eben L. Rosenthal, MD\*, Birmingham, AL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss outcomes following base of tongue resection via transoral robotic surgery for the treatment of obstructive sleep apnea.

**Objectives:** To evaluate outcomes in patients following transoral robotic assisted surgery for the treatment of obstructive sleep apnea. **Study Design:** Retrospective review. **Methods:** From June 2011 to August 2013 a total of 37 patients with obstructive sleep apnea (OSA) underwent transoral robotic surgery (TORS) for base of tongue resection. Sleep endoscopy was performed in all patients, some required additional procedures at the time of tongue base resection to address severe and multilevel obstruction (supraglottoplasty n=9, uvulopalatopharyngoplasty n=14, ZETA palatoplasty n=9, epiglottopexy n=8 and hyoid advancement n=4). Hospital stay and postoperative course were assessed including length of Dobbhoff tube use and MD Anderson dysphagia inventory (MDADI) scores. **Results:** Median age was 46 (range, 26-65). The majority of patients were male (76%) and presented with a BMI of 31.8 (median; range, 22.3-52.9). The mean preoperative MDADI score across all patients was 85 (range 57-100), at 1 month postoperatively 65 (range 47-89) and at 3 months 74 (range 47-100). The majority of patients had a Dobbhoff tube placed at the time of surgery (87%) which was removed at 5 days (range 1-30). Most patients were able to tolerate a soft diet after 3 weeks (90%). **Conclusions:** Transoral robotic tongue base resection for OSA is well tolerated, immediate postoperative dysphagia is common and should be managed accordingly.

## 4:53 Body Mass Index Predicts Success in Patients Undergoing Transoral Robotic Surgery (TORS) for Management of Moderate to Severe Obstructive Sleep Apnea (OSA)

Paul T. Hoff, MD, Ann Arbor, MI; Tiffany A. Glazer, MD, 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 body mass index may be a predictor of success in patients undergoing TORS for management of moderate to severe OSA.

**Objectives:** To determine predictors of success in patients undergoing TORS for management of moderate to severe OSA. **Study Design:** Retrospective cohort study. **Methods:** 148 patients (106 male, 42 female) underwent TORS between December 2010 and October 2013. TORS was preceded by drug induced sedated endoscopy. All patients had varying combinations of robotic assisted lingual tonsillectomy, partial midline glossectomy and epiglottoplasty performed either as standalone surgery or in combination with palatal z-plasty, lateral pharyngoplasty or uvulopalatopharyngoplasty. All procedures were performed with transnasal intubation. Success was defined as a decrease in apnea hypopnea index (AHI)  $< 20$ . Cure was defined as an AHI  $< 5$ . **Results:** There was a significant difference in the preoperative and postoperative AHI in the entire cohort ( $43.2$  vs  $27.9$ ;  $p < 0.001$ ). Overall 75.3% of patients had an improvement in their AHI, 49% of patients met criteria for success defined as AHI  $< 20$  and 11% met criteria for cure defined as AHI  $< 5$ . When stratifying by BMI, there was a significant difference in success when comparing patients with BMI  $< 30$  versus BMI  $> 30$  ( $59.2\%$  vs  $34.5\%$ ;  $p = 0.029$ ). The cure rate in patients with BMI  $< 30$  was 12.2% and BMI  $> 30$  was 9.4% ( $p = 0.54$ ). There was no difference in success or cure rates when stratified by age, sex, ASA classification, volume of lingual tonsil removed, or number of procedures performed. **Conclusions:** TORS for OSA may be effective in carefully selected patients. Preoperative BMI helps the clinician predict success in these patients, with two-thirds of patients having a clinically useful benefit.

# Thursday

5:00 ADJOURN

5:30 MEET THE AUTHORS POSTER RECEPTION

# FRIDAY, MAY 16, 2014

7:00 - 7:50 *Business Meeting (Members only) - Florentine*

## 8:00 - 12:00 CONCURRENT SESSIONS

### SESSION 1 - FLORENTINE

#### LARYNGOLOGY/HEAD AND NECK, PEDIATRIC OTOLARYNGOLOGY

### SESSION 2 - ROMAN II/IV

#### OTOLOGY/NEUROTOLOGY, RHINOLOGY/ALLERGY, FACIAL PLASTICS

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### CONCURRENT SESSION 1

#### FLORENTINE

### 8:00 - 10:00 LARYNGOLOGY/HEAD AND NECK SESSION

8:00 - 9:15 **PANEL: HPV IN DIFFERENT SUBSITES - CLINICAL IMPORTANCE AND EFFECT ON THERAPY**

**Moderators:** Dinesh K. Chhetri, MD\*, Los Angeles, CA  
James W. Rocco, MD PhD, Boston, MA

**Panelists:** Craig Derkay, MD, Norfolk, VA  
James W. Rocco, MD PhD, Boston, MA  
Carole Fakhry, MD MPH, Baltimore, D  
Michael M. Johns III, MD, Atlanta, GA

**Moderators:** Dinesh K. Chhetri, MD\*, Los Angeles, CA  
James W. Rocco, MD PhD, Boston, MA

9:15 **Comparison of Frozen and Permanent Surgical Margins in Large Cutaneous Squamous Cell Carcinomas of the Head and Neck**

Kyle J. Chambers, MD, Boston, MA; Stefan Kraft, MD PhD, Boston, MA; Kevin S. Emerick, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain potential causes of the discrepancy between frozen and permanent section analysis of surgical margins from large cutaneous head and neck squamous cell carcinomas and discuss the potential for certain histopathologic features to predict correlation of frozen and permanent surgical margin analysis.

**Objectives:** To identify histopathologic features associated with poor correlation of frozen and permanent pathology margins following wide local excision for advanced cutaneous squamous cell carcinomas of the head and neck. **Study Design:** Retrospective review. **Methods:** A retrospective review of patients undergoing excision of advanced head and neck squamous cell carcinomas between the years 2010-2013 was performed. Demographic, operative and pathology data were collected. Overall correlation between frozen section margins and final margins on permanent section results was calculated. Positive and negative predictive values of several histopathologic features were determined. **Results:** Forty-one cases were identified from the database. Perineural invasion, lymphovascular invasion, and a component of poorly differentiated carcinoma were identified in 61.3%, 34.5%, and 17.1% of cases, respectively. Discrepancy between frozen section margins and permanent margins was identified in 8 cases (19.5%). The false negative rate for poorly differentiated carcinoma, lymphovascular invasion, and perineural invasion was 14%, 36%, 26%, respectively. The positive and negative predictive value of poorly differentiated carcinoma, lymphovascular invasion, and perineural invasion in predicting discrepancy between frozen and permanent margins was 14% and 82%, 36% and 84%, and 26% and 92%, respectively. **Conclusions:** This study demonstrates a moderate rate of discrepancy between frozen and permanent section analysis of operative margins from high risk cutaneous squamous cell carcinomas of the head and neck. The presence or absence of certain histopathologic features appears to be associated with a higher rate of frozen section discrepancy. Evaluation of these features in a preoperative biopsy or staging excision may be useful in planning definitive excision and reconstruction.

9:22 **The Superior Rhinotomy Approach: A Novel Method for the Resection of Bilateral Sinonasal and Anterior Skull Base Tumors: A Review of 59 Patients**

Anthony G. Del Signore, MD, New York, NY; Anthony Reino, MD\*, New York, NY; William Lawson, MD\*, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the superior rhinotomy procedure, discuss the complications and long term results of the procedure.

**Objectives:** Introduced over 20 years ago, there has been little followup on the novel approach to the anterior skull base lesions. We review the complications and discuss the long term results of the superior rhinotomy approach. **Study Design:** Fifty-nine patients at two tertiary care centers were retrospectively reviewed. **Methods:** From 1985 to 2012, all patients presenting with bilateral ethmoid tumors with and without intracranial extension were resected utilizing the superior rhinotomy approach. Tumors were classified by pathology and stage at presentation. Patients undergoing either preoperative and/or postoperative radiation or chemotherapy were also noted. **Results:** Fifty-nine patients with bilateral ethmoid tumors were treated by the superior rhinotomy technique, with or without a bifrontal craniotomy. The mean age of this cohort was 62 years, with a range of 33-86 years. The mean duration of the followup was 92 weeks. 79% of tumors were malignant. Complication rates were low but consisted of wound dehiscence, epiphora, persistent diplopia, CSF leak and intraparenchymal cranial hemorrhage. **Conclusions:** The superior rhinotomy is a safe, versatile and highly effective approach for the en bloc resection of advanced malignancy of the ethmoid sinuses. The approach affords an excellent cosmetic result, which exceeds that of both the total and lateral rhinotomies. Based on our experience the authors feel that this approach should be part of the otolaryngologist's armamentarium for the treatment of advanced disease of the ethmoid sinuses and anterior skull base.

**9:29      Functional and Oncologic Outcomes following Transoral Robotic Surgery for Supraglottic Laryngectomy**  
Kent L. Burton, BS, Birmingham, AL; Alexandra E. Kejner, MD, Birmingham, AL; Thomas K. Chung, MD, Birmingham, AL; Eben L. Rosenthal, MD\*, Birmingham, AL; William R. Carroll, MD, Birmingham, AL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate the encouraging functional and oncologic outcomes of patients undergoing transoral robotic surgery for supraglottic squamous cell carcinoma.

**Objectives:** To describe functional and oncologic outcomes of patients undergoing transoral robotic surgery for squamous cell carcinoma of the supraglottic larynx. **Study Design:** A single center retrospective chart review from 2007 through 2011 for patients undergoing transoral robotic resection of head and neck cancer. **Methods:** Intraoperative margin status and final pathologic margin status were collected. Close margins were defined as less than 5 millimeters from the cut edge. Negative margins were defined as greater than 5 millimeters. **Results:** There were 17 patients (13 males, 4 females) included in the study with a mean followup time of 23 months. There were 4 patients who received postoperative radiation and one patient received combined radiation and chemotherapy. The mean hospital stay was 2.5 days. The mean time of safe advancement to liquid intake was 101 days for patients with gastrostomy tubes and 18 days for patients without. No (0%) patients required a tracheostomy. 6 (35.3%) patients required a gastrostomy tube. 13 (76.5%) patients were extubated in the OR, 2 (11.8%) were extubated on the first postoperative day and 2 (11.8%) were extubated on the third postoperative day. Overall 4 year survival was 88±8% while 1 year disease free survival was 73±11%. 8 (47.1%) patients had positive initial intraoperative margins and 2 (11.8%) patients had positive final intraoperative margins. 2 (11.8%) patients had positive margins on formal histopathologic analysis requiring re-excision. Final margins were negative on re-excision. **Conclusions:** Despite a high rate of cut-through margins, transoral robotic surgery for supraglottic cancer has oncologic outcomes comparable to open and transoral laser microsurgery.

**9:36      Targeting Aberrant Cell Death Pathways in HNSCC Using Novel SMAC Mimetic Birinapant**  
Danielle F. Eytan, BS, Bethesda, MD; Grace E. Snow, BA, Bethesda, MD; Zhong Chen, MD PhD, Bethesda, MD; Carter Van Waes, MD PhD, Bethesda, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the role of SMAC mimetics in cell death, and discuss birinapant's potential role in the treatment of head and neck squamous cell carcinoma (HNSCC).

**Objectives:** HNSCC cells are resistant to apoptosis induced by tumor necrosis factor (TNF) and cytotoxic therapies. Recently, up-regulation of inhibitor of apoptosis proteins (IAPs) has been demonstrated in HNSCC. SMAC mimetics, a class of drugs that target IAPs, have shown antitumor effects in several cancer models. We investigated the role of novel SMAC mimetic birinapant in HNSCC alone and in combination with TNF or chemotherapy. **Study Design:** A panel of HNSCC cell lines were treated with birinapant ± TNF or TRAIL and assessed for cell proliferation and cell cycle analysis. Combination studies using birinapant ± TNF ± docetaxel were performed using fixed ratios of each agent. **Methods:** Cells were treated with birinapant at doses ranging from 0.05 nM-10 mM and assessed for cell proliferation using XTT assays. Similar assays were performed using TNF (20 ng/mL), TRAIL (50 ng/mL), and docetaxel (0.05 nM-10 uM). IC50s were calculated on day 3. For combination studies, synergism was determined using the Chou-Talalay method. Cell cycle analysis was performed using PI staining and flow cytometry. **Results:** Birinapant, as a single agent or in combination with TNF or TRAIL decreased cell proliferation in a majority of cell lines, with IC50s ranging from 0.1 nM to >1 uM. Docetaxel showed synergism with birinapant ± TNF. Birinapant significantly increased subG0 cell death by flow cytometry at 24-72 hours. **Conclusions:** Birinapant effectively decreased cell proliferation, increased cell death, and exhibited synergism with docetaxel in HNSCC cell lines. Birinapant alone or in combination with chemotherapy may be an effective treatment for HNSCC.

**9:43      Identification of Optimal Intraoperative Nerve Stimulation Values For Prediction of Postoperative Vocal Fold Function in Thyroid Surgery**  
Daniel L. Faden, MD, San Francisco, CA; Tokunbo I. Ayeni, BS, San Francisco, CA; Daniel S. Fink, MD, New Orleans, LA; Lisa A. Orloff, MD, San Francisco, CA; Katherine C. Yung, MD, San Francisco, CA

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

weaknesses of intraoperative nerve monitoring in thyroidectomy as a predictive tool for postoperative vocal fold function.

**Objectives:** To identify accurate and precise measures of intraoperative recurrent laryngeal nerve (RLN) monitoring to help guide clinical use. **Study Design:** Retrospective cohort study of 1,328 nerves at risk, from a single surgeon, between 2004 and 2013. All patients included in the study had normal preoperative vocal fold motion, underwent stimulation of the RLN in a graded fashion, followed by postoperative laryngoscopy for grading of vocal fold motion as full mobility, paresis or paralysis. **Methods:** True/false positives, negative/positive predictive values, sensitivity, and specificity were calculated at stimulation values of 0.3, 0.5, 0.8 and 1.0mAmp for paralysis, paresis and motion abnormality (paralysis+paresis). ROC curves were used to identify optimal levels of stimulation. **Results:** Of 1,328 nerves at risk, 47 (3.5%) were noted to have postoperative motion abnormality. 31 (2.3%) nerves were paralyzed and 16 (1.2%) were paretic. Sensitivity of nerve monitoring was 100% at 0.3mAmp and decreased linearly as stimulation values increased (50% at 1.0mAmp). Specificity was poor at all stimulation levels and dropped off precipitously below 0.5mAmp. NPV was high at all levels (98-100%), while PPV was low at all levels of simulation (2.1-3.8%). ROC curves identified 0.5mAmp as the most clinically useful value to stimulate at, to optimize sensitivity and specificity. **Conclusions:** Measures of RLN monitoring vary greatly depending on the stimulation levels used. Monitoring is excellent at confirming that a nerve that stimulates will have normal function postoperatively but is inaccurate at predicting that a nerve which does not stimulate will have a motion abnormality. A 0.5mAmp stimulation level optimizes the sensitivity and specificity of nerve monitoring.

#### 9:50 Diagnostic Delays and Errors in Head and Neck Cancer Patients

Joel Franco, MS, Indianapolis, IN; Michael S. Harris, MD, Indianapolis, IN; Mimi S. Kokoska, MD, Indianapolis, IN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the types of diagnostic errors or delays that most commonly occur in patients with head and neck cancer.

**Objectives:** To determine the 1) frequency of diagnostic errors; 2) most common types of diagnostic errors; and 3) underlying cause of diagnostic errors in patients with head and neck cancer (HNC) within a tertiary teaching hospital. **Study Design:** Retrospective review of 50 sequential patients with newly diagnosed HNC (2009-2012). **Methods:** Classification was based on five types of diagnostic delay/errors outlined by the Institute of Medicine (To Err is Human): (1) Diagnostic error, 1a. diagnostic error by referring physician; 1b. diagnostic error by otolaryngology clinic. (2) Delay in diagnosis, 2a. >2 weeks for consult placement in symptomatic patient; 2b. clinic delay: seen >2 weeks after consultation request. (3) Failure to employ tests/therapy (>= 30 days from identification of lesion to diagnostic surgery. (4) Use of outmoded tests/therapy. (5) Failure to act on results, 5a. >= 2 months of inaction following pathology/imaging results for symptomatic lesion, 5b. >= 2 months of inaction following reporting of pathology/imaging results for incidental lesion. **Results:** The most common tumor characteristics were primary site=oropharynx (48%), T-classification=T2 (46%), N-status=N2b (34%). There were 47 diagnostic errors/delays. The frequency of a diagnostic delay/error per patient was 0 (40%), 1 error (36%), 2 errors (18%), 4 errors (4%) and 3 errors (2%). The frequency of types of diagnostic error/delay was 2b (36%), 5b (20%), 1a (18%), 3 (16%), 2a (12%), and 4 (4%). **Conclusions:** The frequency and most common diagnostic delays/errors in patients with HNC were identified. Increased awareness of these types of delays/errors is leading to corrective actions and processes to reduce or eliminate them.

10:00 - 10:30 BREAK/POSTER VIEWING

### 10:30 - 12:00 PEDIATRIC OTOLARYNGOLOGY SESSION FLORENTINE

#### 10:30 - 11:15 PANEL: FLUCTUATING AND PROGRESSIVE SENSORINEURAL HEARING LOSS IN CHILDREN

**Moderator:** Marci M. Lesperance, MD FACS, Ann Arbor, MI

**Panelists:** Daniel I. Choo, MD FACS\*, Cincinnati, OH  
Andrew Griffith, MD PhD, Bethesda, MD  
Blake C. Papsin, MD FACS\*, Toronto, ON Canada

**Moderators:** Sukgi S. Choi, MD FACS\*, Pittsburgh, PA

Marci M. Lesperance, MD FACS, Ann Arbor, MI

#### 11:15 The Versatility of Fetal Bovine Derived Acellular Dermal Matrix for Head and Neck Surgical Reconstruction in Children

Andrew Richardson Scott, MD\*, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the differences between fetal bovine derived acellular dermal matrix and cadaveric allograft and describe the applications of fetal bovine derived acellular dermal matrix in pediatric head and neck reconstruction.

**Objectives:** To describe the versatility of fetal bovine derived acellular dermal matrix as an alternative to human cadaveric allograft for reconstructive procedures of the head and neck in children. **Study Design:** Case series with chart review. **Methods:** A database of pediatric operative procedures was queried for the use of fetal bovine derived acellular dermal matrix over a 16 month period. Indications for soft tissue reconstruction were assessed and initial parental and surgeon satisfaction with the product were noted. **Results:** During the time period of 3/2012 and 7/2013 a total of 6 reconstructive procedures were performed on pediatric patients by a single surgeon using fetal bovine derived acellular dermal matrix. Indications for use varied and included transnasal endoscopic repair of an encephalocele and soft tissue reconstructions including lateral pharyngeal wall repair, cleft palate repair, and facial recontouring operations. Fetal bovine derived acellular dermal matrix had a subjectively increased ease of use as compared to the surgeon's prior experience with human cadaveric acellular dermis. Every parent vocalized a greater comfort level with the use of a bovine product over the alternative of human cadaveric tissue. The cost of fetal bovine derived acellular dermal matrix and human cadaveric acellular dermis are essentially the same. **Conclusions:** Fetal bovine derived acellular dermal matrix appears to be an acceptable alternative to human cadaveric acellular dermis for various forms of head and neck soft tissue reconstruction in children. Further prospective studies are warranted to assess for any differences in the long term efficacy of this product as compared to other forms of allograft reconstruction.

**11:22 Correlation between the Presence of Obstructive Sleep Apnea and Difficulty of Anesthesia Induction in Children Undergoing Tonsillectomy**

Sarah B. Jacob, MD, Louisville, KY; Vandra C. Harris, BS, Louisville, KY; Elizabeth D. Cash, PhD, Louisville, KY; Sasi R. Kalathoor, MD, Louisville, KY; Swapna K. Chandran, MD, Louisville, KY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the utility of polysomnography in perioperative planning of children with obstructive sleep apnea undergoing tonsillectomy.

**Objectives:** Evaluate the correlation between the severity of OSA and the difficulty of anesthetic induction in children undergoing tonsillectomy to determine the utility of PSG in perioperative planning. **Study Design:** Prospective case control observational study at a tertiary care pediatric hospital. **Methods:** Enrolled 93 patients between the ages of 2-17 undergoing tonsillectomy. Control group (N=30) consists of children with recurrent tonsillitis. Cohort includes children diagnosed with OSA based on PSG (N=30) or history (N=33). Statistical analysis compares the difficulty of anesthesia induction between the groups with an ANOVA. **Results:** Differences between the control group and the OSA group with and without PSG were statistically significant ( $p=0.010$ ,  $p=.000$ ). No significant difference between the OSA groups was present ( $p=0.308$ ). After controlling for age, tonsil size, BMI interpretation, and asthma, the differences between the control and OSA groups remained significant. ( $p=0.005$ ). **Conclusions:** Children with obstructive sleep apnea undergoing tonsillectomy have more difficult anesthesia inductions than children with recurrent tonsillitis. However, in children with OSA, it did not appear that children with preoperative PSG had statistically different anesthetic induction scores than children without PSG.

**11:29 Indications for Tonsillectomy: A 10 Year Retrospective Review**

Hetal H. Patel, MD, Hershey, PA; Michele M. Carr, MD DDS PhD, Hershey, PA

**Educational Objective:** Tonsillectomy remains a very common procedure performed in the pediatric population. Recurrent tonsillitis and obstructive sleep apnea (OSA) are the two most common indications for tonsillectomy. Prior to the widespread use of antibiotics, infection was the most common indication for surgery secondary to complications associated with infection. Eventually, OSA became the most common indication for surgery. In the face of antibiotic resistance and a potential increase in infections which are difficult to treat medically the trend in indications may have changed. This study was undertaken to determine if there has been a change over the last ten years. At the conclusion of this presentation, the participants should be able to determine what the most common indication for tonsillectomy is currently.

**Objectives:** To determine the trend of indications for tonsillectomy in a pediatric population over the last 10 years. **Study Design:** Retrospective chart review and Literature review. **Methods:** A chart review of patients undergoing tonsillectomy from 2003 to 2012 was performed at an academic children's hospital. Data was gathered from diagnoses made in preoperative clinic visits based on symptoms and sleep study when available. Patients were categorized by the following classifications: obstructive sleep apnea/sleep disordered breathing (OSA/SDB); recurrent tonsillitis and SDB/OSA and recurrent tonsillitis alone and other. Literature review was conducted to identify and compare similar studies. **Results:** A total of 2369 patients were identified, 52% were boys. The mean patient age was 6.5 years, 6.11 in boys and 6.95 in girls. OSA was the indication for surgery for 67% of all cases. OSA increased as an indication in the study period ( $p<0.0001$ ). Tonsillitis as the indication had a decreasing trend ( $p<0.0001$ ). Children aged less than 2 or 2-5 are less likely than older patients to have tonsillitis as an indication for surgery (2.30% and 6.26% vs. 26.46%, OR=0.06 and 0.18,  $p<0.0001$ ). Girls are more likely than boys to have tonsillectomy for tonsillitis (21% vs. 17%, OR=1.32,  $p=0.009$ ). 987 of 2370 (42%) patients undergoing tonsillectomy had a preoperative sleep study. The presence of sleep studies increased with time. Our results were similar to those reported in other studies. **Conclusions:** There were mild variations from year to year in the indications for tonsillectomy but the general trend has not changed. Obstructive sleep apnea remains the most common indication for performing tonsillectomy in children.

**11:36 Hearing Outcomes in Children with Cleft Palate and Referred Newborn Hearing Screen**  
Victoria A. Jordan, MS4, Minneapolis, MN; James D. Sidman, MD\*, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the relationship between cleft palate, patient comorbidities, and failure of newborn hearing screen as well as discuss the limitations of current universal newborn hearing screen guidelines for patients with cleft palate.

**Objectives:** To determine the prevalence of long term hearing loss in patients with cleft palate who fail their universal newborn hearing screen. **Study Design:** The study is a retrospective chart review from a tertiary pediatric center and tertiary children's hospital. **Methods:** Newborns with cleft palate born between January 2002 and July 2012 were identified from a pediatric otolaryngology practice database. This cohort was then reduced to include only those patients who referred their universal newborn hearing screen. Post-pressure equalization tube audiology results, post-palate surgery audiology results, type of cleft palate, and comorbid conditions were collected for each patient who was both born with a cleft palate and referred universal newborn hearing screen. **Results:** 317 newborns presented to the pediatric otolaryngology practice for cleft palate with 89 (28%) having documented referred universal newborn hearing screen. At time of data collection, 67 (75%) of 89 eventually passed a hearing test while 22 (25%) of 89 had not passed a hearing test. 14 patients had permanent hearing loss and all 14 had a comorbid condition. Type of cleft palate and presence of a comorbid condition were correlated to hearing outcome. **Conclusions:** Newborns with cleft palate who refer their universal newborn hearing screen should not be subjected to complex diagnostic hearing tests prior to placement of pressure equalization tubes unless there is another clue to permanent hearing loss such as a comorbid condition.

**11:43 Variations in the Cochlear Implant Experience in Children with Enlarged Vestibular Aqueduct**  
Cedric V. Pritchett, MD, Ann Arbor, MI; Teresa A. Zwolan, PhD, Ann Arbor, MI; Hemant A. Parmar, MBBS, Ann Arbor, MI; Mohannad Ibrahim, MD, Ann Arbor, MI; Marc C. Thorne, MD, Ann Arbor, MI; Steven A. Telian, MD\*, Ann Arbor, MI

**Educational Objective:** At the conclusion of the presentation participants will be able to understand the typical clinical hearing course of children with an enlarged vestibular aqueduct undergoing cochlear implantation.

**Objectives:** To describe the clinical experience and characterize the outcomes of cochlear implantation in children with the isolated enlarged vestibular aqueduct (IEVA) as compared to children with EVA accompanied by other bony labyrinth abnormalities. **Study Design:** Retrospective review at single tertiary care institution over past two decades. **Methods:** The clinical course and outcomes of fifty-five children with EVA undergoing cochlear implantation between 1991 and 2013 were reviewed. Test measures included open and closed set speech perception tests and various speech and language measures. **Results:** In eighteen children (32.7%) IEVA was the only defect present. In 33 children (60%) EVA occurred concomitantly with incomplete partition type 2 (IP2), and 3 children with incomplete partition type 1 (IP1). Ninety-two percent (51 of 55) occurred bilaterally and had matching bony defects. Mean age of cochlear implantation was 73.4 months. A statistically significant defect related and linguistic status pattern was noted, impacting the timing of implantation: IEVA = 112.8 months, IP2 = 58.4 months ( $p < 0.001$ ); prelingual deafness = 53.8 months, post-lingual deafness = 110.8 months ( $p < 0.001$ ). Controlling for age and degree of residual hearing, IP 2 children did not demonstrate significantly different performance on speech perception tests than children with IEVA (0.8 to 8.7 point differences;  $p = 0.18$  to 1.0). Degree of residual hearing appeared to have more consistent relationship to speech and language performance than age or defect type. **Conclusions:** Children with hearing loss secondary to enlarged vestibular aqueducts respond meaningfully to cochlear implantation. However, the severity of temporal bone anomalies in these children has clinical relevance.

**11:50 Variation in Tonsillectomy Costs within a Multi-Hospital Network**  
Jeremy D. Meier, MD, Salt Lake City, UT; Melanie Duval, MD, Salt Lake City, UT; Jonathan Curtis, BS, Salt Lake City, UT; Yingying Zhang, PhD, Salt Lake City, UT; Tom H. Greene, PhD, Salt Lake City, UT; Rajendu Srivastava, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand variation in tonsillectomy costs in a multi-hospital network due to surgeon, hospital, and patient factors.

**Objectives:** Identify hospital costs for same day surgery adenotonsillectomy (T&A) in a multi-hospital network and evaluate surgeon, hospital, and patient factors in cost variation. **Study Design:** Observational cohort study. **Methods:** A standardized activity based hospital accounting system was used to determine total hospital costs (not charges) per encounter for T&A cases within a multi-hospital network from 1998-2012. Children 1-18 years old presenting for same day T&A (and no other procedures) were included. Mixed effects analysis assuming gamma distributed costs was performed to characterize variation in mean costs among surgeons and hospitals, which were analyzed as random effects, after controlling for fixed effect patient factors. **Results:** The study cohort included 29,798 T&A's performed by 76 different surgeons at 20 different hospital facilities. The mean ( $\pm$  SD) cost per T&A was \$1,323 $\pm$ 503. Mean costs varied significantly among surgeons ( $p < 0.001$ ), with an estimated cost range for the middle 95% of surgeons extending from 67%-148% of the overall mean cost, after controlling for hospital variation and patient factors. Similar variability was found between hospitals, with 95% of facility mean costs estimated to vary between 63-160% of the overall mean ( $p < 0.05$ ). Patient factors were gen-

## Friday

erally weakly associated with cost, with the strongest association observed for APR-DRG severity of illness, regression coefficient=1.05 (95% C.I. 1.04-1.07). **Conclusions:** Costs of same day surgery tonsillectomy vary significantly among different surgeons and hospitals within a multi-hospital network. Studies to understand the reasons for this variation and the impact on outcomes are needed. Reducing this variation may improve healthcare value.

**12:00 - 1:00**      *Lunch in Exhibit Hall*

## FRIDAY, MAY 16, 2014

7:00 - 7:50 *Business Meeting (Members only) - Florentine*

### CONCURRENT SESSION 2 ROMAN II/IV

#### 8:00 - 10:00 OTOTOLOGY/NEUROTOLOGY SESSION

##### 8:00 - 9:15 **PANEL: MIGRAINOUS VERTIGO - PATHOPHYSIOLOGY, DIAGNOSIS AND TREATMENT**

**Moderators:** Debara L. Tucci, MD FACS\*, Durham, NC  
Lorne S. Parnes, MD\*, London, ON Canada

**Panelists:** **Pathophysiology of Migraine/Diagnosis of Vestibular Migraine**  
David M. Kaylie, MD FACS\*, Durham, NC  
**Differential Diagnosis of Vestibular Migraine/Benefit (or not) of Vestibular Testing**  
Brian A. Neff, MD\*, Rochester, MN  
**Chronic Subjective Dizziness**  
Michael J. Ruckenstein, MD FACS\*, Philadelphia, PA  
**Treatment of Vestibular Migraine**  
John P. Carey, MD, Baltimore, MD

**Moderators: John P. Leonetti, MD\*, Maywood, IL  
Lorne S. Parnes, MD\*, London, ON Canada**

##### 9:15 **Comparison of Isomorphic 3D Printed and Virtual Haptic Temporal Bone Simulation**

Jordan B. Hochman, MD, Winnipeg, MB Canada; Dana Wong, MD, Winnipeg, MB Canada; Charlotte Rhodes, PhD, Winnipeg, MB Canada; Jay Kraut, PhD, Winnipeg, MB Canada; Justyn Pisa, AuD, Winnipeg, MB Canada; Bertram J. Unger, MD, Winnipeg, MB Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate the steps in generation of an internally accurate rapid prototyped temporal bone model and virtual haptic model with emphasis on evaluating trainee perception of perceived import in learning temporal bone surgery.

**Objectives:** Simulation has assumed a prominent role in education. It is important to explore the effectiveness of different modalities. In this paper we directly compare surgical resident impression of two distinct temporal bone simulations (physical and haptic). **Study Design:** REB approved prospective cohort study. **Methods:** A haptic voxel based simulation (HM) and a physical 3D printed temporal bone simulation (PTBM) were developed. Data for both simulations originated from cadaveric microCT. Ten otolaryngology residents dissected a cadaveric specimen (CTB) followed by the matched, isomorphic physical and haptic models. Participants rated each construct on a number of parameters and performed a direct comparison of the simulations. The survey instrument employed a Likert scale (1-7). **Results:** Subjects rated the PTBM drill quality as more similar to CTB than the HM (cortical bone mean 5.5/2.5,  $p < 0.02$ , trabecular bone mean 5.5/2.5,  $p < 0.004$ ). Both air cell systems were rated as similar to CTB (mean 5.44/5.3,  $p = 0.075$ ). Subjects strongly agreed that both simulations are effective educational tools, but rated PTBM highest (mean 6.7/5.4  $p < 0.02$ ). Notably subjects agreed both modalities should be integrated into training but judged the PTBM higher (mean 7.0/5.5,  $p < 0.003$ ). In direct comparison, the PTBM was the preferred simulation in 7 of 9 educational domains ( $p < 0.05$ ). **Conclusions:** Appraisal of a PTBM and VM found both to have perceived educational benefit. However, the PTBM was considered to have more realistic physical properties and was considered the preferred training instrument.

##### 9:22 **Does High Monopolar Cautery Adversely Affect Cochlear Implants?**

Anita S. Jeyakumar, MD MS, New Orleans, LA; Neal M. Jackson, MD, New Orleans, LA (Presenter); Victoria B. Givens, BS, New Orleans, LA; Todd M. Brickman, MD PhD, New Orleans, LA; Moises A. Arriaga, MD\*, New Orleans, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the impact of electrocautery on cochlear implants.

**Objectives:** 1) Evaluate the effects of monopolar cautery on cochlear implant devices; and 2) determine whether voltage fluctuations within the cochlear implant affect the cochlear implant devices. **Study Design:** Cadaveric model, basic science laboratory, tertiary medical center. **Methods:** 2 Med El cochlear implants modified to record voltage difference from the apical and proximal electrodes were implanted into an unembalmed, fresh cadaver. Cautery was applied to the ipsilateral pectoralis major muscle and ipsilateral tem-

poralis muscle at bipolar, monopolar coagulation, and monopolar cut settings of 50 W. The intensity in the monopolar cut setting was increased by increments of 10 W to a maximum of 100 W. Integrity testing was performed before, during, and after each cautery setting. Voltage fluctuations were measured during cautery, and maximal voltage changes for each setting were noted. After explantation, devices were returned to the manufacturer for in-depth failure analysis to evaluate for any damage to the devices. **Results:** No change in impedance or integrity testing occurred at any cautery setting when applied to either to pectoralis major or temporalis. The maximum voltage change was 22V. Comprehensive device analysis showed no evidence of device damage from the study. **Conclusions:** The cochlear implant devices had no evidence of electrical damage by monopolar cautery, even up to levels of 100 W in the temporalis muscle. The maximum voltage change was 22V, likely due to protecting diodes within the implant. Additional study is necessary, but more flexible recommendations regarding electrosurgery in cochlear implant recipients should be considered.

## 9:29 Age and Interimplant Delay Are Predictive of Second Cochlear Implant Nonuse in Children

Angelia S. Natili, MD, Galveston, TX; Tomoko M. Makishima, MD PhD, Galveston, TX; Kristofer R. Jennings, PhD, Galveston, TX; Jan G. Gilden, MA, Houston, TX; Rachael P. Jacobsen, BS, Galveston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to predict usage patterns in children with a long delay between first and second cochlear implants. They will also be able to discuss the most recent research theories that may explain reduced usage.

**Objectives:** Initially cochlear implants were approved for one ear, but evidence has mounted to change practices towards earlier binaural implantation. Unfortunately, some children have a long interimplant delay and a percentage of them do not use the second device. This novel research seeks to identify factors that predict nonuse of the second cochlear implant. **Study Design:** Retrospective chart review was performed of 71 patients with second cochlear implant at age less than 18 managed by one practice between 3/2003 and 3/2013. **Methods:** Twenty-two children identified as nonusers of their second cochlear implant were statistically compared to 49 users regarding age at second implant, time between first and second implant, primary communication preferences after implantation, and sign or oral education. **Results:** There is a significant difference between groups based on age at second implant and time between implants (both  $p < 0.0001$ ). Using a cutoff for age at 3700 days (about 10 years old), the in-sample classification accuracy is 82% that children will not use the second implant. Similarly, if the time between implants is around 3000 days (close to 8 years), children are unlikely to use the second implant, with an in-sample accuracy of 85%. Type of education and primary use of sign or oral communication were not predictive of nonuse. **Conclusions:** Children with more than an eight year interimplant delay, and children older than age 10 at second implant are at high risk for nonuse of their second implant. Our data suggests practitioners be cautious before risking surgery on a many year single implant user.

## 9:36 Residual Hearing Preservation after Cochlear Implantation in Adults with Functional and Non-functional Low Frequency Hearing

Daniel C. Sukato, BA, Pittsburgh, PA; Jacob S. McAfee, MD, Pittsburgh, PA; Yael Raz, MD, Pittsburgh, PA; Barry Hirsch, MD, Pittsburgh, PA; Catherine Palmer, PhD, Pittsburgh, PA; Andrew McCall, MD, Pittsburgh, PA

**Educational Objective:** To demonstrate that high rates of post-cochlear implantation residual hearing preservation can be achieved in patients with either functional or non-functional low frequency hearing.

**Objectives:** Threshold preservation in functional or severely impaired low frequency hearing after cochlear implantation may be associated with improved candidacy for electroacoustic stimulation and benefits in speech perception. This single center study was performed to investigate the rate of residual hearing preservation after cochlear implantation in adults with functional and non-functional low frequency hearing. **Study Design:** Retrospective chart review. **Methods:** This is a study of 34 adult patients at a single center who underwent unilateral cochlear implantation with soft surgery techniques from 2010 to 2012. Patients with both functional ( $\leq 75$  dB) and non-functional ( $>75$  dB) residual hearing at frequencies of 250, 500, and 1000 Hz were included in this study. Unaided preoperative and 1 month postoperative audiometric testing at these frequencies were compared and median pure tone average (PTA) differences were obtained. **Results:** Partial and complete hearing preservation was achieved in 28/34 patients (82.4%). Eleven patients had complete hearing preservation (32.4%), while 17 had partial hearing preservation (50%). Complete loss was observed in 5 out of 34 patients (14.7%). Preoperatively, 21/34 (61.8%) and 13/34 (38.2%) patients had functional and non-functional residual hearing, respectively. Of patients with functional residual hearing, 16 patients had either complete or partial postoperative hearing preservation (76.2%). In patients with non-functional residual hearing, 12 patients had their residual hearing completely or partially preserved (92.3%). Univariate analyses of the entire cohort indicated no significant association between demographic/operative parameters and hearing preservation status. **Conclusions:** A high rate of residual hearing preservation at 1 month was demonstrated in patients with both functional and non-functional low frequency hearing.

## 9:43 MRI Surveillance of Vestibular Schwannomas with and without Contrast Enhancement

Mohammed Mamdani, BS MS, Richmond, VA; Yang Tang, MD PhD, Richmond, VA; Brian N. Suddarth, MD, Richmond, VA; Daniel H. Coelho, MD, Richmond, VA

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

enhanced MRI in the diagnosis of vestibular schwannoma, discuss the rare but severe risks of gadolinium based agents, and explain the value of non-contrast enhanced MRI in the surveillance of patients with known vestibular schwannomas.

**Objectives:** Vestibular schwannomas (VS) are benign neoplasms comprising 6-9% of all intracranial tumors. For the last 30 years, the gold standard for diagnosis and followup of VS has been T1 weighted contrast enhanced (T1C) magnetic resonance imaging (MRI) using gadolinium based compounds. These contrast agents, however, are not without disadvantages as they carry rare but significant risks including nephrotoxicity and nephrogenic systemic fibrosis. Three dimensional constructive interference in steady state (CISS) gradient echo MRI does not require contrast and has high signal to noise ratio, contrast to noise ratio and spatial resolution. Therefore, we hypothesize that CISS is a comparable, contrast free alternative to T1C for followup of VS growth and recurrence. **Study Design:** A retrospective analysis of VS sizes measured by T1C and CISS in patients diagnosed and followed for suspected vestibular schwannoma. **Methods:** Two neuroradiologists independently measured VS size in medial-lateral, anterior-posterior and superior-inferior axes for 50 randomized patients with T1C and CISS on two separate occasions, blinded to previous measurements. Measurements were assessed by Pearson product moment correlation coefficients and differences were analyzed by Student's t-test. **Results:** Pearson correlations between T1C and CISS were 0.972 - 0.995 and 0.954 - 0.988 for observer 1 and 2, respectively, with no statistically significant differences between imaging techniques. Intra and interobserver correlations (k) were >0.954 for both T1C and CISS, which indicate that the data are highly reliable. **Conclusions:** CISS imaging is a reliable alternative to T1C for followup scans in patients with VS.

**9:50 The Effect of Different Utility Measures on the Cost Effectiveness Assessments of Bilateral Cochlear Implantation**

Jafri Kuthubutheen, MBBS FRACS, Toronto, ON Canada; Hosam Amodi, MD FRCSC, Halifax, NS Canada; Nicole Mittman, MSc PhD, Toronto, ON Canada; Wei Qian, MD MSc, Toronto, ON Canada; Joseph Chen, MD FRCSC\*, Toronto, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) appreciate that different types of utility measures affect calculations of incremental cost utility in relation to bilateral cochlear implantation; 2) appreciate that the Health Utility Index 3 (HUI-3) is the most conservative measure of incremental utility of a second cochlear implant; and 3) appreciate that the HUI-3 is least likely to overestimate the cost effectiveness of the second implant.

**Objectives:** This study aims to demonstrate that when determining the cost effectiveness of bilateral cochlear implantation (BCI), the choice of the health utility measure critically affects the incremental cost utility ratio (ICUR) and therefore whether BCI is a cost effective intervention. **Study Design:** A scenario based estimate with three different scenarios was used: 1) a patient with severe to profound sensorineural hearing loss with no intervention; 2) the same patient with a unilateral cochlear implant with average or better performance; and 3) the same patient with bilateral cochlear implants with average or better performance. **Methods:** There were 142 subjects comprising pre-implant candidates (n=30), unilateral cochlear implant recipients (n=30), bilateral implant candidates (n=30), and health care professionals (n=52). Four health utility instruments were administered to each subject for each scenario. These were the Health Utility Index Mark 3 (HUI-3), EuroQoL Group questionnaire (EQ5D), Visual Analog Scale (VAS), and Time Trade Off (TTO). Cost for each implant was based upon a 25 year time horizon, a 50% reduction in cost of the second implant, and a 15% failure rate. **Results:** For the base case using the HUI-3, the utility gain from unilateral to bilateral implantation was 0.035 or 11.5% of the total utility gain (0.305). This ratio was higher using the other instruments: EQ5D (22.2%), VAS (35.0%) and TTO (41.4%). **Conclusions:** The choice of utility instrument in cost utility analysis of BCI heavily influences whether the second implant is cost effective. The HUI-3, which has components on hearing and speech, is the utility of choice in cochlear implant studies and is the most conservative instrument. It is also the least likely to overestimate the cost benefit of BCI.

10:00 - 10:30 BREAK/POSTER VIEWING

**10:30 - 12:00 RHINOLOGY/ALLERGY AND FACIAL PLASTICS SESSION  
ROMAN II/IV**

**10:30 - 11:15 PANEL: ALLERGY IMMUNOTHERAPY: SHOTS, DROPS OR TABLETS?**

**Moderators:** Sandra Y. Lin, MD\*, Baltimore, MD  
Andrew N. Goldberg, MD MSCE FACS\*, San Francisco, CA

**Panelists:** **Subcutaneous Immunotherapy**  
John H. Krouse, MD PhD FACS\*, Philadelphia, PA  
**Sublingual Immunotherapy**  
Rodney J. Schlosser, MD, Charleston, SC  
**Tablet Therapy**  
Elina Toskala, MD, Philadelphia, PA

**Moderators: Sandra Y. Lin, MD\*, Baltimore, MD**

**Andrew N. Goldberg, MD MSCE FACS\*, San Francisco, CA**

**11:15 In-Office Drainage of Sinus Mucoceles: A Cost Effective Alternative to OR Drainage**  
Emily M. Barrow, BS, Atlanta, GA; John M. DelGaudio, MD\*, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss how in-office drainage of sinus mucoceles is well tolerated by patients with high success and low complication rates, even in large mucoceles with bony erosion.

**Objectives:** Endoscopic drainage has become the standard of care for the treatment of mucoceles. In many patients this can be performed in the office. This study reviews our success with in-office endoscopic mucocele drainage. **Study Design:** A retrospective review of one surgeon's experience with in-office endoscopic drainage of sinus mucoceles between 2006-2013 was performed. **Methods:** Charts were reviewed for patient demographics, previous surgery, mucocele location, bone erosion, and outcomes. **Results:** 31 patients underwent 35 in-office drainage procedures. All procedures were performed under topical/local anesthesia. Mean age was 54 (range 17-92). Mean followup time was 8.3 months. Sixty-five percent had previous sinus surgery. Primary sinus involved was frontal (12), anterior (11)/ posterior ethmoid (6), maxillary (4), sphenoid (2). Bone erosion was noted to be present on CT in 21 mucoceles (60%) (14 orbital, 7 skull base). All mucoceles were successfully accessed in the office with the exception of one, which was aborted due to neo-osteogenesis (not included in results). Five patients (14% of mucoceles) required additional surgery: 1 for mucocele recurrence and 4 for septated mucoceles not completely drained in the office. No treatment complications occurred. All but one patient preferred office to OR drainage. **Conclusions:** In-office drainage of sinus mucoceles is well tolerated by patients with high success and low complication rates, even in large mucoceles with bony erosion. The presence of septations and neo-osteogenesis reduce the likelihood of complete drainage and are relative contraindications. Orbital and skull base erosion are not contraindications.

**11:22 The Impact of Comorbid Migraine on Endoscopic Sinus Surgery Quality of Life Outcomes**  
Adam S. DeConde, MD, Portland, OR; Jess C. Mace, MPH, Portland, OR; Timothy L. Smith, MD MPH\*, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the impact of the history of migraine on quality of life in patients with chronic rhinosinusitis after endoscopic sinus surgery.

**Objectives:** Chronic rhinosinusitis (CRS) and migraine are common entities that overlap in symptomatology yet no clinical research exists investigating patients at the intersection of the two. This study seeks to investigate whether patients with CRS with and without a migraine history experience comparable quality of life (QOL) improvement after endoscopic sinus surgery (ESS). **Study Design:** A retrospective subset analysis of a prospective cohort study. **Methods:** An adult population (n=223) with medically refractory CRS was prospectively assessed following ESS using three disease specific QOL constructs: the Rhinosinusitis Disability Index (RSDI), the Chronic Sinusitis Survey (CSS), and the Sino-Nasal Outcome Test 22 (SNOT-22). History of comorbid migraine was retrospectively identified (n=46) and pre- and postoperative QOL were compared to patients without migraine (n=183). **Results:** Patients with comorbid migraine and CRS were more likely to be female (p=0.023), have allergies (p = 0.024), fibromyalgia (p=0.009), depression (p = 0.010) and less likely to have nasal polyposis (p=0.003). Objective measures of disease (Lund-Kennedy endoscopy scores, and Lund-Mackay computed tomography scores) were significantly lower in patients with comorbid migraine (p=0.027 and p=0.002, respectively), yet these patients scored lower on baseline RSDI and SNOT-22 (p=0.025 and p=0.019, respectively) scores. Both patients with and without comorbid migraine improved significantly after ESS (p<0.001) and by comparable magnitudes (p>0.050). **Conclusions:** Patients with comorbid migraine and CRS are more likely to have less severe objective evidence of disease, yet worse preoperative baseline QOL scores than patients with CRS without a history of migraine. ESS provides comparable improvement for patients with CRS with or without comorbid migraine.

**11:29 Indications for Balloon Sinus Dilation in Chronic Rhinosinusitis: The Current State of Practice**  
Steven A. Gordon, MPH, Richmond, VA; Theodore A. Schuman, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the near universal adoption of balloon sinus dilation (BSD) and the subsequent widespread variation in its clinical use.

**Objectives:** To identify practice patterns for the use of balloon sinus dilation (BSD) by otolaryngologists. **Study Design:** A cross-sectional survey was employed to elicit the clinical scenarios in which functional endoscopic sinus surgery (FESS) and BSD are currently used by otolaryngologists. Physician characteristics associated with choice of technique were analyzed. **Methods:** An original multiple choice survey was created. Univariate descriptive statistics were used for all study variables. Chi square analysis was employed to evaluate differences in usage of BSD and FESS. **Results:** Between March and July 2013, 152 completed surveys were received, yielding a 30.4% response rate. Seventy-two percent of respondents used BSD. Of those employing BSD, 63% used it in <25% percent of their practice and only 10% used it >50%. A majority (69%) performed BSD always or almost always in the OR, with 7% using BSD exclusively in clinic. The majority of otolaryngologists (93%) who used BSD employed hybrid procedures with traditional FESS. Sub-

stantial variation was identified in treatment approach to patients with a history of recurrent acute or chronic sinusitis and no opacification on CT, mild to moderate opacification of the maxillary, frontal and sphenoid sinuses on CT, and severe to complete opacification of the frontal sinus on CT. Statistically significant variation in use of BSD was identified by years in clinical practice, percent rhinology practiced, and academic versus private setting. **Conclusions:** The widespread adoption of BSD coincides with significant variation in its clinical usage. Considerable differences in opinion exist regarding the optimal indications for this technique.

**11:36 Food Hypersensitivity and Chronic Rhinosinusitis**  
Alissa A. Kanaan, MD, Pittsburgh, PA; Berrylin J. Ferguson, MD\*, Pittsburgh, PA; Stella Lee, MD, Pittsburgh, PA; Nivedita Sahu, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to determine relationship of food hypersensitivity to symptoms of chronic rhinosinusitis.

**Objectives:** To determine relationship of food hypersensitivity to symptoms of chronic rhinosinusitis (CRS). **Study Design:** Retrospective review of prospectively acquired data at a tertiary academic rhinology center. **Methods:** 43 consecutive CRS symptomatic adults completed a sinonasal survey, underwent nasal endoscopy, allergy testing for foods and were given instructions for elimination challenge food diet (ECFD). Symptoms were reassessed 6-12 weeks later and endoscopic evaluation was performed. **Results:** 49% (21/43) of patients reported improvement with elimination of ECFD identified foods. Of these patients, 57% (12/21) had no polyps. The most commonly identified food was wheat (43%), followed by dairy (28%), or both (14%). Other sensitivities included eggs, sugar and corn. In responders, nasal endoscopy improved in 24% (5/21) and of these 65% (2/5) had complete resolution of their polyps. Only 1 non-responder had improvement in nasal endoscopy with decrease in cobblestoning of the nasal mucosal lining. 33% (7/21) of the responders had positive allergy testing. Only 9% (2/21) of the responders were aware of their food allergies. Out of the 22 non-responders, 73% (16/22) had nasal polyps. 22% (6/22) had improvement in other symptoms such as increased energy and resolution of abdominal discomfort. A validated sinonasal survey pre- and post-intervention also showed significant improvement ( $p=0.03324$ ). **Conclusions:** Overall 51% (24/43) of patients had improvement in symptoms primarily pertaining to sinonasal symptoms and 24% had improvement in endoscopic exam with complete resolution of nasal polyps in 5% (2/43). ECFD is an inexpensive intervention, which improved symptoms in over half of patients in this study.

**11:43 Rethinking Nasal Tip Support: A Finite Element Analysis**  
David Shamouelian, MD, Irvine, CA; Ryan P. Leary, BA, Irvine, CA; Cyrus T. Manuel, BS, Irvine, CA; Rani Harb, PhD, Irvine, CA; Dmitry E. Protsenko, PhD, Irvine, CA; Brian J.F. Wong, MD PhD\*, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain how the scroll region attachments and membranous septum attachments play a role in resisting shear and stress forces in the human nose, using a finite element model.

**Objectives:** Accepted nasal tip support mechanisms were derived from clinical experience rather than from a detailed analysis involving structural mechanics. Herein computational analysis using finite element modeling (FEM) is used to examine the role of attachments between: 1) the upper lateral cartilage (ULC) and lower lateral cartilage (LLC); and 2) the medial crural footplates and the caudal septum. **Study Design:** A finite element model (FEM) of the human nose was used to examine changes in stress distribution in the nasal soft tissue and cartilage following simulated surgical maneuvers and wound healing. Varying degrees of disruption in the scroll region (SR) and the membranous septum (MS) were simulated, and then changes in stress and strain in response to nasal tip depression were computed. **Methods:** A model of the nose was constructed from CT data, segmented (bone, cartilage, soft tissue), and rendered in Mimics (Materialize, Inc.). Cartilage components with attachments at the scroll region and medial crural footplates were customized to the model using computer assisted design software (Autodesk, San Rafael, CA). Simulations of varying degrees of weakening of the SR and MS were performed, using a 5mm displacement of the nasal tip. The resultant stress distribution and strain energy density were computed. **Results:** In the control, stress was distributed most prominently to the intermediate crura of the lower lateral cartilages and the caudal most aspect of the septum and upper lateral cartilages. Strain energy density was calculated for simulated models with MS and SR attachments intact (4.97mJ), MS attachments intact (4.92 mJ), SR attachments intact (4.76mJ) and disrupted MS and SR attachments (4.52 mJ). **Conclusions:** Although SR and MS attachments play a role in resisting shear and stress forces in the human nose, MS attachments have a relatively greater contribution to tip support with the nasal tip depression test.

**11:50 In Vivo Long Term Viability and Shape Change of Costal Cartilage following Electromechanical Cartilage Reshaping in the New Zealand White Rabbit Optimization**  
Karam W. Badran, BSc, Irvine, CA; Cyrus Manuel, BSc, Irvine, CA; Anthony Chin Loy, MD, Irvine, CA; Christian Conderman, MD, Irvine, CA; Yuk Yee Yau, MD, Irvine, CA; Brian J.F. Wong, MD PhD\*, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that electromechanical reshaping (EMR) can be used to alter the shape of costal cartilage within an in vivo animal model for auricular reconstruction.

**Objectives:** Evaluate electromechanical reshaping (EMR) as a method to alter and maintain the shape of costal cartilage and evaluate

# Friday

this animal model as a means to study emerging methods of reshaping costal cartilage through tissue repair processes and chondrocyte viability. **Study Design:** This is a preclinical in vivo animal study with cellular viability, digital photography, and histologic analysis. **Methods:** A subperichondrial cartilaginous defect was created within the base of the pinna of 9 New Zealand white rabbits (18 ears). Costal cartilage grafts were then harvested, electromechanically reshaped, and implanted into the auricular defect. EMR voltage time parameters, identified and optimized in ex vivo studies were assessed. The auricular implants were harvested following 12 week survival durations and analyzed with digital imaging, tissue histology, confocal microscopy, and live-dead viability assays. **Results:** Localized cell death was appreciated in all specimens; the 4V 4 minute parameter produced the least amount of injury at 12 weeks (2.36 +/- 0.33mm). Cross-sectional imaging demonstrates favorable costal cartilage reshaping with appropriate contouring to the auricular base and neochondrogenesis in all electromechanically reshaped specimens. Response to tissue injury demonstrates increasing amounts of mineralization, empty lacunae, and histological artifact with increasing current transferred. **Conclusions:** EMR is a viable tool for shape change and permanence in costal cartilage grafts with the preservation of viable cells within areas of localized cell death. These studies suggest that elements of auricular reconstruction may be feasible using EMR, and warrants longer survival periods to assess final shape change and affects of complete wound healing.

12:00 - 1:00 Lunch in Exhibit Hall

## 1:00 - 5:00 SCIENTIFIC SESSION FLORENTINE

### 1:00 - 2:45 HEALTHCARE AND TRAINING 2014: ENHANCING QUALITY CARE DELIVERY AND TRAINING IN THE MIDST OF THE STORM

1:00 - 2:10 **PANEL: HEALTHCARE DELIVERY/AFFORDABLE CARE ACT – WHAT DO WE KNOW AND WHAT CAN WE DO?**

**Moderator:** Ellis M. Arjmand, MD MMM PhD, Cincinnati, OH  
**Panelists:** Jonas T. Johnson, MD FACS\*, Pittsburgh, PA  
Michael M.E. Johns, MD\*, Atlanta, GA  
Marion E. Couch, MD PhD MBA FACS, Burlington, VT

**Moderator: Ellis M. Arjmand, MD MMM PhD, Cincinnati, OH**

2:10 **Electronic Health Records and Otolaryngology Resident Workflow: A Time Motion and Efficiency Study**  
Andrew J. Victores, MD, Houston, TX; Kenneth W. Coggins, BA, Houston, TX; Masayoshi Takashima, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss how electronic health records (EHRs) impact the workflow and efficiency of otolaryngology residents in the era of ACGME duty hour standards.

**Objectives:** To evaluate the impact of EHRs on the workflow of otolaryngology residents. **Study Design:** Prospective, time motion study. **Methods:** A time motion study was conducted both early and late in the 2012-2013 postgraduate year (PGY). Four otolaryngology residents (2 PGY-2 and 2 PGY-4 residents) were directly observed and resident activities categorized by way of a database program. Observations were performed on both operative and clinic days. Comparisons were made to the same data collected in the same setting prior to integration of an EHR system during 2008-2009. **Results:** Residents spent their day on direct patient care (39.2%), indirect patient care (37.4%), didactic education (14.0%), personal activities (5.2%), and transit (4.2%). The primary activity during operative days was direct patient care and during clinic days was indirect patient care. Activities of marginal educational value comprised a considerable component of their time (14%). Compared to data collected prior to use of an EHR, time was spent similarly. However, residents devoted significantly more time to indirect patient care on clinic days ( $P < .05$ ). These results were further compared to data obtained prior to the availability of an EHR. **Conclusions:** This is the first study to evaluate EHR integration on otolaryngology resident workflow. Resident efficiency was not significantly altered by the implementation of an EHR. However, more time was shifted from directly caring for patients to documenting on the EHR. These findings provide an important objective insight into EHRs, especially given the looming mandate for their use and the need to streamline resident curriculum in the duty hours era.

2:17 **Safety of Nerve Integrity Monitoring (NIM) Endotracheal Tubes in Patients of Short Stature**  
Michael B. Cohen, MD, Boston, MA; Katie A. McDonough, MSN, Boston, MA; Scharukh M. Jalisi, MD\*, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify risk factors for mainstem intubation in short stature, discuss potential complications of mainstem intubation, and demonstrate understanding of enhanced airway safety protocols in patients undergoing recurrent laryngeal nerve monitoring.

**Objectives:** To evaluate effect of difference in endotracheal tube length between NIM tubes and standard endotracheal tubes. To demonstrate increased risk of mainstem intubation in short stature patients. **Study Design:** Retrospective review of short stature patients undergoing endocrine surgery at a tertiary care medical center. **Methods:** Chart review of 2 short stature patients who presented with immediate complications after intubation with NIM tubes according to standard anesthesia protocol. **Results:** Both patients had NIM tube electrodes appropriately positioned at the level of the vocal folds resulting in mainstem intubation. 1 patient with spontaneous pneumothorax requiring chest tube placement and 2nd patient required bronchoscopy and subsequent reintubation with standard endotracheal tube. **Conclusions:** Short stature patients have a higher risk of mainstem intubation and complications due to the design of NIM endotracheal tubes. Confirmation of endotracheal tube positioning should be confirmed with bronchoscopy.

2:24

#### Effectiveness of a Standardized Education Process for Tracheostomy Care

Joshua C. Yelverton, MD, Richmond, VA; Josephine H. Nguyen, MD, Richmond, VA; Wen Wan, MD PhD, Richmond, VA; Michael C. Kenerson, BA, Richmond, VA; Theodore A. Schuman, MD, Richmond, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize that a standardized education curriculum for tracheostomy care is essential for safe and appropriate patient care, especially in the academic hospital or medical center where multiple services may be performing tracheostomies and providers frequently change.

**Objectives:** 1) Evaluate the effectiveness of an education curriculum on general tracheostomy care principles; and 2) determine the effect of an education curriculum on the level of comfort with tracheostomy care. **Study Design:** Cross-sectional survey in an academic medical center. **Methods:** A 25 question multiple choice and true/false quiz was given to non-otolaryngology health care providers (nurses and physicians) who routinely provide tracheostomy care. This was followed by an education module and the quiz was repeated. Participants were also asked to rate their level of comfort (0-100 point scale) managing a tracheostomy before and after the module. A 6 month followup assessment was also obtained. **Results:** A total of 43 healthcare providers participated in the education module (29 physicians, 11 nurses and 3 fourth year medical students). The average number of correct answers increased by 3.72 ( $P < 0.001$ ) and the level of confidence in tracheostomy care improved by an average of 23.5 points ( $P < 0.001$ ) immediately following the training session. At the 6 month assessment, there was still a significant improvement in number of correct questions and level of confidence when compared to pre-education values ( $P < 0.05$  for both). There was no significant change in the 6 month values when compared to the post-education values. **Conclusions:** A standardized education module for tracheostomy care teaching resulted in significant increases in knowledge and confidence, which was sustained over a 6 month period. A standardized education module is essential in academic hospitals and medical centers where multiple services may be performing tracheostomies and providers frequently change.

2:31

#### Balance as a Measurement of Fatigue in Post Call Residents

David W. Cuthbertson, MD, Houston, TX; Eric M. Bershada, MD, Houston, TX; Haleh Sangi-Haghpeykar, PhD, Houston, TX; Helen S. Cohen, EdD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should recognize the need for investigation in fatigue and sleep medicine, especially with a view to the accurate measurement of levels of fatigue. This is particularly necessary as more attention is focused on medical resident fatigue and the increasing need for research to provide a basis for evidence based guideline formation.

**Objectives:** 1) Determine if computerized dynamic posturography (CDP), clinical test of sensory interaction on balance (CTSIB), and reaction time are accurate surrogate measurements of fatigue; and 2) determine if these tests are useful in a real world situation involving post call residents. **Study Design:** Prospective study. **Methods:** Medical residents were tested before and immediately after overnight call. Residents were tested with CDP using the EquiTest force platform (Neurocom Intl). They were then tested using CTSIB, in which the resident stood on an unstable surface (a compliant foam mat) with eyes closed and were asked to flex and extend their neck. Lastly, the residents performed a computerized reaction time test (available at [www.humanbenchmark.com](http://www.humanbenchmark.com)). All the tests were performed before and after call at approximately the same time of day so as to exclude circadian rhythm influence on fatigue. They also completed questionnaires, including a Stanford Sleepiness Scale, describing their level of fatigue before and after call. **Results:** Preliminary results show a statistically significant difference between a resident's pre and post call test with regard to their reaction time ( $p = 0.01$ ), Stanford score ( $p = 0.001$ ), and preference for the visual system as measured by CDP ( $p = 0.05$ ). Linear regression analysis showed a relationship between sleep deprivation and decline in vestibular function. **Conclusions:** With the growing attention paid to resident duty hours, there is an increasing need for research involving fatigue and practical ways to measure it. This study shows that residents who are measurably fatigued (both objectively and subjectively) may show signs of vestibular impairment but are able to compensate by means of somatosensory and visual input.

2:38

#### Attitudes towards Professionalism Education in Otolaryngology Training

Brent G. Nichols, MD, Milwaukee, WI; Michael E. Stadler, MD, Milwaukee, WI; David M. Poetker, MD, Milwaukee, WI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe current methods of professionalism education in otolaryngology-head and neck surgery (OHNS) residency programs. They should also be able to discuss

program director and resident attitudes towards common professionalism education and evaluation techniques.

**Objectives:** Resident professionalism is difficult to teach with important implications for physician training and patient care. Meaningful professionalism curriculum requires collaboration between learners and educators. We aimed to better understand attitudes of otolaryngology-head and neck surgery (OHNS) program directors (PDs) and residents towards professionalism education. **Study Design:** Prospective survey. **Methods:** We identified contemporary methods of professionalism evaluation and education. We then formulated questions to assess attitudes towards each of these modalities as well as general professionalism topics. A program director survey was then electronically distributed to 104 PDs who were subsequently asked to forward a separate survey to their residents. **Results:** The resident survey was completed by 110 OHNS residents and the PD survey was completed by 33 OHNS PDs. Faculty questionnaires (100%) and nursing/ancillary staff questionnaires (93%) were the most common methods of resident evaluation. Role modeling (93%) and morbidity and mortality conference (90%) were the most common methods of education. Faculty mentoring (66%) and small group discussions (56%) were most often considered useful methods of teaching professionalism and formal lectures (14%) were generally not considered useful. Questionnaires by faculty (98%), medical staff (97%), and patients (94%) were commonly considered useful for professionalism evaluation. **Conclusions:** This represents the first study to examine OHNS resident and PD attitudes toward professionalism evaluation and education. We found residents valued mentoring programs and small group sessions rather than formal lectures. Residents also valued professionalism evaluation from multiple sources. This data regarding resident and program director attitudes should be considered when developing professionalism curricula.

2:45 - 3:15      **BREAK/POSTER VIEWING**

## 3:15 - 5:00 GERIATRICS/HEAD AND NECK SESSION FLORENTINE

3:15 - 4:15      **PANEL: ISSUES YOU CANNOT IGNORE IN YOUR OLDER PATIENTS**

**Moderators:** Karen M. Kost, MD\*, Montreal, QC Canada  
David E. Eibling, MD FACS\*, Pittsburgh, PA

**Panelists:** **Sleep Disturbances in the Elderly**  
Eric J. Kezirian, MD\*, Los Angeles, CA  
Edward M. Weaver, MD MPH FACS, Seattle, WA  
**Assessment of Frailty**  
Robert J. Stachler, MD FACS\*, Detroit, MI

**Moderator: Karen M. Kost, MD\*, Montreal, QC Canada**

4:15      **WITHDRAWN--The Safety and Cost of Thyroidectomy in the Elderly Population**

Anthony G. Del Signore, MD, New York, NY; Kelsey L. Ensor, BFA, New York, NY; Jien Shim, BA, New York, NY; Marita Teng, MD, New York, NY; Eric M. Genden, MD\*, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the safety of thyroidectomy in the elderly population and compare the cost of performing such procedures in the two compared age groups.

**Objectives:** Thyroid disease has been increasingly common with the aging population. Several published studies have shown mixed results regarding safety and cost effective thyroidectomy in the elderly population. Our objective is to discuss the safety implications of performing thyroidectomy in the aging population and determine the associated cost of care. **Study Design:** Retrospective review at a tertiary care institution and query of the New York State Department of Health's Statewide Planning and Research Cooperative System (SPARCS) database. **Methods:** One hundred nineteen patients over the age of 75 at a single institution that underwent thyroidectomy between 2005 and 2013 were reviewed. The SPARCS database during the same time period was queried for thyroidectomy and hospital costs in those > 75 as compared to those < 75. **Results:** In our cohort of elderly patients the mean age was 83.3 years old (range 76-93), with 75% ASA 3 or greater. The mean Charlson comorbidity index was  $2 \pm 1.80$ . There were no reported readmissions, reoperations or deaths. A multivariate analysis of the SPARCS database compared the cost of thyroidectomy, including length of stay and readmission rates for the two aforementioned groups. **Conclusions:** Thyroidectomy in the elderly population is associated with no increased morbidity or mortality as compared to other published cohorts. As the number of elderly patients continues to rise and the economic pressures increase, it is important to establish the ability to perform these procedures safely and efficiently.

4:22      **Outcomes of Swallowing after Chemoradiation Therapy for Head and Neck Cancer in Older Patients**

Pelin Kocdor, MD, Minneapolis, MN; Ozlem E. Tulunay-Ugur, MD, Little Rock, AR (Presenter); Eric R. Siegel, MS, Little Rock, AR; Emre A. Vural, MD, Little Rock, AR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe swallowing function

following chemoradiation in patients with head and neck cancer comparing outcomes between the patients over and under 60 years old.

**Objectives:** To evaluate swallowing function following chemoradiation in patients with head and neck cancer and to compare outcomes between the patients over and under 60 years old. **Study Design:** Retrospective chart review. **Methods:** Retrospective chart review of 60 patients who underwent a modified barium swallow (MBS) after chemoradiation from 2004-2012. Patient demographics, TNM staging, MBS results, BMI, PEG status were recorded. **Results:** Average age at diagnosis was 58 years old (range, 30-77 years old). 43 patients (71.6%) were male. 34 patients (56.6%) had oropharyngeal, 16 (26.6%) laryngeal, 9 (15%) hypopharyngeal and 1 (1.6%) nasopharyngeal cancer. Average followup was 2.9 years. 30 patients (50%) had oropharyngeal, 19 patients (31.6%) pharyngoesophageal and 10 patients (16.6%) pharyngeal dysphagia. Patients older than 60 years old showed increased aspiration compared to younger patients (86% vs 58%,  $p=0.02$ ). Remarkably 66.6% of the patients under 60 years old were PEG dependent whereas 33.3% of the patients over age 60 were PEG dependent ( $p=0.019$ ) for more than 6 months. A positive correlation was found between tumor size and swallowing scores ( $p=0.0006$ ) and PEG dependency ( $p=0.0006$ ). 24/30 patients in the younger age group had a T3-4 cancer, which could explain the higher PEG dependency rates. **Conclusions:** The current study supports that patients over 60 years of age are more prone to the aspiration regardless of TNM staging. Tumor size plays an important role for PEG dependency regardless of age.

**4:29**                    **Analysis of Prognostic Indicators in Well Differentiated Thyroid Carcinoma When Controlling for Stage and Treatment**  
Kaelyn A. Krook, MD, Atlanta, GA; Stacey A. Fedewa, MPH, Atlanta, GA; Amy Y. Chen, MD MPH FACS\*, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the relationship between survival from well differentiated thyroid carcinoma and race, age, and other sociodemographic factors.

**Objectives:** The incidence of thyroid carcinoma is on the rise. Few studies have examined patient characteristics that influence survival when adjusting for treatment and tumor stage/extent. **Study Design:** Retrospective analysis was performed using the Surveillance Epidemiology and End Results (SEER) database for patients diagnosed with well differentiated thyroid (WDT) carcinoma between 1988-2009. **Methods:** Kaplan Meir survival curves were used to estimate 5 and 10 year cause specific (CS) and overall survival (OS) differences by sociodemographic, clinical characteristics, and treatment. Multivariate cox proportional hazard models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI). **Results:** 83,985 patients were identified with WDT carcinoma. Blacks had higher hazard of all cause death at 5 years (HR 1.67, 95%CI 1.42-1.96) and 10 years (HR 1.57, 95% CI 1.37-1.80) when compared to non-Hispanic whites, but there were no significant differences when CS death was considered. Hispanics had poorer overall and cause specific 5 year and 10 year survival (5-year CS HR 1.562, 95%CI 1.227-1.989). Age was the most significant predictor of CS and OS with the risk increasing in a nonlinear fashion. After age 45, the HR for 5 and 10 year CS survival rose exponentially, reaching a HR 153 for individuals aged 85 and above (HR 153.454, 95%CI 97.843-240.673). **Conclusions:** The strongest prognostic indicator of survival from WDT thyroid carcinoma is age. Risk of death from thyroid carcinoma increases exponentially with age. Race/ethnicity are associated with OS from WDT although do not significantly alter CS survival. These factors should be taken into account in counseling patients and treatment planning.

**4:36**                    **Superior Laryngeal Nerve Monitoring Using Laryngeal Surface Electrodes and Intraoperative Neurophysiology Monitoring**  
Benjamin L. Hodnett, MD PhD, Pittsburgh, PA; Nicole C. Schmitt, MD, Pittsburgh, PA; Daniel R. Clayburgh, MD PhD, Pittsburgh, PA; Parthasarathy D. Thirumala, MD, Pittsburgh, PA; Umamaheswar Duvvuri, MD PhD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to utilize laryngeal surface electrodes and intraoperative neurophysiology monitoring to identify and preserve the external branch of the superior laryngeal nerve.

**Objectives:** To establish normative waveform data for the superior laryngeal nerve (SLN) utilizing laryngeal surface electrodes and intraoperative neurophysiological monitoring in conjunction with a clinical neurophysiologist. **Study Design:** Retrospective chart review. **Methods:** Forty-one consecutive at risk SLN were identified retrospectively in 28 patients in whom intraoperative neurophysiological monitoring using laryngeal surface electrodes was performed by a clinical neurophysiologist using the Dragonfly SSEP system. Data collected includes procedures performed, rates of nerve identification and stimulation, waveform characteristics, and preoperative/postoperative voice and swallowing dysfunction. **Results:** Of the 41 SLN at risk, 35 nerves were positively identified intraoperatively (85%). Preliminary analysis of 22 SLN yielded a peak latency of  $3.6 \pm 0.2$  ms, onset latency of  $1.7 \pm 0.2$  ms, peak to peak amplitude of  $277 \pm 75$   $\mu$ V, onset to peak amplitude of  $226 \pm 58$   $\mu$ V, and stimulation of  $0.6 \pm 0.0$  mA (data = mean  $\pm$  SEM). One patient had abnormal SLN function documented clinically on postoperative laryngoscopic examination. **Conclusions:** Laryngeal surface electrodes were successfully utilized to identify and monitor SLN function intraoperatively. Intraoperative neurophysiological monitoring using laryngeal surface electrodes enables analysis of waveform morphology and latency in addition to threshold and amplitude data obtained with the traditional NIM system, potentially improving the performance of nerve monitoring during thyroid surgery.

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**4:43**                    **Outcomes after Failure of Extubation in Head and Neck Surgery Patients**  
Gina D. Jefferson, MD, Chicago, IL; Kaori Ito, MD, Lansing, MI; Barry L. Wenig, MD\*, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) recall the criteria accepted as standard for patient extubation; and 2) cite criteria specific to head and neck surgical patients that impact successful extubation despite meeting the “standard criteria”.

**Objectives:** It is well established that standardized criteria for weaning mechanical ventilation are vital for successful extubation. However, these conventional extubation criteria (EC) do not specifically consider head and neck surgery (HNS) patients (pts). We aim to demonstrate that EC for this challenging population of pts are not well established. **Study Design:** Cohort study. **Methods:** Medical records of consecutive HNS pts surgically treated under general anesthesia between 4/2012 and 6/2013 were reviewed. The incidence of unplanned extubation, reintubation (RI), and outcomes in these pts were reviewed. Comparisons were made between outcomes of patients requiring RI and those that did not. **Results:** 96 pts met inclusion criteria. 70 pts (72.9%) were male. Median age was 61.5 years. Preoperative diagnoses with malignancies were noted in 64 patients (66.7%). 26 pts (27.1%) underwent immediate flap reconstruction. 28 pts (29.2%) underwent tracheostomy as part of the initial surgical procedure. 6 pts (8.8% of pts without tracheostomy) required reintubation (RI) within 1 - 6 days [median 3 days]. Unplanned extubation occurred in 2 pts (33.3% of pts with RI). Four pts (66.6 % of pts with RI) were in fact extubated after meeting institutional EC. 4 pts (66.7% of patients with RI) required an emergent surgical airway due to failed RI. The mortality rate was higher among pts requiring RI than in pts without RI (2 pts [33.3%] vs 1 pt [1.6%], p=0.021). **Conclusions:** Failed extubation after HNS is associated with increased risk for emergent surgical airway and increased mortality. Specific criteria that impact the airway, and hence successful extubation, of the HNS patient are critical to prevent untoward outcomes.

**4:50**                    **Seeing Is Believing: Novel Objective Evidence of Facial Reanimation Surgery Success**  
Jacob K. Dey, BS, Baltimore, MD; Lisa E. Ishii, MD MHS, Baltimore, MD; Patrick J. Byrne, MD, Baltimore, MD;  
Kofi D. 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 differences in how observers view normal faces and paralyzed faces and discuss the novel application of eye tracking technology to objectively measure the ability of facial reanimation surgery to normalize the appearance of facial paralysis.

**Objectives:** Use eye tracking technology to objectively measure the ability of facial reanimation surgery to normalize the appearance of facial paralysis. **Study Design:** Randomized controlled experiment. **Methods:** An eye tracker system was used to record the eye movement patterns, called scan paths, of 86 naïve observers gazing at pictures of paralyzed faces (HB IV-VI), smiling and in repose, before and after temporalis muscle tendon unit (MTU) transfer, as well as normal, nonparalyzed faces. Observers gazed at each face for 10 seconds. Fixation durations for all predefined facial areas of interest were analyzed using mixed effects linear regression. **Results:** Observers spent the majority of time [7 of 10 seconds] gazing in the central triangle region (eyes, nose, and mouth) of normal faces and paralyzed faces. However, there were statistically significantly greater gaze times on the mouth [314 ms, p<0.001] in paralyzed faces as compared to normal faces, both smiling and in repose. Those gaze differences were significantly minimized after surgery, where there were no statistically significant differences in the postop as compared to normals. Gaze times on the eye region remained significantly different between the normal and paralyzed faces, smiling and in repose, pre and postoperatively. **Conclusions:** There were objective differences in the way observers directed their attention to facial features when viewing normal faces and paralyzed faces. After facial reanimation surgery, observers were not distracted by many facial feature irregularities. These findings are important additions to the emerging body of objective evidence of the effectiveness of reanimation surgery; they also define reconstruction limitations and deficiencies that need to be improved.

**4:58**                    **Introduction of President-Elect**  
Derald E. Brackmann, MD\*, Los Angeles, CA

**5:00**                    **Adjourn**

**5:30 - 7:00**           **Meet the Authors Poster Reception**

# POSTER SESSION

## Laryngology/Bronchoesophagology

- C1. **Nebulized Racemic Epinephrine and Cardiac Complications: A Retrospective Study**  
Geoffrey P. Aaron, MD, Birmingham, AL; Richard K. McHugh, MD PhD, Birmingham, AL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the risks involved in using nebulized racemic epinephrine and the increased risk of cardiac complications in patients that have previous cardiac medical histories.

**Objectives:** To determine if nebulized racemic epinephrine used in the adult population is a safe tool in airway control and to determine if there is an increased risk of complications in patients that have previous cardiac medical histories. **Study Design:** A retrospective study looking at patients that were given nebulized racemic epinephrine at a tertiary hospital treated by the otolaryngology service. **Methods:** 50 patients who received nebulized racemic epinephrine, older than 19 years, and were treated by the otolaryngology service as a primary or consult patient between 2008 and 2013 were included in the study. Patients were found using ICD-9 codes for respiratory distress, dyspnea, and stridor. Reason for administration, number of doses, EKGs, telemetry, cardiac markers, past medical history, hospital course, and followup were all examined. **Results:** Of the 50 patients included, there were 55 unique hospitalizations with nebulized racemic epinephrine most commonly given for stridor, respiratory distress, and postextubation. On average each patient received 2 doses of racemic epinephrine per hospitalization. 25 patients (50%) had a positive cardiac history. 7 patients had cardiac related changes (including atrial fibrillation with rapid ventricular rate; coronary vasospasm with ST elevation changes, positive cardiac markers, and negative angiogram; and sinus tachycardia) around time of administration. Of these patients, 5 patients (71%) had a positive cardiac history. There were no incidents of myocardial infarction. **Conclusions:** This report represents the first retrospective study of racemic epinephrine's cardiac side effects in adults. We believe this supports relative contraindications to the administration of racemic epinephrine and further research should be performed.

- C2. **Telemedicine in Laryngology: Remote Evaluation of Voice Disorders**  
Paul C. Bryson, MD, Cleveland, OH; Michael S. Benninger, MD\*, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the current state of the art and technical demands for telemedicine in laryngology.

**Objectives:** To describe the set-up, execution, and application of telemedicine in evaluating voice disorders. **Study Design:** Prospective case series. **Methods:** Two long distance evaluations were performed using audio, video, internet streaming, and internet encoding and decoding technology. Both patients were examined at our tertiary care center via flexible fiberoptic laryngoscopy with stroboscopy and the audio and video was streamed in real time to distant locations for consultative review. A piano accompanist was able to perform with the patient at a remote location using similar technology. **Results:** Both patients were able to undergo live, interactive evaluation with physicians and speech language pathologists in both locations. **Conclusions:** Telemedicine in laryngology is a technically feasible and useful way to provide patient care. Access to this technology will continue to grow as costs decrease.

- C3. **Validation of a High Fidelity Phonomicrosurgical Trainer**  
Jennifer H. Gross, BA, Atlanta, GA; David M. Johnson, MD, Pittsburgh, PA; Adam M. Klein, MD, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the purpose of a phonomicrosurgical trainer and compare novice surgical performance before and after training.

**Objectives:** To validate the use of an updated, high fidelity phonomicrosurgical trainer. **Study Design:** This updated laryngeal dissection module (LDM) uses an improved larynx model with copolymer vocal folds that more closely mimic the consistency of true vocal folds. It also has adjustable hand and wrist supports that improve comfort and simulate placement in the OR. The aim was to determine whether there is a difference between the participants' surgical outcomes (total errors and total operating time) before and after training. **Methods:** Synthetic vocal folds containing lesions were placed within the LDM. Novices and experts were instructed to remove the lesion, and novices were given four training trials. All participants' performances were measured by amount of time spent and tissue injury (microflap, superficial, deep) to the vocal fold. An independent student t-test and Fisher exact tests were used to compare novices and experts. A matched-paired t-test and Wilcoxon signed rank tests were used to compare novice performance on the first and fourth trials and assess for improvement. **Results:** Experts completed the excision with less total errors than novices ( $P = .004$ ) and made less injury to the microflap ( $P = .05$ ) and superficial tissue ( $P = .003$ ). Novices improved their performance with training, making less total errors ( $P = .002$ ) and superficial tissue injuries ( $P = .02$ ) and spending less time for removal ( $P = .002$ ). **Conclusions:** The updated LDM has been validated as a phonomicrosurgical trainer for novice surgeons. It can distinguish between experts and novices, and after training, it helped to improve novice performance.

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### C4. Office versus Operating Room Based Procedures for Recurrent Respiratory Papillomas

Anya J. Li, MD, Detroit, MI; Glendon M. Gardner, MD\*, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the limitations and benefits of an in office versus operating room procedure from a patient perspective and from a hospital cost perspective.

**Objectives:** To analyze cost and patient satisfaction among patients undergoing office versus operating room based procedures for recurrent respiratory papillomas. **Study Design:** Retrospective chart review with prospective patient questionnaire. **Methods:** Patients who had undergone both operating room and in office laser procedures for their recurrent respiratory papillomas were asked to complete a 30 question questionnaire about their experiences. Billing extraction was performed as well. **Results:** There were 26 patients who underwent both office based laser procedures and operating room (OR) procedures for recurrent respiratory papillomas (RRP). Of those, 17 patients completed the survey. The average number of OR procedures per patient was 13.5 with a mean interval of 14.2 months between procedures. The average number of office laser procedures was 4.2 with 10 patients undergoing it only once and a mean interval of 5.2 months between procedures. An equal number of patients reported complications with both types of procedures. Average cost savings of the office procedure compared to the operating room was over \$8,900 per procedure with an initial investment of \$80,000. Overall, patients reported slightly more discomfort with the office based procedure but slightly more convenience in scheduling and time spent. **Conclusions:** Office based procedures are significantly more cost effective than operating room procedures, however, their use may be limited by patient tolerance.

### C5. Irritant Induced Paradoxical Vocal Fold Motion Disorder: Diagnosis and Management

Anna M. Marcinow, MD, Columbus, OH; Jennifer Thompson, MA CCC-SLP, Columbus, OH; L. Arick Forrest, MD MBA\*, Columbus, OH; Brad W. DeSilva, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the strategies for diagnosis and management of irritant induced paradoxical vocal fold motion disorder (IPVFMD). Paradoxical vocal fold motion disorder (PVFMD) is a well recognized clinical entity that is characterized by inappropriate adduction of the vocal folds during inspiration. It has been associated with exposures to irritants, however the demographic, diagnosis and management of this disorder has been sparsely described in the literature.

**Objectives:** To review our experience with the diagnosis and treatment of IPVFMD. **Study Design:** Single institution retrospective review and cohort analysis. **Methods:** This is the largest case control cohort study to determine the characteristics of IPVFMD cases. Chart review of PVFMD patients produced 34 cases that met IPVFMD criteria. 76 control PVFMD subjects were selected by age matching. PVFMD diagnosis was made on the basis of video laryngoscopy that visualized the paradoxical motion of the vocal folds during symptoms. In addition, patients underwent inhalation challenges with various strong odors. **Results:** There were no statistical differences between the groups for gender, asthma, obstructive sleep apnea, gastroesophageal reflux, environmental allergies, psychiatric diagnoses, tobacco use, or symptoms. 20 (59%) patients enrolled in laryngeal control therapy (LCT). Of the patients who attended LCT, 13 (65%) reported improvement or complete resolution of symptoms. Symptom improvement increased to 100% in those patients who attended at least 2 LCT sessions. **Conclusions:** A new pathogenic mechanism for PVFMD is supported by our observations. IPVFMD should be considered in patients presenting with respiratory symptoms after irritant exposure. Patients diagnosed with IPVFMD respond well to LCT.

### C6. Atraumatic Intubation: Experience Using a 5.0 Endotracheal Tube without a Stylet for Laryngeal Surgery

Jaime Eaglin Moore, MD, Philadelphia, PA; Amanda C. Hu, MD, Philadelphia, PA; Amy L. Rutt, DO, Philadelphia, PA; Parmis Green, DO, Philadelphia, PA; Robert T. Sataloff, MD DMA\*, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) identify the potential barriers to intubation with a 5.0 endotracheal tube without a stylet for laryngeal surgery; and 2) discuss the possible benefits of intubation with a 5.0 endotracheal tube without a stylet for laryngeal surgery.

**Objectives:** Vocal fold injury is a well known complication of intubation, with rates reported as high as 69%. Laryngology surgical textbooks recommend the use of a small endotracheal tube (ETT) to minimize these complications and optimize visualization. Case reports have also shown that the rigid stylet can lead to further laryngeal injury. Given the additional risk, intubation without the stylet is preferred in our practice. There is limited documentation in the literature regarding this viewpoint. Our study demonstrates the frequency and the potential barriers to intubation using 5.0 ETT without a stylet. **Study Design:** Prospective study. **Methods:** Consecutive adult patients undergoing laryngeal surgery were intubated with a 5.0 ETT without a stylet. Demographic data, specialty and training level of the personnel intubating and factors that would predict a difficult intubation were recorded. Descriptive statistical analysis was performed. **Results:** Findings of the participants (n=49) included average ASA (2.2), average Mallampati score (1.8), average grade of laryngoscopic visualization (1.6), and average BMI (28.2). The patients were intubated most commonly by residents (49.2%), followed by CRNAs (27.9%), and lastly by attendings (23.0%). The majority of patients were intubated by the anesthesia personnel (98.4%) on first attempt (88.5%). Five patients (10%) were intubated using a stylet, and only one participant was intubated initially with a stylet. Of these five participants, 80% required use of a GlideScope. One patient sustained an oropharyngeal laceration during intubation by direct

laryngoscopy with a stylet. No participants had laryngeal injury and no other anesthetic complications were encountered. **Conclusions:** Most patients can be successfully intubated using a 5-0 ETT without a stylet.

**C7. WITHDRAWN—Open Revision of Transcervical Medialization Laryngoplasty: Indications and Surgical Decision Making**

Noah P. Parker, MD, Boston, MA; Anca M. Barbu, MD, Boston, MA; Robert E. Hillman, PhD, Boston, MA; Steven M. Zeitels, MD\*, Boston, MA; James A. Burns, MD\*, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify patterns of failure following transcervical medialization laryngoplasty for unilateral vocal fold paralysis and to describe indications and revision techniques for optimal vocal outcomes.

**Objectives:** To identify patterns of failure following transcervical medialization laryngoplasty for unilateral vocal fold paralysis (UVFP) and to describe indications and revision techniques for optimal vocal outcomes. **Study Design:** Retrospective review. **Methods:** A retrospective review identified consecutive patients between January 2005 and September 2013 undergoing open revision of transcervical medialization laryngoplasty. Demographics, etiology, stroboscopic assessment, and surgical techniques were recorded. Patient self-assessment using the Voice Related Quality of Life questionnaire (VRQOL) and objective acoustic and aerodynamic assessments performed pre and postoperatively were analyzed using t-tests for paired comparisons. **Results:** Thirty-six patients underwent 44 open revision procedures. Indications included: implant too small (n=27), persistent posterior glottic insufficiency (n=18), inadequate vocal fold surface pliability (n=12), implant malposition (n=12), and/or implant too large (n=7). Twenty-five patients (70%) had more than 1 indication. Revision techniques included: implant revision (n=48) or removal (n=2), arytenopexy (n=15), and/or cricothyroid subluxation (n=13). Sixteen surgeries (36%) included a combination of techniques. Median followup was 160 days. Pre-revision and post-revision vocal function data were available for 22 patients. Group based results showed statistically significant ( $p < 0.05$ ) post-revision increases in VRQOL scores and reductions in percent jitter, noise to harmonic ratio, and average air flow rates. **Conclusions:** Voice enhancement after initial transcervical medialization for UVFP required careful analysis of post-surgical phonatory anatomy and vibratory biomechanics. Consideration of posterior glottic insufficiency and underlying phonatory mucosal pliability were critical to patient specific surgical planning. This careful analysis, along with tailored selection of revision procedures from a set of defined options, optimized post-revision vocal enhancement as observed by subjective and objective measures of vocal function.

**C8. Laryngeal Warthin's Tumor - An Unusual Case of Dysphonia**

Amit A. Patel, MD, Newark, NJ; Jared M. Wasserman, MD, Hackensack, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand and discuss the differential diagnosis of laryngeal masses as well as the current theories behind the etiology and pathogenesis of Warthin's tumor.

**Objectives:** We present an unusual case of progressive dysphonia in an 86 year old female with a history of smoking. Final pathology after excision of the mass was positive for Warthin's tumor, an entity which is almost exclusively arises from the parotid gland. The differential diagnosis of laryngeal masses is discussed as well as a review of the current literature regarding Warthin's tumor. **Study Design:** Case study. **Methods:** Case study and literature review. **Results:** An 86 year old female presented with a several month history of increasing dysphonia and globus sensation. Flexible laryngoscopy revealed fullness of the right aryepiglottic fold and false vocal fold extending to the ventricle, smooth and cystic in appearance. The patient underwent microdirect laryngoscopy with CO2 laser excision of the mass. Final pathology was consistent with Warthin's tumor. On followup, the patient's globus sensation had improved and her voice had returned to baseline. **Conclusions:** Warthin's tumor is a benign neoplasm which usually arises from the parotid gland. Extrasalivary Warthin's tumors are unusual, and laryngeal Warthin's tumors are exceedingly rare, with this case representing only the second such case in the English literature. Nevertheless, they should be considered in the differential diagnosis of laryngeal masses.

**C9. Nasal Angiosarcoma Metastatic to the Larynx: Case Report and Systematic Review of the Literature**

Hannah E. Qualls, MD, Minneapolis, MN; Ryan M. Mitchell, MD PhD, Seattle, WA; Heike Deubner, MD, Seattle, WA; Kris S. Moe, MD FACS\*, Seattle, WA; Maya G. Sardesai, MD MEd, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the literature regarding presentation and course of laryngeal angiosarcoma, including demographic factors, treatment strategies, and outcomes, and consider implications for followup of angiosarcoma presenting in the head and neck.

**Objectives:** To describe the first case of angiosarcoma metastatic to the larynx and systematically review the reported cases involving angiosarcoma in the larynx. **Study Design:** Systematic review of the literature. **Methods:** A systematic review of the literature was performed to identify all cases of angiosarcoma of the larynx reported in the peer reviewed English literature. Predefined variables were identified and data was extracted by two different reviewers. Discrepancies were resolved by discussion and consensus. **Results:** Including the present case and previously reported cases, 18 cases were identified. Patients ranged in age from 24 to 83 years, with a mean age of 64.3 years; the male to female ratio was 1.6:1. Mean duration of followup was 33.4 months. Eight of seventeen patients

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died with disseminated disease at a mean duration of followup of 18.4 months and range of three to 45 months. Two additional patients died, one with no evidence of disease and one with unknown disease status, and one patient was lost to followup. **Conclusions:** Angiosarcoma of the larynx is a rare entity, with limited therapeutic options and poor prognosis. We performed a systematic review of the literature and report on the first case of a laryngeal metastasis from a cutaneous angiosarcoma of the head and neck. Our findings may inform the surveillance of patients who present with cutaneous angiosarcoma of the head and neck.

### C10. Concomitant Tracheoesophageal Fistula and Subglottic Stenosis after Percutaneous Dilation Tracheostomy: A Case Report and Literature Review

Christopher R. Roxbury, MD, Baltimore, MD; Jesse Qualliotine, BS, Baltimore, MD; Daniel Shinn, BS, Baltimore, MD; Daniela Molena, MD, Baltimore, MD; Young J. Kim, MD PhD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss potential complications of percutaneous dilation tracheostomy and treatment options for a severe complication.

**Objectives:** The purpose of this report is to discuss a potential serious complication of percutaneous tracheostomy and its management, and to review the literature on complications of percutaneous tracheostomy. **Study Design:** Case report and literature review. **Methods:** N/A. **Results:** N/A. **Conclusions:** We report a case of an otherwise healthy 59 year old male who experienced tracheoesophageal fistula and grade IV subglottic stenosis after percutaneous dilation tracheostomy following polytrauma. Although percutaneous tracheostomy is considered a safe procedure that is often performed in the intensive care unit setting, it is not without complications. While subglottic stenosis and tracheoesophageal fistula are known complications of percutaneous tracheostomy, this report is the first to our knowledge that discusses management of a patient who experienced both complications simultaneously.

### C11. Photodynamic Therapy for Endolaryngeal Kaposi Sarcoma

Mausumi N. Syamal, MD, Detroit, MI; Vanessa G. Schweitzer, MD\*, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to see that photodynamic therapy is an effective treatment modality for laryngeal Kaposi's sarcoma.

**Objectives:** We present the first documented case of successful photodynamic therapy (PDT) treatment of endolaryngeal Kaposi's sarcoma. **Study Design:** Case report. **Methods:** Presentation and photodocumentation of successful PDT treatment of endolaryngeal Kaposi's sarcoma. **Results:** A 37 year old male initially presented to our office with Kaposi's sarcoma on his face, tongue, soft palate and right side of the epiglottis. He subsequently underwent injection of photofrin II followed by PDT to a total of five fields at a dose of 100 joules/cm<sup>2</sup> involving the supraglottic region. Postoperatively, he was found to have 80-90% resolution of his epiglottic lesion based on size reduction. **Conclusions:** PDT is a safe and effective alternative for treating cutaneous as well as endolaryngeal lesions and Kaposi's sarcoma.

### C12. Removing Vocal Fold Epithelium Impairs Vibration in an Excised Larynx Model

Justin R. Tse, BS, Los Angeles, CA; Yue Xuan, PhD, Los Angeles, CA; Zhaoyan Y. Zhang, PhD, Los Angeles, CA; Jennifer L. Long, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss how removal of the vocal fold epithelium affects phonation.

**Objectives:** The role of vocal fold epithelium in phonation is not understood. We hypothesized that selectively removing the epithelium, leaving lamina propria intact, would impair vibration. These experiments quantitatively and qualitatively assessed the impact of de-epithelialization in an excised larynx model. **Study Design:** Basic science investigation. **Methods:** Cadaveric human larynges were studied on an excised larynx phonation apparatus. Subglottal pressure was applied and the following aerodynamic parameters were measured: phonatory threshold pressure (PTP), flow rate, and fundamental frequency. High speed video was used to assess vibrational symmetry and glottal closure. After baseline phonation, the epithelium was enzymatically removed from one vocal fold with trypsin (de-epithelialized hemilarynx) and phonation was repeated. Phonation was then repeated once more with both vocal folds de-epithelialized. **Results:** Baseline mean PTP, flow rate, and fundamental frequency were 0.46kPa, 64mL/s, and 88.5Hz, respectively. De-epithelialization changed those parameters to 0.30kPa, 105mL/s, and 122Hz in the hemilarynx condition, and 0.46kPa, 170mL/s, and 130Hz with both vocal folds de-epithelialized. Vibration was symmetric with complete glottal closure in untreated vocal folds. However, in both the de-epithelialized hemilarynx and whole larynx, vibration was asymmetric, aperiodic, and with incomplete glottal closure. Histological analysis verified that de-epithelialization was complete and the lamina propria was unperturbed. **Conclusions:** These results demonstrate the importance of intact epithelium in phonation. Epithelial injury was found to impair glottal closure, periodicity, and vibrational symmetry, causing excess air loss and raising the fundamental frequency. Epithelial injury may represent an under-recognized cause of dysphonia, and has implications for vocal fold tissue engineering and repair.

**C13. Epithelial Inclusion Cyst of the Hypopharynx**

James C. Wang, BS, Lubbock, TX; Joe Hassan Cordero, MD, Lubbock, TX; Ruc Tran, MD, Lubbock, TX; Tam Q. Nguyen, MD, Lubbock, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the rarity of epithelial inclusion cysts in the head and neck and its diagnosis, treatment, and complications.

**Objectives:** Describe a rare case of an epithelial inclusion cyst of the hypopharynx. **Study Design:** Case report of a 67 year old man with a history of heavy tobacco and alcohol use that presented with a few month history of dysphagia. **Methods:** Examination with a flexible fiberoptic scope revealed no mass in the nasopharynx or endolarynx. Interestingly, a cystic non-ulcerating mass was noted protruding from the right piriform sinus. From its presentation, it could either be a swelling or a true neoplasm. CT scan revealed a uniform mass situated at the medial wall of the right piriform sinus budding against the thyroid cartilage. Direct laryngoscopy allowed visualization of a 3 cm horseshoe shaped mass situated at the right base of tongue and the medial wall of the piriform sinus. Applying pressure with the tip of the scope, a well encapsulated benign looking round structure emerged from the right hypopharynx which was marsupialized. **Results:** Histopathology of the biopsy tissue revealed sections of the cyst wall and the surrounding hypopharynx to be consistent with an epithelial inclusion cyst, ruling out malignancy. At the two month followup, the patient had bilateral vocal cord mobility visualized with fiberoptic laryngoscopy, resolution of all symptoms, and no evidence of recurrence. **Conclusions:** Epithelial inclusion cysts are a rare entity in the head and neck region. There have been a few reported cases in the oral cavity, especially associated with the tongue. We believe this is the first reported case of an incidental finding of an epithelial inclusion cyst on the piriform wall that presented as a neoplasm.

**Otology/Neurotology****C14. Predictors of Abnormal MRI Findings in Patients with Asymmetric Sensorineural Hearing Loss**

Syed F. Ahsan, MD, Detroit, MI; Daniel Osborne, MD, Detroit, MI; Robert T. Standing, MD, Detroit, MI; Michael Seidman, MD\*, Detroit, MI; Rajan Jain, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify factors which suggest higher likelihood of an abnormal MRI in patients presenting with asymmetric sensorineural hearing loss.

**Objectives:** To evaluate the association between clinical and audiometric factors and abnormal magnetic resonance imaging (MRI) findings in patients evaluated for asymmetric sensorineural hearing loss (ASNHL). **Study Design:** Retrospective chart review. **Methods:** Medical records and charts were reviewed for a total of 451 patients who presented with ASNHL and had MRI performed between January 2005 and December 2011. The charts were reviewed looking at various audiometric parameters as well as clinical presentation. This was compared with findings on the MRI exam. MRI was categorized as abnormal, normal and incidental. Statistical analysis was performed using chi-square tests to evaluate the relationship between the variables and the MRI findings. Logistic regression analysis was also performed to provide an odds ratio. Finally, multivariate model was used to assess audiometric criteria and their relationship to abnormal MRI findings. **Results:** A total of 45 patients (9%) had abnormal MRI findings. Only 4.7% had a CPA/IAC mass on MRI. These made up 39.6% of all abnormal MRI findings. The next most common finding was labyrinthitis. Vertigo, tinnitus, loud noise exposure, labyrinthitis, and 15db asymmetry at 3khz were associated with an abnormal MRI finding. Logistic regression analysis showed that vertigo, tinnitus and 15db asymmetry at 3khz were risk factors for abnormal MRI. Finally, in multivariate analysis, only 15 db asymmetry at 3khz was significantly associated with an abnormal MRI finding. **Conclusions:** In evaluating patients with asymmetric SNHL, asymmetry of 15 db at 3khz is associated with an abnormal finding on MRI. Those patients who present with ASNHL with this audiometric characteristic should undergo MRI of the brain.

**C15. Epithelial Migration in the Pathogenesis of Acquired Cholesteatomas**

Danielle M. Blake, BA, Newark, NJ; James Sun, BA, Newark, NJ; Senja Tomovic, MD, Newark, NJ; Neena M. Mirani, MD, Newark, NJ; Robert W. Jyung, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand the relevance of collective cell migration to normal epithelial migration of the tympanic membrane and EAC; and 2) understand how directed collective cell migration plays a role in the genesis of cholesteatomas.

**Objectives:** Cholesteatoma is an invasive lesion where squamous epithelium erodes the temporal bone. Polarity of epithelial cells is a marker of migration. Our goals were to determine if polarity of cholesteatoma epithelial cells could be verified by 1) immunohistochemical staining or 2) by nuclear shape analysis. **Study Design:** Case control. **Methods:** Surgically harvested cholesteatoma (n=12) and control specimens were oriented by marking the distal cholesteatoma sac or normal EAC epithelium with ink. Immunohistochemical staining for beta-tubulin and Golgi as markers of cell polarity was performed. The polarity of epithelial cells was determined using densitometry and nuclear shape analysis. **Results:** In cholesteatomas and controls, no difference between distal and proximal staining of individual cells was found. The average ratio of distal to proximal staining in cholesteatomas was 0.52 and 0.48 for controls. Nuclear shape analysis was performed by calculating the deformation index, a ratio indicating the polarity of a cell on a scale from 0 to 1, with 0 being non-polarized. This revealed alternating areas of nuclear elongation (highest 0.55) and roundness (lowest 0.08) within

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a given specimen. **Conclusions:** Polarity of epithelial cells was not confirmed with immunohistochemistry but was supported by nuclear shape analysis. Alternating nuclear elongation and roundness suggested areas of compression and elongation, consistent with epithelial migration in cholesteatomas. We propose that the invasiveness of cholesteatomas is related to diversion or obstruction of the normal epithelial migration of the TM and EAC.

### C16. Tympanostomy Tubes in Pediatric Cochlear Implant Recipients: Analysis of Complications

Jason A. Brant, MD, Philadelphia, PA; Jessica L. Guidi, BS, Philadelphia, PA; Luv R. Javia, MD, Philadelphia, PA; John A. Germiller, MD PhD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the risks of tympanostomy tube use in children with cochlear implants.

**Objectives:** To review infectious complications associated with cochlear implantation (CI) in children and their relation to the presence of tympanostomy tubes (TT). **Study Design:** Retrospective chart review, extending a smaller unpublished series from 2008. **Methods:** All patients undergoing cochlear implantation at a tertiary referral children's hospital between 1990 and 2012 for which adequate followup and clinical information was available. **Results:** A total of 478 patients (557 ears) were reviewed, representing over 2978 patient years of followup. One hundred thirty-seven ears (24.6%) had TT present at time of, or placed at some point after, implantation. The remainder either never had TT or they had extruded prior to implantation. Overall, 63 complications occurred, of which 17 were infectious: wound cellulitis (4), acute mastoiditis (1), device infection (4), labyrinthitis (2), meningitis (4), and refractory AOM requiring IV antibiotics (2). Only one was temporally associated with the presence of TT, a device infection that occurred in an ear with a retained TT in place over 4 years. In 3 cases, TT had to be removed due to high flow perilymph leaks associated with cochlear malformations. **Conclusions:** Infectious complications after CI are rarely associated with the presence of TT, supporting the concept that overall, TT are safe in CI recipients. Close monitoring is essential, including prompt removal of tubes when they are no longer needed.

### C17. Changes in Cochlear Orientation in Pediatric and Adult Populations

Adam P. Campbell, MD, Chapel Hill, NC; Benjamin Huang, MD, Chapel Hill, NC; Oliver F. Adunka, MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, participants should be able to discuss the differences in the cochlear orientation of adults and children.

**Objectives:** To evaluate the orientation of the cochlea within the temporal bone in pediatric and adult populations and its relation to hearing loss. **Study Design:** A retrospective analysis of high resolution computed tomography scans of the temporal bones performed between 2001 and 2013 at a single academic tertiary care medical center. **Methods:** One hundred fifty-eight adult and pediatric subjects with appropriate biographical, clinical, audiometric and imaging data were selected from the database of the study institution. Sensorineural hearing loss (SNHL) and control groups were determined. Six predetermined angular relationships between the cochlea and surrounding temporal bone were measured by a neuroradiologist in a blinded fashion. Imaging data were recorded and statistically analyzed. **Results:** Data from pediatric temporal bones demonstrates a progressive change in the angle between the round window and basal cochlear turn over the first decade of life. All angles remained constant during adulthood. In addition, there was a significant difference in the angle between the round window and the coronal plane of the basal cochlear turn in children and adults ( $p < 0.001$ ). Children with SNHL had a significantly greater angle between the cochlear axis and mastoid segment of the facial nerve than their normal hearing counterparts ( $p < 0.004$ ). **Conclusions:** The orientation of the cochlea appears to change during the first decade of life, but remains stable throughout adulthood. Children and adults have a significantly different cochlear orientation within the temporal bone, which may impact both the surgical approach to the cochlea and ease of cochlear implantation.

### C18. Hearing Outcomes after Repair of Spontaneous Temporal Bone Cerebrospinal Fluid Leak

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 discuss the effects that repairs of spontaneous temporal bone cerebrospinal fluid leaks have on hearing.

**Objectives:** To describe hearing outcomes in patients who underwent repair of a spontaneous, temporal bone cerebrospinal fluid (CSF) leak. **Study Design:** Retrospective case series at a tertiary referral center. **Methods:** Patients who underwent repair of a spontaneous, temporal bone CSF leak, and who had audiometry performed both before and after repair were included in the study. Preoperative and postoperative audiometry results were compared. Patients with iatrogenic causes of CSF leak were excluded. **Results:** Sixty-nine patients presented with spontaneous, temporal bone CSF leak from 7/2007 - 10/2013. Seventy-seven repairs were performed. Twenty-three patients (26 repairs) were identified who underwent both preoperative and postoperative audiometry. Middle fossa craniotomy was performed for 17 cases (65%), a combined middle fossa and transmastoid approach for 4 cases (16%), and a transmastoid approach for 5 cases (19%). Postoperative audiometry was performed at a median of 105 days after surgery. Overall, there were no significant differences between preoperative and postoperative 4 frequency pure tone average ( $p = 0.12$ ), speech reception threshold ( $p = 0.08$ ), and speech discrimination score ( $p = 0.39$ ). There was also no significant change in air bone gap (ABG), with a mean of 1.5 dB less ABG postoperatively (standard deviation 13.9 dB,  $p = 0.28$ ). Specific surgical approach did not significantly influence

postoperative hearing. **Conclusions:** Patients who undergo repair of a spontaneous, temporal bone CSF leak do not appear to experience significant postoperative changes in hearing. To the authors' knowledge, this is the first study specifically examining hearing outcomes following repair of spontaneous, temporal bone CSF leaks.

**C19. Impact of Physical Activity on Hearing**

Patrick J. Haas, MD, Jackson, MS; Charles E. Bishop, AuD, Jackson, MS; Jiankang J. Liu, MD PhD, Jackson, MS; John M. Schweinfurth, MD\*, Jackson, MS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the relationship between physical activity and hearing loss, and how it relates to an increasingly sedentary population.

**Objectives:** Modifiable risk factors for hearing loss remain poorly defined. There is some evidence to suggest that physical activity is protective against noise induced temporary threshold shifts. This study evaluates the relationships between physical activity and auditory function. **Study Design:** Prospective cohort study. **Methods:** Since 2008 we have assessed the hearing and central auditory function of 1349 participants of a large adult African American cohort. This cohort has also undergone extensive cardiovascular evaluation including detailed assessment of physical activity by way of a validated, multidimensional, physical activity questionnaire. We performed correlation and regression analysis of self-reported physical activity and hearing impairment by individual frequencies (250 - 8kHz) and frequency averages. We present our findings for different models of multivariate adjustment. **Results:** Physical activity as a continuous variable has a small, though statistically significant ( $p < 0.05$ ), correlation with both pure tone average and pure tone thresholds at most test frequencies. The correlation with physical activity was significant while adjusting for age, gender, alcohol, smoking, BMI, hypertension, diabetes, and dyslipidemia. **Conclusions:** The protective effect of physical activity, while statistically significant, is small. These findings may indicate that increasing incidence of sedentary lifestyles may result in increased rates of hearing loss on a population level. This may imply younger generations with higher rates of sedentary lifestyles are more at risk for age related hearing loss than their elders.

**C20. Transmastoid Repair of Otogenic Cerebrospinal Fluid Leaks**

Elton M. Lambert, MD, Houston, TX; Mark A. Mims, BS, Houston, TX; Chin-yen J. Chang, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) describe the common etiologies of otogenic cerebrospinal fluid leaks; 2) appreciate the most common signs and symptoms as well the diagnostic workup for otogenic cerebrospinal fluid leaks; and 3) describe the approaches and techniques most commonly used in the transmastoid repair of otogenic cerebrospinal fluid leaks.

**Objectives:** To review a single surgeon experience with the transmastoid extradural approach to otogenic cerebrospinal fluid leak repair. **Study Design:** Retrospective review. **Methods:** Twenty-five patients (twenty-six ears) were identified who underwent transmastoid repair of a cerebrospinal fluid leak between July 2001 and November 2011. Patient demographics and characteristics of the leak including side, etiology, location, type of repair, recurrence rates and audiometric data if available were analyzed. **Results:** The average age at presentation was 50.23 years +/-18.83. There were ten males (40%) and 15 females (60%). Mean length of followup was 21.2 months (SD=29.3 months; range 1 to 94 months). The most common presenting symptom was hearing loss in 21 ears (80%). Eight patients (32%) had a history of meningitis. There were fourteen spontaneous leaks (53%), five traumatic (19%), five iatrogenic (19%) and 2 congenital (7%). All leaks were repaired via a transmastoid approach without the need for craniotomy. There were four recurrences (15%) in the followup period, all of whom presented with hearing loss. There were no major complications as a result of the surgery. **Conclusions:** The transmastoid approach is a viable and safe option in the management of most otogenic cerebrospinal fluid leaks. It can often negate the need for craniotomy with a high rate of success and low rate of complications.

**C21. Intratympanic Mannitol Therapy for Sudden Sensorineural Hearing Loss**

Christopher V. Lisi, MD, Miami, FL; Seo Moon, MD, Miami, FL; Adrien A. Eshraghi, MD\*, Miami, FL; Simon I. Angeli, MD\*, Miami, FL; Fred F. Telischi, MD MEE FACS\*, Miami, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the potential role of IT mannitol injection as a safe therapeutic option for improving hearing after sudden sensorineural hearing loss.

**Objectives:** To determine the effect of intratympanic (IT) mannitol injection on speech reception threshold (SRT) and speech discrimination score (SDS) in sudden sensorineural hearing loss (SSNHL). In this preliminary study, our aim was to identify any negative effects of using mannitol intratympanically. Previous in vitro and animal studies have shown mannitol to be an antioxidant capable of preventing ischemic and ototoxic damage to the inner ear. We are aware of no studies using IT mannitol in humans as salvage therapy for SSNHL. **Study Design:** Retrospective review within a university hospital setting. **Methods:** Charts were reviewed of 19 patients who underwent IT injection of mannitol 25% solution. Subjects experienced SSNHL and had received oral (except for 2 diabetic patients) and IT steroids with incomplete recovery in hearing. Outcome measures included changes in SRT and SDS, subjective hearing change, and discomfort. **Results:** Mean patient age was 59.8 (SD 8.8) years with a followup of 7.9 (SD 5.3) weeks. We found a decrease in SRT of 1.2 dB (SD 12.1) and an increase of 9.1% (SD 15%) in SDS after injection. Subjective improvement was reported by 42.1% of subjects

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and a subjective worsening in 10.5%. Twenty-five percent of patients reported transient pain associated with injection. No patients were found to have tympanic membrane perforation or other complications. **Conclusions:** IT mannitol injection is a novel, safe, and potentially effective salvage modality for patients not benefitting from oral and IT steroids after SSNHL.

### C22. Bilateral Endolymphatic Hydrops in a Patient with Migraine Variant without Vertigo

Isabelle Yisha Liu, MD, Los Angeles, CA; Ali R. Sepahdari, MD, Los Angeles, CA; Kevin Johnson, BA, Los Angeles, CA; Akira Ishiyama, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to learn a novel MR imaging protocol for detecting endolymphatic hydrops and discuss the significance of endolymphatic hydrops in migraine variant, specifically in a patient lacking vertigo or Meniere's disease.

**Objectives:** Endolymphatic hydrops (EH) has been well described in patients with Meniere's disease and vestibular migraine; however, no cases of EH have been reported in patients suffering from migraine variant with no vestibular symptoms. Here we present a novel imaging modality for detecting EH and a unique case of a patient experiencing migraine headaches along with auditory symptoms without vertigo for more than 20 years. **Study Design:** Retrospective case report. **Methods:** Magnetic resonance imaging sequences included cisternographic three dimensional T2, and delayed intravenous enhanced three dimensional fluid attenuation inversion recovery (DIVE-3D-FLAIR) sequences, performed with 2350 ms (bright perilymph) and 2050 ms (bright endolymph) inversion times. The bright endolymph images were subtracted from bright perilymph images to create a composite image with bright perilymph, dark endolymph, and intermediate bone signals. **Results:** One case was reviewed of a 40 year old female who presented with chronic left sided mixed hearing loss and migraine headaches since age 12, and more recent right sided fluctuating sensorineural hearing loss, tinnitus, and aural fullness. Audiometry confirmed increased right sided hearing loss at times of symptom severity. Vestibular testing was within normal limits. MRI showed the presence of severe bilateral vestibular and cochlear EH. **Conclusions:** Endolymphatic hydrops can be present in patients without Meniere's or vertigo. This demonstrates that EH does not necessarily cause vertigo or MD, and all these are likely epiphenomenon of underlying inner ear pathology, possibly secondary to migraines. New imaging modalities are allowing exciting new research into the field of inner ear pathology, with significant future implications.

### C23. Anatomic Factors Influencing Surgical Approach for Selective Vestibular Nerve Section: A Comparison of Retrolabyrinthine and Retrosigmoid Internal Auditory Canal Approaches

Adam N. Master, MD, Shreveport, LA; Maura K. Cosetti, MD, Shreveport, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss anatomic features that would guide selection of surgical approach for vestibular nerve section.

**Objectives:** Perform retrolabyrinthine (RL) and retrosigmoid (RS) with or without internal auditory canal dissection (RSwIAC) on cadaveric heads. Identify measurable anatomic factors that may guide surgical approach for selective vestibular nerve section (VNS) and identify the vestibulocochlear cleavage (VCC) plane. **Study Design:** Cadaveric dissection. **Methods:** RL and RS approaches were performed on 16 ears. Trautman's triangle (TT) and the distance from the posterior semicircular canal to the anterior border of the sigmoid along Donaldson's line (pDL) were measured. Details of the VCC plane from each approach were calculated and compared. **Results:** Overall mean pDL was 8.53 mm (range 5-11.5mm) and mean TT area was 124 mm<sup>2</sup> (range 95- 237 mm<sup>2</sup>). The VCC was identified in 10 of 16 ears (63%) of ears through the RL approach alone. 6 of 16 (37%) of ears required RSwIAC. In ears requiring IAC dissection, the VCC was found within 1-2mm distal to the porus. The pDL in the RL group had a larger mean compared to the RSwIAC group, 9.3mm versus 7.2mm ( $p = .03$ ). Area of TT was also larger in the RL group compared to the RS with IAC group, 162 versus 139 ( $p = .35$ ). **Conclusions:** While a contracted mastoid is known to be unfavorable for a RL approach to VNS, specific anatomic factors influencing surgical approach are poorly described. Ears amenable to RL approach had greater pDL and TT area. Measurement of pDL may have a role in surgical planning and choice of approach for VNS.

### C24. Bilateral Vestibulopathy Patients with Preserved Vestibular Evoked Myogenic Potentials Who Respond to Acetazolamide Therapy

Kimanh D. Nguyen, MD, Los Angeles, CA; Akira Ishiyama, MD, Los Angeles, CA; Robert W. Baloh, PhD, Los Angeles, CA; Gail Ishiyama, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify patients who should be tested for bilateral vestibulopathy, and determine the subset of patients who may respond well to acetazolamide therapy.

**Objectives:** Bilateral vestibulopathy is characterized by functional loss of both labyrinths, leading to symptoms of oscillopsia and unsteadiness. Patients typically have absent or reduced bilateral responses to bithermal caloric stimulation, indicating deficits of the semicircular canals. Herein we present a subset of patients with bilateral vestibulopathy who have unusual symptomatology and preserved vestibular evoked myogenic potential (VEMP) responses. **Study Design:** Clinical history and neurotological examination of four patients (ages 20-50) who presented to the neurotology clinic with bilateral vestibulopathy. **Methods:** Patients underwent the standard vestibular test battery of caloric irrigation, rotational chair testing, and head impulse testing to evaluate semicircular canal function, along

with cervical VEMP testing to assess saccular performance. Patients were treated with acetazolamide to ameliorate their symptoms. **Results:** All patients also suffered from migraines and reported recurrent brief episodes of spontaneous rotational vertigo. Acetazolamide produced total or near complete resolution of recurrent vertigo spells in all patients. All patients had absent or significantly reduced responses to caloric irrigation, rotational sinusoidal vestibular testing, and head impulse testing. All patients surprisingly had normal robust responses to cervical VEMP testing. **Conclusions:** In a subset of bilateral vestibulopathy patients with migraines and brief spells of vertigo, acetazolamide greatly alleviates symptoms. The clinician is advised to identify the patients who need to undergo vestibular testing, and in the subset of bilateral vestibulopathy patients with brief spells of vertigo, acetazolamide should be tried.

**C25. Hydrogel Sutureless Facial Nerve Repair**

Nathan E. Pierce, MD, Gainesville, FL; Jeremiah A. Alt, MD PhD, Salt Lake City, UT; Patrick J. Antonelli, MD\*, Gainesville, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the technique and value of hydrogel sutureless facial nerve repair.

**Objectives:** Traditional suture repair of the facial nerve (FN) can be technically challenging and time consuming, particularly when performed on the intracranial segment. This study reports the surgical outcomes of a novel, rapidly applied, hydrogel sutureless nerve repair (HSNR) technique for the FN. **Study Design:** Retrospective chart review. **Methods:** HSNR consisted of nerve alignment with fibrin glue, followed by polyethylene glycol hydrogel encasement for tensile strength. Medical records of patients repaired with the HSNR technique were reviewed. FN function was the primary outcome measure. **Results:** Patient one had 20 years of progressive facial palsy secondary to intraneural perineurioma extending from the tympanic segment to the brainstem. Middle fossa HSNR yielded return to baseline FN function with good eye closure after 1 year. Patient two's FN was sacrificed from the stylomastoid foramen to distal to the pes to remove a squamous cell carcinoma. At six months, he had full eye closure and slight movement of the lower branches. Total HSNR time was less than 10 minutes for each case. **Conclusions:** HSNR repair is an appealing alternative to traditional techniques as it provides excellent tensile strength, simplifies neuroorrhaphy (particularly intracranially), reduces intraoperative time, and yields results equivalent to conventional suture neuroorrhaphy.

**C26. Rare Case of Successful Cochlear Implantation in a Pediatric Patient with Type 3 Gaucher's Disease**

Amanda I. Rodriguez, BS, Lubbock, TX; James C. Wang, BS, Lubbock, TX (Presenter); Steven Zupancic, AuD PhD, Lubbock, TX; Joehassin Cordero, MD, Lubbock, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss a rare case of successful cochlear implantation in a pediatric patient with type 3 Gaucher's disease (GD).

**Objectives:** Describe a rare case of successful cochlear implantation in a pediatric patient with type 3 GD. **Study Design:** Case report of a 16 year old female with diagnosis of type 3 GD, with bilateral progressive severe sensorineural hearing loss. **Methods:** Audiology recommended cochlear implantation. CT scan revealed sclerosis and obliteration of the antrum with a clear middle ear cavity. With difficulty visualizing landmarks due to mucosa thickening, cochleostomy was deferred followed by biopsy of the left mastoid tissue. 11 weeks post initial operation, the patient was consented for right cochlear implantation. The incus and stapes were visualized to have normal mobility, although completely covered by thickened mucosa, as was the round window. This mucosa was carefully removed followed by a cochleostomy. **Results:** Initial frozen sections revealed histiocytes outnumbering squamous cells, suggesting cholesteatoma. After further review, benign macrophage accumulation with PAS staining was consistent with GD. Confirmation of implant placement showed expected impedances, present neural response telemetry, and good positioning of the electrode visualized on x-ray. The patient's subjective response to auditory input at initial activation was successful; the patient localized speech and responded to questions. The patient reported improved auditory acuity over a 10 month period. **Conclusions:** There is controversy whether cochlear implantation is appropriate for patients with peripheral neurological disorders, as the integrity of the auditory nerve may be compromised. Although auditory neuropathy may be present in association with GD, cochlear implantation may improve synchronicity of neural activity and stimulate sound awareness. For pediatric patients with type 3 GD, cochlear implantation may serve as effective management for improved auditory sensitivity.

**C27. Audiovisual Speech Perception following Rapid or Progressive Hearing Loss in Adult Cochlear Implant Users**

Chad V. Ruffin, MD, Indianapolis, IN; Ryan A. Crane, MD, Indianapolis, IN; Tonya R. Bergeson, PhD, Indianapolis, IN; Charles W. Yates, MD, Indianapolis, IN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the audiovisual speech perception outcomes in cochlear implant users with a sudden or progressive hearing loss.

**Objectives:** To compare the audiovisual speech perception outcomes of cochlear implant subjects with a sudden or rapid hearing loss to those with a progressive hearing loss. **Study Design:** This was a retrospective cross-sectional investigation that compared the audiovisual speech perception outcomes of two groups of adult cochlear implant users at the pre-implantation and the 1 year post-implantation intervals. **Methods:** The two subgroups included 22 subjects with a sudden or rapid hearing loss and 29 subjects with a

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progressive hearing loss. Speech perception measures included word recognition (Consonant Nucleus Consonant Words) and sentence recognition (Hearing in Noise Test) in quiet and noise as well as sentence perception in auditory only, visual only and audiovisual conditions (City University of New York Sentences). **Results:** The pre-implantation scores for sentence recognition in quiet, audiovisual sentence perception, auditory enhancement and visual enhancement of the sudden/rapid subgroup were worse than the progressive subgroup. At one year post-implantation, the performance on these measures was similar for both groups. There were no significant differences in visual only speech perception scores between groups at either interval. At the post-implantation interval, better audiovisual enhancement scores for the entire cohort were negatively correlated with auditory only outcomes. **Conclusions:** Our findings suggest that 1) the temporal onset of hearing loss does not affect 1 year post-implantation auditory only or audiovisual speech perception; 2) a progressive hearing loss does not facilitate the development of lipreading skills; and 3) cochlear implant listeners who are poorer at auditory only sentence recognition more efficiently combine auditory and visual cues.

### C28. An Unusual Presentation of Pleomorphic Adenoma in the External Auditory Canal

Jessica M. Somerville, MD, Memphis, TN; Paul F. Shea, MD\*, Memphis, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe presentation, workup and treatment for ceruminous gland tumors of the external auditory canal with a focus on pleomorphic adenoma.

**Objectives:** Pleomorphic adenoma, a common benign salivary gland tumor with malignant potential, has been rarely described as arising from the ceruminous glands of the external auditory canal (EAC). Unlike its malignant counterpart, pleomorphic adenoma often presents with insidious findings. Benign lesions, such as pleomorphic adenoma, present on magnetic resonance imaging (MRI) as well circumscribed lesions. We present a case of a patient with clinical findings consistent with benign disease, imaging characteristic of malignant disease, and a final diagnosis of pleomorphic adenoma. **Study Design:** Case report and literature review. **Methods:** Clinical documentation reviewed and Medline search performed. **Results:** A 41 year old African American female presented with a history of worsening aural fullness and hearing loss in the left ear. Physical exam revealed a skin covered mass occluding the EAC. Audiometry demonstrated a unilateral conductive hearing loss. Computerized tomography (CT) of the temporal bone revealed erosion of the lateral posterior bony canal. MRI showed a hyperintense lesion on T2 weighted imaging with intravenous contrast enhancement. The patient underwent wide local excision using a postauricular approach with partial mastoidectomy and temporalis fascia grafting for reconstruction of the posterior canal wall. Between the lesion and the tympanic membrane was thick mucoid material and cerumen. The tympanic membrane and middle ear were not involved. Pathology revealed pleomorphic adenoma. **Conclusions:** Preoperative imaging and clinical exam may provide clues to the diagnosis, but pathology is needed for confirmation. This is the first reported case, to our knowledge, of pleomorphic adenoma of the EAC presenting with worrisome bone involvement on radiologic imaging.

### C29. Minimizing Vestibulotoxicity in Gamma Knife Radiosurgery for Vestibular Schwannoma

Emily Z. Stucken, MD, Farmington Hills, MI; Peter Y. Chen, MD, Royal Oak, MI; Inga S Grillis, MD, Royal Oak, MI; Daniel J Krauss, MD, Royal Oak, MI; Ann H Maitz, MS, Royal Oak, MI; Dennis I. Bojrab, MD, Farmington Hills, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the relationship between dose of gamma knife radiation delivered in treatment of vestibular schwannoma and post-treatment vestibular toxicity. Participants should be able to discuss appropriate radiation parameters to minimize toxicity to the labyrinth.

**Objectives:** Gamma knife radiosurgery (GK) may be employed to treat appropriately selected vestibular schwannomas. The goal of treatment planning in GK is to maximize tumor control while minimizing cochleovestibular morbidity. Previously, a mean cochlear dose <3Gy has been associated with improved hearing preservation. Our purpose is to determine whether this dose cutoff, when applied to the labyrinth, will have implications for reducing vestibulotoxicity. **Study Design:** Case series with chart review. **Methods:** 52 patients were identified who underwent GK as definitive therapy for vestibular schwannoma. All patients had pretreatment and post-treatment videonystagmography (VNG). Patients were treated to a median marginal dose of 12.5 Gy to the 50% isodose volume. The mean, maximum, and minimum doses to the labyrinth were recorded. **Results:** There was no significant difference in the degree of pretreatment caloric weakness in patients receiving <3Gy compared to those receiving >3Gy to the labyrinth (30.9% vs. 44.6%;  $p>0.05$ ). Post-treatment, patients treated with >3Gy to the labyrinth had a greater degree of caloric weakness than patients treated with <3Gy at first post-treatment VNG (mean 65.9% vs. 32.1%;  $p<0.05$ ). This difference persisted at final post-treatment VNG (mean 74.5% vs. 36.8%;  $p<0.05$ ). **Conclusions:** Patients who received a mean dose >3Gy to the labyrinth exhibited a greater caloric weakness after treatment than patients who received a mean dose <3Gy. Efforts should be made to minimize the mean dose to the labyrinth to preserve vestibular function.

### C30. Tympanic Membrane Repair Using a Novel Delivery System in a Chinchilla Model

Kevin Taheri, MD, New Orleans, LA; Elaine L. Ranney, BSE, New Orleans, LA; Parastoo Khoshakhlagh, MS, New Orleans, LA; Jesse D. Ranney, MD, New Orleans, LA; Michael J. Moore, PhD, New Orleans, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the potential advantages of using a selectively polymerizable hydrogel for tympanic membrane repair.

**Objectives:** Over one million procedures to insert pressure equalization tubes (PETs) are performed each year in the United States

alone. Chronic tympanic membrane perforation can result from PETs left in the TM for an extended period of time or from chronic infection. Several methods currently exist for TM perforation closure. We present the novel use of a selectively polymerizable hydrogel for use as a multipurpose surgical scaffold with drug delivery capabilities for tympanic membrane repair. **Study Design:** A chinchilla model was used to model chronic tympanic membrane perforations. The protocol was reviewed and accepted by the Institutional Animal Care and Use Committee. The perforations were divided into a material application and a control group. **Methods:** Animals were anesthetized and perforations were performed surgically under microscopic examination. Tympanic membranes were reexamined and edges were cauterized weekly to ensure patency. Perforations were considered chronic if patent for a period of four weeks. The material was applied to perforations and polymerized with light in situ, without further surgery. The polymerized hydrogel patch was used to close the perforations, which were then reexamined to determine healing at subsequent intervals. **Results:** Chronic tympanic membrane perforations were achieved in the majority of the chinchillas. The photopolymerizable hydrogel closed the chronic tympanic membrane perforations with a 78% success rate. Tympanic membrane perforations remained patent in 75% of the control group. **Conclusions:** Our new photopolymerizable hydrogel can be used as a scaffold to repair chronic tympanic membrane perforations.

**C31. Radiologic Surveillance after Resection of Vestibular Schwannoma: Measurement Techniques and Predictors of Growth**

Shan Tang, MD, New York, NY; Andrew S. Griffin, MD, New York, NY; Carl E. Johnson, MD, New York, NY; Joseph P. Comunale, MD, New York, NY; Sasan Karimi, MD, New York, NY; Samuel H. Selesnick, MD FACS\*, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participant should be able to 1) compare methods of assessing tumor growth on MRI after resection of vestibular schwannoma; 2) identify predictors of growth; and 3) discuss situations in which it may be appropriate to adjust the MRI surveillance interval based on clinical and radiologic factors.

**Objectives:** We wished to compare different methods of measuring tumor growth after resection of vestibular schwannoma and to identify predictors of growth. **Study Design:** Case series with chart review. **Methods:** Retrospective review was performed of patients who underwent vestibular schwannoma resection from September 1991-April 2012 and had >2 postoperative MRI scans. Tumor size in one (1D), two (2D), and three dimensions (3D) and enhancement pattern were recorded using standard radiology workstation tools. Statistical analyses were conducted using SASv9.3. This is the first study to define growth mathematically. **Results:** Eighty-eight patients were included in the study, with mean duration of followup of 3.9 years. Measurement of tumor size in 1D was found to have moderate correlation with 2D and 3D measurements (Spearman  $r=0.67$  and  $r=0.66$ ). Excellent correlation was found between the 2D and 3D methods ( $r=0.99$ ). Nodular enhancement increased risk for tumor growth (OR 6.25,  $p=0.03$  on 2D analysis). Tumors with nodular enhancement increase in size starting at 2 years postoperatively, whereas those with linear or no enhancement show no increase in size up through 5 years. Age and preoperative tumor size were also risk factors for growth (OR 0.9 /  $p=0.01$  and OR 1.09 /  $p=0.02$ ). **Conclusions:** 2D measurement is an efficient method that correlates well with the more time consuming 3D method. The major risk factor for tumor growth is nodular enhancement on a baseline scan, a finding that warrants annual MRI beginning at 2 years postoperatively. Younger age and larger preoperative size minimally increased risk of growth.

**C32. Delayed Complications following Cochlear Implantation**

Bradford W. Terry, MD, New Orleans, LA; Rachel E. Kelt, BS, New Orleans, LA; Anita S. Jeyakumar, MS MD, New Orleans, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to have a better understanding of the long term complications that cochlear implant patients can experience.

**Objectives:** 1) Study delayed complications following cochlear implantation; and 2) review some of the management plans following complications. **Study Design:** Literature review. **Methods:** A systematic analysis of the literature was performed from 2003 to 2013 on patients who had complications following cochlear implantation. Demographic information was recorded. All delayed complications (occurring > 3days postoperatively). **Results:** Our initial search resulted in 766 articles. 83 were reviewed for the study. A total of 22,510 patients were reviewed. When reported, prevalence of males was 50.7% ( $n=4319$ ). The patients' age range was 0.2-94.9 years, with a mean age of 19.04 years. The range of followup was 1 month to 17 years. The total number of delayed complications was 1,728 (7.68%) with device failure being the most common ( $n=570$ ; 2.53%), skin infections being the second most common ( $n=335$ ; 1.49%) and vestibular concerns were third most common ( $n=251$ ; 1.12%). Less common complications included mastoiditis ( $n=65$ ; 0.29%), cholesteatoma ( $n=59$ ; 0.26%), and facial nerve palsy ( $n=38$ ; 0.17%). Table 1 is a summary of all the complications recorded. **Conclusions:** Cochlear implantation continues to be a reliable and safe procedure, with a low percentage of severe complications, in experienced hands. The patients should continue to have lifetime followup.

**C33. Effectiveness of the Malleus to Oval Window Technique for Revision Stapedectomy**

Ling Zhou, MD, New York, NY; Robert Peng, BS, New York, NY; Darius Kohan, MD\*, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the etiology and management of failed primary stapedectomy. Specifically, the participants should be able to understand the common causes of stapedectomy failure and the techniques which are available to reestablish ossicular continuity. In particular, participants should be able

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to compare the various surgical techniques which are available when there is severe incus erosion. Finally, the participants will be presented with one of the largest case series of malleus to oval window revision stapedectomies to assess its merits and pitfalls.

**Objectives:** To determine the long term effectiveness of the malleus to oval window technique for revision stapedectomy. **Study Design:** Retrospective chart review. **Methods:** The charts of 19 revision stapedectomies performed using the malleus to oval window technique between 2000 and 2012 were reviewed. The surgeries were performed under local anesthesia using a standard transcanal approach using a laser technique and the malleus to oval window prosthesis. **Results:** Among 19 stapedectomies performed, 11 were primary revisions, 7 were secondary revisions, and 1 was a tertiary revision. The average preoperative air bone gap was 30. The average postoperative air bone gap was 9. These results were comparable with traditional incus to oval window techniques. The average length of followup after revision stapedectomy was 31 months. There was no significant difference in air bone gaps between the initial postoperative visit and the most recent visit ( $p=0.40$ ). **Conclusions:** In experienced hands, revision stapedectomy using the malleus to oval window technique is both feasible and durable.

### Pediatric Otolaryngology

- C34. Rural Healthcare Provider Knowledge and Practice Patterns Regarding Infant Hearing Loss**  
David K. Alexander, BS, Lexington, KY; Bryce R. Noblitt, BS, Lexington, KY; Matthew L. Bush, MD, Lexington, KY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) describe educational gaps in infant hearing loss and treatment in rural healthcare providers; and 2) discuss hearing healthcare practice patterns of these providers.

**Objectives:** Diagnosis and intervention for infant hearing loss is often delayed in areas of healthcare disparity, such as rural Appalachia. Primary care providers play a key role in timely hearing healthcare. The purpose of this study is to assess the knowledge and practice patterns of rural primary care providers regarding early hearing diagnosis and intervention (EHDI). **Study Design:** Cross-sectional questionnaire study. **Methods:** Primary care practitioners in a large rural region of Appalachia were surveyed on practice types, patterns, and knowledge on congenital hearing loss diagnosis and treatment. **Results:** 93 practitioners responded and 84.9% believe newborn hearing screening is very valuable for pediatric health. General practitioners predominate the region but are less likely to receive infant hearing screening results than exclusive pediatric practices (54.5% versus 95.2%,  $p < 0.01$ ). Providers' knowledge of EHDI standards was assessed and they reported a goal diagnosis age of 7.8 months and a goal hearing aid use age of 9 months. Participants estimated the earliest age for cochlear implantation to be 18.6 months after birth. Over 50% were lacking confidence in counseling families and directing the care through the EHDI process, and 46% of providers felt their training in infant hearing was inadequate. **Conclusions:** Delays in diagnosis and treatment of infant hearing loss in rural regions of healthcare are due to multiple factors. Lack of practitioner knowledge and confidence in managing infant hearing loss may impede timely care in rural areas.

- C35. Changing Trends of Intratemporal and Intracranial Complications of Acute Otitis Media in Children: A 15 Year Review of a Major Academic Center's Experience**  
Jose L. Mattos, MD MPH, Pittsburgh, PA; Kathryn L. Coleman, MD, Salt Lake City, UT; Margaretha L. Casselbrant, MD PhD\*, Pittsburgh, PA; David H. Chi, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss major contemporary complications of acute otitis media as experienced at a major academic center, along with their current management and bacteriology.

**Objectives:** To review all cases of intratemporal and intracranial complications of acute otitis media (AOM) between 1998 and 2013. **Study Design:** Retrospective chart review. **Methods:** Retrospective chart review at a tertiary care academic children's hospital. Primary outcomes measured were type of complication, bacteriology, and management. **Results:** 108 patients were admitted for complications of AOM. Complications included mastoiditis (86.1%), subperiosteal abscess (38%), facial palsy (16.7%), sigmoid sinus thrombosis (8.3%) and epidural abscess (7.4%). Other complications included postauricular cellulitis, otic hydrocephalus, internal jugular thrombosis, cranial nerve VI palsy and Gradenigo syndrome, labyrinthine fistula, sensorineural hearing loss, and cerebellar infarct. 56% of patients received antibiotics prior to presentation. Cultures revealed streptococcus pneumoniae in 36 patients (33.3%), other bacteria in 30 patients (27.8%), and "no growth" in 33 patients (30.5%). Of the patients with streptococcus pneumoniae, 55% were found to be multidrug resistant between 1998 and 2008 and 67% were resistant between 2008 and 2013. 10% of patients were treated nonsurgically, the remaining 90% required myringotomy, and 61% required mastoid surgery either along or in combination with drainage of abscess in multiple locations. 72.2% patients with facial palsy had full recovery. **Conclusions:** Intracranial and intratemporal complications continue to be uncommon but serious sequelae of otitis media. The most common pathogen is *S. pneumoniae*. There is an increasing trend of resistant organisms in this disease process, with 55% of strains showing resistance in our population over the past 15 years, and 67% of strains showing resistance over the most recent 5 year period.

**C36. Grill Cleaning Brush Bristle Ingestions in Children**

Ryan M. Mitchell, MD PhD, Seattle, WA; Kimberly J. Riehle, MD, Seattle, WA; Hannah G. Parish, Seattle, WA; Tausala J. Coleman, MD, Seattle, WA; Jeffrey P. Otjen, MD, Seattle, WA; Julie C. Brown, MD, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate potential injuries related to ingestion of grill cleaning brush bristles.

**Objectives:** Foreign body ingestion is a common complaint in the pediatric emergency department. Wire grill brush bristles can be hidden in grilled food and unknowingly ingested by consumers of all ages. We aimed to identify pediatric cases of wire grill brush bristle ingestion seen at a single institution. **Study Design:** Retrospective chart review. **Methods:** We reviewed records for 5,912 patient visits diagnosed as foreign bodies in order to identify patients 0-20 years of age who had ingested wire grill brush bristles, from 1/1/1998 through 8/31/2013. **Results:** Five patients with grill brush bristles were identified, all within the last 3 years of study. Four patients presented with oropharyngeal or neck pain shortly after eating grilled meat. Neck radiographs demonstrated a thin radiopaque foreign body in the base of tongue (two patients) or upper esophagus (two patients). Three of these wire bristles were removed endoscopically and one most likely dislodged and was swallowed during an attempted endoscopic procedure. One patient who was asymptomatic at the time of eating grilled meat subsequently developed abdominal pain and vomiting. At laparotomy, he was found to have an extraluminal wire bristle causing an interloop adhesion and bowel obstruction. **Conclusions:** Pediatric wire grill bristle ingestions are rare but appear to be increasing, and can result in serious injuries. Patients with odynophagia or abdominal complaints should be questioned about possible foreign body ingestion and recent grilling. Improved grill brush design or alternatives such as pumice stones may decrease these injuries.

**C37. Supracapsular Partial Tonsillectomy with Monopolar Electrocautery—A Single Surgeon’s Novel Method and Experience**

Sanjeet V. Rangarajan, MD MEng, Columbus, OH; Evan Tobin, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate how to perform supracapsular tonsillectomy using a new method and describe the expected complications and course in the pediatric population.

**Objectives:** To present a single surgeon’s method and experience with a novel approach to monopolar supracapsular tonsillectomy to treat obstructive tonsillar hypertrophy in the pediatric population. **Study Design:** Retrospective chart review and literature review. **Methods:** We describe a novel method utilizing monopolar bovie electrocautery to perform supracapsular partial tonsillectomy and reviewed the cases of pediatric patients who underwent this procedure performed by a single surgeon. The technique, outcomes, complications, and average materials cost of these procedures were examined. We also present a review of the current literature. **Results:** The cases of 220 pediatric patients undergoing supracapsular partial tonsillectomy with monopolar bovie electrocautery by a single surgeon were reviewed retrospectively. Tonsils were excised using a combination of bovie/needle tip electrocautery and suction cautery using a novel technique until roughly 95% of tonsillar tissue was removed and hemostasis was confirmed. Only one patient (0.45%) experienced postoperative hemorrhage. Two patients required reoperation for regrowth/recurrent infection (1%). Materials cost analysis was performed to compare our method with powered microdebrider assisted or Coblation partial tonsillectomy and revealed a cost advantage of nearly 500%. **Conclusions:** Supracapsular partial tonsillectomy with monopolar electrocautery is an effective and inexpensive modality for treatment of obstructive tonsillar hypertrophy and is associated with only rare instances of regrowth and postoperative bleeding.

**C38. Clinical Trial of a Single Stage Tympanostomy Tube Insertion Device for Use in the Uncooperative Child**

Frank L. Rimell, MD, Minneapolis, MN; Daniel W. Yoon, MD, Minneapolis, MN; Robert J. Tibesar, MD, Minneapolis, MN; Abbey C. Meyer, MD, Minneapolis, MN; Timothy A. Lander, MD, Minneapolis, MN; James D. Sidman, MD\*, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to review and understand the results of a new device to assist in the placement of tympanostomy tubes in the uncooperative child.

**Objectives:** Tympanostomy tube placement requires general anesthesia for the uncooperative child. Our goal was to design a single stage device that could simplify tube placement in the uncooperative child. This could allow for the procedure to occur without general anesthesia and performed in a reduced cost facility such as the sedation unit or office. **Study Design:** This was a non-randomized, clinical pilot study. **Methods:** Children who met the medical criteria for tympanostomy tube placement underwent the procedure with a newly designed tool which allowed for single pass placement of a tympanostomy tube under local or general anesthesia. **Results:** 138 tympanostomy tube placements occurred in 70 children with an age range of 7-75 months. 31 children did not receive general anesthesia but only sedation (nitrous oxide and topical anesthetic). 3 tympanostomy tubes were over inserted into the middle ear space in the early stages of device development. One tube extruded at first followup and one tube was obstructed at first followup. **Conclusions:** We believe this device allows for quick single pass tympanostomy tube placement. It may assist in the placement of tympanostomy tubes in an uncooperative child potentially without the need of general anesthesia in a less expensive setting like the office.

# Posters

## C39. Pediatric Sialoendoscopy: Initial Experience in a Pediatric Otolaryngology Group Practice

Ryan A. Semensohn, Fort Lauderdale, FL; David L. Mandell, MD, Boynton Beach, FL; David J. Kay, MD, Boynton Beach, FL; Zorik Spektor, MD, Boynton Beach, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the use of sialoendoscopy as a diagnostic and therapeutic tool in pediatric inflammatory salivary gland disease.

**Objectives:** To describe the use of sialoendoscopy as a diagnostic and therapeutic tool in pediatric inflammatory salivary gland disease. **Study Design:** Retrospective review of patient medical records from a tertiary care center consisting of three fellowship trained pediatric otolaryngologists. **Methods:** Consecutive pediatric patients with either recurrent or chronic sialadenitis underwent sialoendoscopy. The procedure was performed with a 1.3 mm semirigid sialoendoscope using saline irrigation for ductal dilatation. Data collected included age of onset of symptoms, indications for surgery, gender, intraoperative findings, complications, recurrences, followup intervals, and need for additional procedures. **Results:** Eight pediatric patients underwent sialoendoscopy (5 unilateral, 3 bilateral, for a total of 11 glands). There were 8 parotid glands and 3 submandibular glands in the study. The most common indication for surgery was recurrent sialoadenitis (n=9 glands), followed by chronic sialoadenitis (n=2 glands). Intraoperative findings included stricture (n=10) and ductal calculus (n=1). No perioperative complications were noted. Average followup was 18 months (range: 2-44 months), during which time 2 glands had recurrence (18%). Among recurrent cases, only 1 long term case of repeated recurrences required salvage parotidectomy. **Conclusions:** Sialoendoscopy was utilized as a technique for management of recurrent and chronic parotid and submandibular sialadenitis in this group of pediatric patients. The procedure was found to be safe and effective in resolving the presenting complaints in most patients. The overall success rate was 9 out of 11 glands (82%).

## C40. Detection of Group A Streptococcus in Pediatric PFAPA Tonsils

Ross A. Udoff, MD, Winston Salem, NC; Dan J. Kirse, MD, Winston Salem, NC; Robert C. Holder, PhD, Winston Salem, NC; Sean D. Reid, PhD, Winston Salem, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to determine the detection rate of group A streptococcus in pediatric PFAPA tonsils.

**Objectives:** To determine the existence of group A streptococcus (GAS) biofilms in pediatric PFAPA tonsils. **Study Design:** Immunohistochemical analysis of 4 pediatric PFAPA tonsils. **Methods:** With IRB approval over 400 tonsils were collected from pediatric patients. 4 patients were found to have a tonsillectomy for PFAPA. Those tonsils were frozen in OCT resin at -80 degrees celsius. Samples were acclimated to -20 degrees celsius and cut to 5 microns with a cryotome. The samples were placed onto slides. Samples were stained with primary anti-GAS and secondarily with goat anti-rabbit IgG. Visualization of GAS of the stained tonsil was with a light microscope. **Results:** Despite previous studies showing GAS detection in over 30% of tonsils removed for adenotonsillar hypertrophy and recurrent tonsillitis, the 4 PFAPA samples showed no detection of GAS. **Conclusions:** No detection of GAS in PFAPA tonsils.

## General/Clinical Fundamentals

## C41. International Humanitarian Mission Trips during Otolaryngology Residency

Lacey K. Adkins, MD, Washington, DC; James E. Saunders, MD\*, Lebanon, NH; Nazaneen N. Grant, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the viewpoints of both residents and program directors about the apparent benefit and perceived program support of international humanitarian service.

**Objectives:** Examine the educational benefits and challenges of otolaryngology resident international humanitarian service. **Study Design:** Web based survey of U.S. otolaryngology residency program directors and resident travel grant recipients. **Methods:** A web based survey was conducted among 53 U.S. otolaryngology residents who received humanitarian travel grants through the American Academy of Otolaryngology-Head and Neck Surgery Foundation. The survey asked residents about clinical exposure, surgical experience, and educational benefit. A similar survey among 103 U.S. otolaryngology program directors asked about program support as well as perceived benefit for participating faculty and residents. **Results:** Of those surveyed, 31 (58%) residents and 67 (65%) program directors responded. Residents averaged 14.5 surgeries a week and 65% noted an improvement in their surgical skills, as did 50% of the program directors. No correlation was found with the number of cases performed. When asked about improvement in clinical skills, 32% of the residents and 46% of the program directors saw an improvement. Residents saw lack of funding and residency support as the main obstacles to international humanitarian work. Program directors cited lack of funding as an obstacle in addition to vacation time and call responsibilities. The majority of respondents stated that they would like to participate in another mission trip and 81% plan to make humanitarian trips a regular part of their future practice. **Conclusions:** International humanitarian service can improve surgical and other skills, as perceived by both residents and program directors. Barriers to participation are viewed differently to the two groups and include lack of funding and residency program support.

- C42. To Evaluate the Effect of Distractions on the Operative Performance of Otolaryngology Residents**  
Aadil Ahmed, MD, Baltimore, MD; Adeel A. Malik, BS, Baltimore, MD; Howard W. Francis, MD\*, Baltimore, MD; Mueen D. Ahmad, MD, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the residents' ability to multitask and the factors involved.

**Objectives:** Full focus and distraction control are important factors in attaining an excellent outcome of a surgery. In this study, we will first measure the effect of distractions and then analyze if practice and experience are the factors which can improve the ability to multitask. **Study Design:** Prospective longitudinal study. **Methods:** Twenty PGY1-5 residents from our otolaryngology department were recruited and asked to deepen dissection and open antrum on voxel-man mastoidectomy simulator. They were asked to perform the task under four conditions; 1) no distracters, 2) simultaneous differentiation and counting of a specific alarm sound among different sounds played in the background, 3) simultaneous performance of simple arithmetic task (addition, subtraction, multiplication and division involving two digit numbers), 4) simultaneous performance of the task with both sets of distractors combined. All the performances were saved and evaluated later by the faculty with previously validated OSATS. **Results:** The voxel-man simulator evaluation for number of errors and length of each procedure under abovementioned four conditions were analyzed along with the performance on OSATS. Also, the number of correct answers for distractive tasks was recorded. All the data was analyzed using two tailed student's t-test within each PGY level. In addition, performance of residents with increasing PGY level was compared using the non-paired, two tailed student's t-test. **Conclusions:** Distractions lead to impaired dexterity and an increase in the incidence of errors. Recognizing how residents from different levels of training respond to distractions may help in developing learning strategies to help residents achieve the ability to multitask early in their training.

- C43. Evaluating Endoscopic Balloon Sinuplasty Skills in Otolaryngology Residents**  
Mitchell J. Challis, MD, Memphis, TN; Merry E. Sebelik, MD, Memphis, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the use of objective measurements to evaluate the endoscopic skills of otolaryngology residents.

**Objectives:** Evaluate if hand motion analysis can be used as an objective measurement of technical skill of otolaryngology residents while performing specific sinus endoscopy task (balloon sinuplasty) on a surgical simulator. **Study Design:** Educational study. **Methods:** Residents and faculty in our residency program were asked to cannulate the frontal, sphenoid, and maxillary sinus ostia on a head model from The Chamberlin Group using the Entellus Express balloon sinuplasty system. Each subject was given two attempts. Each attempt was video recorded and hand motion was analyzed using the Polhemus Patriot wired tracker system. Videos were reviewed and scored using an Endoscopic Sinus Surgery Global Assessment (ESSGA) tool. ESSGA scores and hand motion data between first and second attempt were compared for each subject. Scores and data were then stratified by year of training, and number endoscopic sinus cases. **Results:** ESSGA scores improved with each year of training. The number of hand motions was inversely related to the subject's year of training and the number of sinus cases performed. **Conclusions:** ESSGA and hand motion analysis are effective tools for evaluating the development of endoscopic surgery skills in otolaryngology residents.

- C44. Emergencies in Otolaryngology Boot Camp: A Novel Experience in Surgical Training**  
Christopher J. Chin, MD, London, ON Canada; Kathryn Roth, MD FRCSC, London, ON Canada; Brian W. Rotenberg, MD FRCSC\*, London, ON Canada; Kevin Fung, MD FRCSC, London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the benefits of a national otolaryngology-head and neck surgery boot camp to help junior residents prepare for on call emergencies.

**Objectives:** A one day intensive course (boot camp) was developed to teach junior residents emergency procedural skills, clinical reasoning and communication skills. This learning paradigm utilized a number of novel task trainers, panel case based interactive discussions and emergency simulations. Our study objective was to assess the educational value of this boot camp. **Study Design:** Prospective cohort survey. **Methods:** Residents and teaching faculty were recruited from regional teaching centers within a 2000 km radius of the simulation center. Preceptors fluent in English and in French were in attendance. Pre-boot camp outcome measures included the Kolb Learning Style inventory and a self-administered survey measuring confidence levels in performing specific otolaryngology tasks. Post-boot camp outcome measures included a survey and a structured followup telephone interview conducted by an independent party. **Results:** Twenty-eight residents participated in the boot camp from across the United States and Canada. Participants felt the boot camp was an effective learning process (mean score of 4.75/5.0). The vast majority of participants (92.9%) felt they would recommend the boot camp to a future junior resident. Kolb learning styles that prefer active experimentation (acting, initiating, and deciding) were more common than those that utilize reflective observation (imagining, analyzing, reflecting) which favors a hands-on model of learning. **Conclusions:** This is the first Canadian otolaryngology boot camp for junior residents and demonstrates the feasibility of conducting a centralized boot camp for regional training centers spanning multiple states/provinces and languages. The effectiveness of this educational paradigm is supported by the learning style of today's trainees.

## Posters

- C45. The Utility of Routine Pathological Analysis after Tonsillectomy in Adults**  
Winsion Chow, MD MSc, London, ON Canada; Brian Rotenberg, MD FRCSC MPH\*, London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the utility of routine pathological analysis of tonsil specimens for non-malignant cases.

**Objectives:** The purpose of this study is to determine the rate of occult pathology in routine analysis of tonsillectomy specimens from non-malignant cases such as sleep apnea or recurrent tonsillitis. **Study Design:** Retrospective chart review, literature review. **Methods:** 130 consecutive charts of tonsillectomies performed for non-malignant conditions between 2007 and 2011 were reviewed. Data on age, indications for surgery, preoperative and intraoperative clinical findings and final pathology results were collected. A literature review of studies examining the rate of occult malignancy in tonsillectomy specimens was also performed, and the combined data was pooled. The financial impact of routine tonsil pathological analysis was determined. **Results:** In 130 patients, there was not a single case of occult malignancy. After study inclusion and exclusion criteria were met, a review of the literature yielded 4205 pooled cases of tonsillectomy specimens with no case of unsuspected occult malignancy. The financial impact of routine histopathological analysis at our institution was determined to be \$2881.13 per year. **Conclusions:** Routine pathological analysis of tonsil specimens in nonmalignant surgical cases to rule out occult malignancy is not supported by current evidence and not financially sound. Modern evidence does not support the need for even gross specimen analysis in these cases.

- C46. Circumferential Oropharyngeal Stenosis after Single Stage Transoral Robotic Surgery and Standard Uvulopalatopharyngoplasty for Surgical Treatment of Obstructive Sleep Apnea: A Report of Five Patients**  
David S. Cohen, MD, Detroit, MI; Ho-Sheng Lin, MD\*, Detroit, MI; Michael E. McCormick, MD, Milwaukee, WI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize circumferential oropharyngeal stenosis as a potential complication after single stage transoral robotic surgery combined with uvulopalatopharyngoplasty for the treatment of obstructive sleep apnea, and should be able to identify risk factors that may increase the likelihood of oropharyngeal stenosis in order to improve preoperative planning, counseling, and patient selection.

**Objectives:** 1) To report circumferential oropharyngeal stenosis as a complication of single stage transoral robotic surgery (TORS) and uvulopalatopharyngoplasty (UPPP) for the treatment of obstructive sleep apnea (OSA); 2) to identify risk factors which increase the likelihood of oropharyngeal stenosis for improved preoperative planning and patient selection. **Study Design:** Retrospective consecutive case series from 2008-2013. **Methods:** Case series of five patients with circumferential oropharyngeal stenosis after single stage TORS and UPPP surgery for OSA in a tertiary care academic medical center with subsequent treatment. **Results:** Five adults with OSA underwent standard UPPP combined with single stage TORS, including base of tongue resection and epiglottidectomy. Two patients had significant history of keloid formation. Postoperatively, all patients developed circumferential oropharyngeal stenosis. Patients were treated variably with corticosteroid injections. All patients ultimately required revision pharyngoplasty. One patient required three pharyngoplasty procedures and was augmented with AlloDerm implantation. Preoperative average AHI prior to initial surgery was 15.3, while post-correctional average AHI was 4.3. There was significant improvement of functional and objective outcomes after surgical correction. To our knowledge this is a previously unreported complication. **Conclusions:** Circumferential oropharyngeal stenosis is a potential complication of combined single stage TORS and UPPP surgery for treatment of OSA. Caution should be used in patients with a history of keloid formation when using single stage OSA surgery. For this reason, multilevel surgery for OSA should be staged whenever possible. Though still an effective surgery for treatment of OSA, the surgeon must be aware of oropharyngeal stenosis and should proceed with caution during preoperative planning, counseling, and patient selection.

- C47. Retropharyngeal Calcific Tendinitis: A Review of 234 Cases**  
John D. Cramer, MD, Chicago, IL; Rakesh K. Chandra, MD, Chicago, IL

**Educational Objective:** At the conclusion of this presentation the participants should be able to explain the most common presenting symptoms of retropharyngeal calcific tendinitis, understand the typical demographic features, and recognize the typical imaging features. The participants should also understand the typical clinical course in response to treatment.

**Objectives:** Retropharyngeal calcific tendinitis is a rare condition characterized by inflammation and calcification of the longus colli muscle, often with a reactive effusion that can mimic a retropharyngeal abscess. The literature consists of anecdotal case reports and small case series. **Study Design:** Retrospective chart and literature review. **Methods:** We present 234 cases of retropharyngeal calcific tendinitis consisting of 6 identified at our institution and 228 cases identified through a PubMed literature review from 1951-2013. We analyze the demographics, clinical characteristics, imaging features and treatments. **Results:** The most commonly reported symptoms were neck pain (97.0%), odynophagia or dysphagia (75.6%) and neck stiffness (77.3%, n=234). In 82.1% of cases, patients presented with less than 7 days of symptoms. The average age at the time of presentation was 45.3 years (95% confidence interval [CI] 43.9 to 46.8, n=232) and women represented 54.5% of cases (CI 48.1 to 60.9%, n=233, P=0.28). On imaging, calcifications were located anterior to C1-C2 in 73.9% of cases (n=157). The average length of treatment until resolution of symptoms was 10.6 days (CI 9.6 to 11.7 days, n=164). The average duration of symptoms was significantly less in those who received NSAIDs (10.6 days, CI 9.2 to 11.4, n=124) and/or corticosteroids (8.1 days, CI 5.9 to 10.1, n=15), than in those who received no treatment (23.8 days, CI 16.1 to

31.4, n=4, P<0.01). **Conclusions:** Retropharyngeal calcific tendinitis is characterized by neck pain, odynophagia, and neck stiffness. Treatment with NSAIDs or corticosteroids significantly decreased the duration of symptoms.

**C48. Endoscopic Removal of a Foreign Body of the Orbit and Paranasal Sinuses**

Joseph D. DePietro, MD, Boston, MA; John H. Romanow, MD, Burlington, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the complications and treatment of sinus foreign bodies.

**Objectives:** To demonstrate a case of an unusual paranasal sinus foreign body requiring a multidisciplinary and endoscopic approach. **Study Design:** Case report. **Methods:** Case report. **Results:** This is a 45 year old male who presented with vegetative material extruding from a laceration at the superior orbital rim. The patient sustained a mechanical fall into a bush 3 months prior to presentation. He presented to an outside ED, where the laceration was repaired. A CT scan showed a linear foreign body with the anterior end in the medial orbit. This object traversed the medial orbital wall, ethmoid sinus, and sphenoid sinus. A dehiscence of the posterior sphenoid sinus wall was noted adjacent to the posterior edge of the foreign body. Given the proximity of the foreign body to the internal carotid artery, an angiogram and balloon occlusion test were performed preoperatively. The patient was taken to the operating room, where the ophthalmology, otolaryngology and interventional radiology services coordinated an endoscopic removal of foreign body. Given the chronicity of the foreign body and scarring, a total ethmoidectomy and sphenoidotomy were required in order to lessen the chance of trauma to the carotid artery during removal of the object. Once the object was free of all soft tissue attachments, it was removed through the orbit. The patient had no neurological deficits postoperatively. He was discharged home the following day. **Conclusions:** This case demonstrates a multidisciplinary case in which an ethmoidectomy and sphenoidotomy were required to remove a foreign body.

**C49. The Impact of Informal Disaster Preparedness on a Hospital Evacuation**

Nandini Govil, MD MPH, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the value of using informal mechanisms of disaster preparedness in the context of hospital settings.

**Objectives:** Formal hospital disaster preparedness plans are focused on training workshops and drills to prepare health care workers to respond to disaster scenarios. However, unforeseen scenarios such as hurricanes and tornados may thwart these plans. A recent experience with hospital evacuation during a category 3 hurricane demonstrated the value of informal strategies in addressing unanticipated challenges. **Study Design:** This presentation will review the role played by medical students in the evacuation of a large metropolitan hospital following loss of infrastructure during a hurricane. **Methods:** During the disaster precipitated by this hurricane, approximately 110 medical students assisted in the evacuation of 200 patients from a major academic hospital center. Some of the students had prior disaster preparedness training through classes offered by a medical student interest group. Students made up a large bulk of the responder workforce at the onset of the evacuation, with official responders arriving later in the process. **Results:** The pivotal role that medical students played in the evacuation was due to a number of variables: 1) existence of a student led interest group in disaster preparedness; 2) proximity of student residence halls to the hospital; 3) communication via word of mouth rather than electricity dependent technology such as cell phones and email; and 4) student baseline awareness of hospital needs and structure. **Conclusions:** This unforeseen event demonstrated that informal preparation and the student work force are underutilized and can supplement the traditional formal training that is used during a natural disaster. All healthcare workers must consider what their role may be when the unthinkable happens.

**C50. Surgical Management of Patulous Eustachian Tube: A Systematic Review**

Ahmed Awad Hussein, MD, Nashville, TN; Justin H. Turner, MD PhD, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to critically evaluate the current literature and compare surgical management techniques for treatment of patulous eustachian tube.

**Objectives:** Patulous eustachian tube (PET) is a challenging clinical problem with limited medical and surgical options. The current study systematically reviews the literature to determine the safety and efficacy of surgical treatments for PET. **Study Design:** Systematic review. **Methods:** The PubMed, Google Scholar, and Cochrane databases were reviewed and studies evaluating the surgical management of PET were extracted based on defined inclusion criteria. **Results:** 1616 studies were retrieved from the initial search. Fifteen studies comprising a total of 226 patients (286 sides) met inclusion criteria and were evaluated for surgical techniques, patient outcomes and complications. All studies were classified as level 4 evidence per definition provided by Oxford Center for Evidence Based Medicine. The most commonly reported techniques were pressure equalization tube placement (2 studies) and implantation of autologous cartilage (2 studies). Additional techniques, including injection of hydroxyapatite, silicone plugging, diathermy, and pterygoid hamulotomy, were reported in single studies. Postoperative followup ranged from 2 to 60 months (mean, 20.6 months). Outcome measures varied significantly between individual studies, with overall symptom improvement reported at between 13% and 100%. A low incidence of minor complications was reported in 5 of 15 studies. **Conclusions:** Current literature evaluating the surgical management of PET is limited and comprised entirely of level 4 studies. Comparisons between techniques was not possible due to the small number of

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studies and variable outcome measures. Future larger studies evaluating defined outcomes and quality of life measures are needed to determine the comparative efficacy of surgical treatments for this challenging condition.

- C51. Retained Nasal Tube Bridle System Insertion Stylet Presenting as Nasal Foreign Body: A Report of Two Cases**  
Ryan S. Jackson, MD, Tampa, FL; Saurabh Sharma, MD, Tampa, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the potential risk of a nasal foreign body using a nasal feeding tube bridle system.

**Objectives:** We aim to present two cases of a retained insertion stylet from nasal feeding tube bridle systems. **Study Design:** Case series of two patients. **Methods:** Patients were evaluated from 8/2012 to 9/2013 for retained bridle system insertion stylet. **Results:** Two cases were identified in a 12 month period with patient presenting to the hospital with a retained stylet from nasal tube bridle system. The first case was a 67 year old male who was referred to ENT clinic with complaints of nasal pain and congestion two months after discharge from the hospital. Nasal endoscopy was performed and revealed a plastic foreign body within the left middle meatus with a green wire wrapping around the posterior septum and into the right nasal cavity. This was removed from the left nasal cavity by advancing the wire retrograde into the nasopharynx and back through the left nasal cavity to avoid trauma to the posterior septum. The second case included a 70 year old male that presented to the emergency department from a nursing home one day after discharge from the hospital. Patient was noted to have an orange foreign body hanging from the left nostril that was easily identified as a stylet used in the nasal bridle system. This was removed without difficulty. **Conclusions:** Some institutions use a bridle system to secure nasal feeding tubes. Physicians must be aware of the insertion stylet as a potential source of a retained nasal foreign body.

- C52. Does the Use of Electronic Cigarettes Reduce the Disease Burden? Review Based on Chemical Analysis of Electronic Cigarette Vapor versus Tobacco Cigarette Smoke**  
Ashutosh Kacker, MD\*, New York City, NY; Anne Oh, BS, New York City, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to differentiate the disease burden between electronic cigarettes and tobacco cigarette.

**Objectives:** The rising interest in the development and utilization of electronic cigarettes (ECs) stems from the search for healthier alternatives to conventional tobacco cigarettes (TCs). **Study Design:** Review of published data. **Methods:** We assessed a potential disease burden presented by EC vapor versus TC smoke by direct comparison of all chemicals and carcinogens using scientific machines that read inhaled components from published data. **Results:** Studies show that EC vapors contain far less carcinogenic particles as compared to TC smoke. In addition, other studies show that while ECs have the ability to reach peak serum cotinine/nicotine levels, comparable to that of TCs, ECs do not cause an increase in total white blood cell (WBC) count, giving ECs the potential to lower the risk of atherosclerosis and systemic inflammation for those who are trying or have difficulty controlling their addiction to nicotine. Furthermore, use of ECs has shown to improve indoor air quality in a home in which the caregiver refuses to or is unable to quit TC usage. This reduces secondhand smoke exposure (SHSe), thereby having the potential to decrease respiratory illness/asthma, middle ear disease, and sudden infant death syndrome, amongst others. Furthermore, there are no studies that show that propylene glycol vapor causes any deleterious effects, but many studies show that propylene glycol has been safely used in a wide variety of consumer products. In an effort to minimize risks, EC manufacturers are replacing propylene glycol with distilled water and glycerine for vapor production. **Conclusions:** Overall, based on chemical analysis, ECs present lower potential disease burden than that of the conventional TC.

- C53. Variance in Intraoperative Parathyroid Hormone Levels during Parathyroidectomy**  
Katherine A. Lees, BA, Saint Louis, MO; Sean M. Miller, MD, Louisville, KY; Mark A. Varvares, MD, Saint Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify factors that may predict failure of parathyroid hormone level to decline during parathyroidectomy for adenoma.

**Objectives:** To identify factors that predicts failure of intraoperative parathyroid hormone levels to decline during parathyroidectomy despite successful adenoma excision. **Study Design:** Retrospective chart review. **Methods:** Patients that underwent parathyroidectomy by the department of otolaryngology from January 2006 to June 2013 were eligible for inclusion in the study. Those with known multiglandular disease or who did not have monitoring with intraoperative parathyroid hormone (PTH) levels were excluded. PTH levels were measured preoperatively and at ten minutes and thirty minutes after adenoma excision. Decline of PTH level to  $\leq 50\%$  of baseline at ten minutes was considered a surgical success. **Results:** One hundred and sixty-six patients were included in the data analysis. One hundred and seven patients (65%) had PTH levels drop to  $\leq 50\%$  of baseline at ten minutes, and 16 patients (9.6%) met criteria at thirty minutes. The group reaching 50% decline at thirty minutes was significantly older than the group with sufficient decline at ten minutes ( $69.9 \pm 7.7$  vs.  $59.6 \pm 12.6$ ,  $p=0.002$ ). There was no statistically significant difference in gender, preoperative PTH, baseline calcium, creatinine or localizing sestamibi scan between the ten and thirty minute groups. Forty-three patients (25.9%) that did not reach 50% decline of PTH at ten minutes underwent further unilateral or bilateral neck exploration. **Conclusions:** In older patients that fail to achieve 50% or greater PTH decline at ten minutes despite high clinical suspicion of successful adenoma excision, it may be reasonable to check thirty minute PTH levels prior to undertaking further gland exploration.

- C54. Tracheotomy Care and Management at a Community Hospital: A Quality Improvement Initiative**  
 Ross M. Mayerhoff, MD, Detroit, MI; Giancarlo F. Zuliani, MD, Detroit, MI; Vibhav Sekhsaria, MD, Detroit, MI; Michael Chen, MD, Detroit, MI; Tsveti Markova, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) compare tracheotomy management practices at a community versus academic hospital; 2) discuss the ways in which education can improve tracheotomy management; and 3) demonstrate that involvement of residents in quality improvement initiatives can positively affect outcomes.

**Objectives:** Tracheotomy is one of the most commonly performed procedures in the United States, with 113,653 adult tracheotomies in 2006. One-third were performed in non-teaching hospitals, however the bulk of literature has focused on academic centers. In light of the recently published Clinical Consensus Statement and other quality initiatives, we set out to assess and improve the care at a local community hospital. This was done in conjunction with institutional involvement of residents in quality improvement programs. **Study Design:** Retrospective chart review; prospective cross-sectional. **Methods:** We reviewed charts of all tracheotomies performed at a community hospital from 2010-2012. Data collected included operative details, indication, disposition, complications, and documentation of education. Additionally, standardized education classes for nurses are now a part of a quality improvement initiative. We will assess their comfort and knowledge with tracheotomies before and after the class with a questionnaire. **Results:** Forty-six tracheotomies were performed in this time period. The most common indication was ventilator dependence (85%), with the remainder done for airway obstruction. The average age was 68.5 years. There were no intraoperative complications. Postoperative complication rate was 21.7%. Mucus plug was the most common complication. Results from the questionnaire are pending. **Conclusions:** Tracheotomy demographics, indications, and management may vary among hospitals, and particularly between community and academic settings. By instituting quality improvement initiatives, we hope to improve comfort and knowledge with tracheotomy management, and ultimately to improve outcomes. Additionally, we demonstrate the impact the involvement of graduate medical education programs can have on quality at community hospitals.

- C55. Deep Space Neck Infections: A Retrospective Review and Best Practice Recommendations**  
 Beth N. McNulty, MD, Louisville, KY; Derek M. Vaughn, BS, Louisville, KY; Elizabeth D. Cash, PhD, Louisville, KY; Julie L. Goldman, MD, Louisville, KY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the management and clinical course of deep space neck infections. Secondly, to identify risk factors for the development of complications and a prolonged hospital course.

**Objectives:** To evaluate the trends in management and clinical course of deep space neck infections. Secondly, to identify risk factors for the development of complications and a prolonged hospital course. **Study Design:** Retrospective chart review. **Methods:** Patients presenting to our tertiary care hospital with a deep space neck infection during the years 2000 to 2012 were eligible for inclusion. Demographics, antimicrobial therapy, surgical intervention, bacteriology, comorbidities, and complications were recorded. **Results:** 51 charts were reviewed, male to female ratio of 3:1. A one way ANOVA model and logistic regression analysis revealed that patients admitted to the intensive care unit had a 3 times longer average length of stay ( $p < .001$ ), as well as an increased likelihood of complications ( $p = .002$ ), than patients admitted to the floor (9% versus 53%). Stepwise regressions were used to test whether substance abuse, diabetes mellitus or immunocompromised status predicted length of stay or complications. Immunocompromised patients were found to have a greater likelihood of complications,  $p = 0.36$ . A logistic regression model revealed that patients who tested positive for coagulase negative staphylococcus or klebsiella were more likely to develop complications. **Conclusions:** The treatment of deep space neck infections in our cohort involved the use of multiple antibiotic therapies and often surgical intervention. Patients warranting an intensive care unit admission, with an immunocompromised status, and cultures positive for coagulase negative staphylococcus or klebsiella should be monitored closely for the development of complications. A larger sample size is necessary to establish significance of these findings.

- C56. Does NIH Funding to One's Choice of Medical School, Residency, or Fellowship Have Any Impact on an Academic Otolaryngologist's Scholarly Impact?**  
 Ryan K. Meacham, MD, Memphis, TN; Cory Vaughn, BS, Memphis, TN; Faisal Shaikh, BS, Memphis, TN; Michael Cody Scarbrough, BS, Memphis, TN; Jaron Densky, BS, Memphis, TN; Merry E. Sebelik, MD, Memphis, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the h index as a bibliometric, identify which subspecialties of otolaryngology are the most scholarly, and identify if NIH funding to one's choice of medical school, residency, or fellowship, have any impact on one's scholarly impact.

**Objectives:** Describe the h index as a bibliometric that can be utilized to objectively evaluate scholarly impact. Identify which otolaryngology subspecialties are the most scholarly. Describe if NIH funding to one's choice of medical school, residency, or fellowship has any impact on one's scholarly output. **Study Design:** Analysis of bibliometric data of academic otolaryngologists. **Methods:** Active grants from the National Institutes of Health (NIH) to otolaryngology departments were ascertained via the NIH Research Portfolio Online Reporting Tools Expenditures and Reports database. Faculty listings from these departments were gleaned from departmental websites. H index was calculated using the Scopus database. **Results:** 47 otolaryngology programs were actively receiving NIH fund-

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ing. There were 838 faculty members from those departments who had a mean h index of 9.61. Otolaryngology (h index 12.50) and head and neck (h index 11.96) were significantly ( $p < .0001$ ) more scholarly than the rest of subspecialists. H index was significantly correlative ( $p < .0001$ ) with degree of NIH funding at a given institution. H index was not significantly higher for those that attended medical school ( $p = .18$ ), residency ( $p = .16$ ), and fellowship ( $p = .16$ ) at institutions with NIH funding to otolaryngology departments. **Conclusions:** H index is a bibliometric that can be used to assess scholarly impact. Otolaryngology and head and neck are the most scholarly subspecialists within otolaryngology. NIH funding to an individual's choice of medical school, residency, or fellowship was not correlative with one's future scholarly impact.

### C57. Recurrent Facial Abscess: A Rare Presentation of Pyoderma Gangrenosum

Matthew C. Mori, MD, Boston, MA; Margaret Carter, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the clinical features, diagnose, and treat pyoderma gangrenosum in the setting of recurrent facial abscess.

**Objectives:** To highlight the clinical features, histopathologic diagnosis, and treatment of pyoderma gangrenosum presenting as recurrent facial abscesses in patients with inflammatory bowel disease. **Study Design:** Case report. **Methods:** Chart and literature review. **Results:** Facial abscesses are common problems otolaryngologists treat. However nonhealing facial abscesses are rare. In patients with inflammatory bowel disease, clinicians must be aware of neutrophilic dermatoses like pyoderma gangrenosum masquerading as infectious abscesses. Case: a 26 year old male presents with 6 week history of persistent worsening right sided preauricular abscess. The patient had undergone incision and drainage three times by plastic surgery and had been placed on antibiotics with no resolution of the abscess. He had a history of ulcerative colitis and was having a flare on admission. Together with gastroenterology and dermatology, we diagnosed him with atypical pyoderma gangrenosum and began treatment with steroids and immunosuppressants. His abscess improved within 24 hours of treatment and resolved after 1 week. **Conclusions:** This case illustrates the importance of considering neutrophilic dermatoses when treating facial abscesses in patients with inflammatory bowel disease. In these patients, multiple incision and drainage procedures can enlarge and worsen the abscess causing irreparable cosmetic damage. Appropriate treatment with steroids and immunosuppressants managed with dermatology or gastroenterology input can lead to rapid resolution of these skin lesions.

### C58. The Use of Transoral Ultrasound Imaging in the Evaluation of Peritonsillar Infections

Stephen J. Nogan, MD, Columbus, OH; Danny B. Jandali, MD, Columbus, OH; Michael J. Cipolla, MD, Columbus, OH; Brad W. DeSilva, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand transoral ultrasound technique; 2) understand appropriate indications for ultrasound imaging; and 3) compare transoral ultrasound with contrast enhanced CT scan.

**Objectives:** To evaluate the efficacy of intraoral ultrasound (US) in the diagnosis and management of peritonsillar infections. **Study Design:** Prospective single cohort study. **Methods:** 22 patients were enrolled and initially evaluated in the emergency department for peritonsillar infection. Physicians formally trained in US techniques performed intraoral US to evaluate for abscess. Presence of abscess and dimensions were recorded. Eight patients had a CT scan performed and results were compared to US findings. Needle aspiration and drainage were performed by the otolaryngology physician in appropriate patients. **Results:** Intraoral US was successfully performed on 19/22 patients (86%). The US probe could not access the peritonsillar space in three patients due to excessive trismus. The positive predictive value of this imaging modality was 84.6%, and the negative predictive value was 100%. The specificity was 75% and the sensitivity was 100%. CT was obtained in 8/22 patients. US demonstrated a false positive finding in two of these patients. **Conclusions:** Intraoral US is a sensitive imaging modality at our institution, making it a strong initial imaging choice in patients with peritonsillar infections. US can reliably rule out the presence of a peritonsillar abscess and make CT neck unnecessary in most patients. In patients unable to tolerate ultrasound due to trismus, diagnosis can be made clinically or with CT scan. Intraoral US is a useful tool in diagnosing and treating peritonsillar infections and provides a more cost effective means of imaging peritonsillar abscess when compared to CT neck.

### C59. Midface Necrosis from Purpura Fulminans Secondary to Streptococcus Pneumoniae Sepsis

Aaron D. Robinson, MD, Sacramento, CA; D. Gregory Farwell, MD, Sacramento, CA; Luu C. Quang, MD, Sacramento, CA; Levi G. Ledgerwood, MD, Sacramento, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to: 1) identify the presenting features of purpura fulminans; 2) understand the proposed mechanisms of the disease process; 3) be familiar with current medical and surgical treatments for initial management of this disease; and 4) describe reconstructive options after surgical treatment.

**Objectives:** Purpura fulminans is a rare syndrome associated with consumptive coagulopathy leading to infarction of terminal vessels, especially in the skin. The sequelae of these diffuse thrombotic events present initially as peripheral purpura which progress rapidly to necrosis. Involvement of the midface is exceedingly rare and very destructive. The objectives of this report are to describe a 42 year

old male with S. pneumonia sepsis and purpura fulminans with extensive necrosis of the soft tissues and bony structures of the midface. The clinical presentation, epidemiology, pathophysiology and current management strategies will be discussed. **Study Design:** Case report. **Methods:** A single case of purpura fulminans involving the midface is reviewed using electronic health data. This data includes operative reports, initial presentation, operative photographs and followup reports. A review of the literature is also performed. **Results:** In 2012 a 42 year old man presented to our medical center with malaise and fever which rapidly progressed to sepsis. Purpura fulminans developed secondary to the sepsis and progressed to necrosis of the midfacial structures. The patient required extensive surgical debridement and presents an extreme reconstructive challenge. **Conclusions:** Purpura fulminans is a rare but devastating disease leading to purpuric skin lesions that progress to necrosis of skin and subcutaneous tissues. Head and neck involvement is rare in this disease, but when there is involvement, the subsequent cosmetic and functional deficits are usually extreme. Reconstruction of these defects can be challenging when donor sites are also diseased. A multi-disciplinary team of otolaryngologists, speech and language pathologists, prosthetists, and dentists is essential when helping patients recover after facial resection.

**C60. A Specialized Emergency Room as a Model for Otolaryngology Resident Training**

Rosh K.V. Sethi, BS, Boston, MA; Elliott D. Kozin, MD, Boston, MA; Aaron K. Remenschneider, MD MPH, Boston, MA; Mark G. Shrime, MD MPH, Boston, MA; Richard E. Gliklich, MD, Boston, MA; Stacey T. Gray, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand how a junior resident staffed otolaryngology emergency room may serve as a model for enhanced resident training.

**Objectives:** There is a paucity of data on junior resident training in common otolaryngology procedures, such as cerumen disimpaction, nasal and laryngeal endoscopy, epistaxis management, and peritonsillar abscess drainage. Many of these procedures are not recorded in the ACGME case log, but they represent a critical aspect of training and an important component of general practice. There is also a debate on the ideal setting for providing PGY2 residents with basic procedural training. We sought to determine how a dedicated otolaryngology emergency room (ER) staffed by PGY2 residents and a supervising attending may increase exposure to common otolaryngology procedures and provide necessary training to achieve independence as a senior consult resident. **Study Design:** Retrospective review. **Methods:** Electronic diagnostic and procedural data for all patients examined in our institution's ER between January 2011 and September 2013 were evaluated. **Results:** A total of 12,234 patients were evaluated. The average daily volume in 2011-2012 was 12.6 patients with the majority seen Monday through Friday (75%). A total of 5,491 patients (44.9%) underwent a procedure. The most common procedures included nasolaryngoscopy (53.7%), cerumen disimpaction (35.5%), epistaxis control (3.9%), incision and drainage of lesion (1.8%), peritonsillar abscess drainage (1.7%), and removal of foreign body (0.8%). **Conclusions:** An otolaryngology specific ER provides PGY-2 residents with significant diagnostic and procedural volume in a concentrated period of time and may provide a superior setting for teaching these procedures. Our study examines one type of surgical education model and provides insight into otolaryngology training not reflected in the ACGME case log.

## Allergy/Rhinology

**C61. Predictive Findings of Allergic Disease in Fiberoptic Nasolaryngoscopy**

Christopher D. Brook, MD, Boston, MA; Kimberly Russell, MD, Boston, MA; Avner Aliphas, MD, Boston, MA; Pieter Noordzij, MD\*, Boston, MA; Michael Platt, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to more clearly define which endoscopic findings in the pharynx and larynx predict allergic disease.

**Objectives:** To determine whether fiberoptic nasolaryngoscopy can predict the diagnosis of allergic disease. **Study Design:** Case control analysis of patients undergoing fiberoptic nasolaryngoscopy and allergy testing at a single academic institution. **Methods:** Patients who underwent flexible nasolaryngoscopy for either laryngeal or nasal symptoms and allergy testing by in vitro methods were divided into an allergic group and a non-allergic control group based on results of blood tests. Three board certified otolaryngologists who were blinded to the allergy status and symptoms viewed 88 patient videos and filled out an 8 item endoscopic rating questionnaire for each. Randolph's multirater kappa values and Mann-Whitney test was used to determine correlation between raters and between endoscopic findings and allergy status. **Results:** Intrarater reliability was moderate to perfect for all physicians on all questions (kappa 0.545-1.0). Interrater reliability was slight to fair (Kappa 0.143-0.399) for all questions and the overall diagnosis of allergic disease. Abnormalities of the torus tubarius (p=0.007) and increased nasopharyngeal secretions (p=0.038) were predictive of allergic disease, while the presence of an adenoid (p=0.08) and impression of allergic disease (p=0.15) approached significance. All other endoscopic measures were not predictive of allergy status. **Conclusions:** Fiberoptic nasolaryngeal findings within the nasopharynx rather than the nasal cavity or larynx are predictive of positive in vitro allergy status.

**C62. Olfactory Dysfunction and Molecular Expression of TNF-alpha in Patients with Chronic Rhinosinusitis**

Maria C.F. Buniel, MD MS, Portland, OR; Nathan B. Sautter, MD, Portland, OR; Jess C. Mace, MPH, Portland, OR; Timothy L. Smith, MD MPH\*, Portland, OR; Dennis R. Trune, PhD MBA, Portland, OR; Kara Y. Detwiller, MD, Portland, OR

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

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gene expression of TNF-alpha and olfactory function scores as measure by the BSIT instrument.

**Objectives:** To measure mucosal expression of tumor necrosis factor-alpha (TNF-alpha), nuclear factor kappa-light-chain-enhancer of activated B cells (NFkappaB), and nuclear factor of kappa-light-polypeptide gene enhancer in B cells inhibitor-alpha (IkappaB-alpha) in chronic rhinosinusitis (CRS) patients and to correlate gene expression levels with objective measures of olfactory function. **Study Design:** Prospective cohort study in an academic, tertiary rhinology practice setting. **Methods:** Adult patients with CRS undergoing endoscopic sinus surgery were enrolled. Demographic data, clinical characteristics and sinonasal tissue were obtained. Preoperative olfactory function was assessed using the Brief Smell Identification Test (BSIT). Lund-Kennedy endoscopy scores and Lund-MacKay computed tomography (CT) scores were measured. Reverse transcriptase polymerase chain reaction was used to measure gene expression, which was correlated with olfactory function and CRS specific clinical characteristics. **Results:** 69 patients were included in the final analysis. Olfactory dysfunction was reported in 24.6% of patients and was significantly associated with nasal polyposis and recalcitrant disease ( $p < 0.014$ ). Patients with olfactory dysfunction had significantly worse endoscopy scores (9.9(3.1) vs. 6.2(3.0),  $p < 0.001$ ) and CT scores (16.9(5.4) vs. 12.1(5.2),  $p = 0.002$ ). Gene expression of TNF-alpha and its downstream signaling mediators, NFkappaB and IkappaB-alpha, did not correlate to olfactory dysfunction in patients with CRS as measured by the BSIT. **Conclusions:** Sinonasal mucosal inflammation in CRS is characterized by expression of TNF-alpha, NFkappaB, and IkappaB-alpha. Despite this pro-inflammatory milieu, no significant correlation between TNF-alpha expression and olfactory dysfunction measures was observed.

**C63. Evaluation of Pathological Findings in Patients with Eosinophilic Chronic Rhinosinusitis with Nasal Polyposis**  
Jose G. Gurrola II, MD, Augusta, GA; Stilianos E. Kountakis, MD PhD\*, Augusta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss pathological findings common to patients with eosinophilic chronic rhinosinusitis with nasal polyposis (eCRSwP).

**Objectives:** To evaluate the pathological findings of patients with eCRSwP and identify the factors distinguishing subsets within this patient population. **Study Design:** Analysis of prospectively collected data. **Methods:** Eighty-three patients were identified with a clinically and histopathologically verified diagnosis of eosinophilic chronic rhinosinusitis with nasal polyposis. Preoperative clinic visits and postoperative pathological reports were evaluated. All patients included in this study had pathological examinations significant for positive eosinophilia and no fungal elements present. The patients were evaluated according to their level of eosinophilia and the presence or absence of Charcot Leyden crystals and allergic mucin. **Results:** Of the 83 patients evaluated, 82% demonstrated 20 eosinophils or greater per high powered field (phf) on pathological examination. Among these patients, 19% were positive for allergic mucin and Charcot Leyden crystals (CLC) on pathological evaluation, 7% presented with allergic mucin and no CLC, and 74% presented with no allergic mucin or CLC. Patients with 10-20 eosinophils phf made up 6% of the total patients and 10% of the total patients had eosinophil levels less than 10 phf. None of these patients had allergic mucin or CLC. Two percent of the patients were listed only as positive for eosinophilia and no findings of allergic mucin or CLC. **Conclusions:** The majority of patients presenting with eosinophilic chronic rhinosinusitis with nasal polyposis had >20 eosinophils per high powered field and tended not to present with allergic mucin or CLC on pathological evaluation. While this study specifically excluded patients with findings of fungal elements/positive fungal cultures, it was only in the patients with higher levels of eosinophilia that findings of allergic mucin and/or CLC were found, similar to the typical presentation of allergic fungal sinusitis. While all patients in this study presented with eosinophilia, further exploration into factors involved in development of allergic mucin and Charcot Leyden crystals, as well as the impact of these features on clinic outcome or possible disease progression toward allergic fungal sinusitis warrants further investigation.

**C64. Endoscopic Culture Directed Antibiotic Therapy: Impact on Patient Outcomes in Chronic Rhinosinusitis**  
Zi Yang Jiang, MD, Dallas, TX; Pete S. Batra, MD\*, Dallas, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the impact of culture directed antibiotic therapy on patients' symptoms in chronic rhinosinusitis.

**Objectives:** Endoscopically guided cultures are frequently employed to guide antimicrobial therapy in refractory chronic rhinosinusitis (CRS) patients. The objective of this study was to determine the impact of culture directed antibiotics on patient outcomes. **Study Design:** Retrospective cohort study at a tertiary care academic center. **Methods:** Retrospective cohort study was conducted of 176 adult CRS patients. Demographics, microbiology, treatment variables, pre- and post-treatment SNOT-20 scores, and presence of purulence on followup endoscopy were recorded. **Results:** A total of 105 CRS patients met the predetermined criteria for inclusion. The mean age was 46.3 years with 43.8% male. Concurrent polyposis and asthma was noted in 51% and 37.1%, respectively. The most common microbes were staphylococcus aureus (29.5%), pseudomonas aeruginosa (23.8%) and methicillin resistant S. aureus (11.4%). Statistically significant change in total SNOT-20 scores and all 4 subdomains was noted, with improvement being clinically meaningful in the rhinologic subdomain (-1.10,  $p < 0.0001$ ). Repeat purulence was only noted in 5 cases (4.8%). Multivariate regression analysis demonstrated that concurrent use of oral steroids was independently associated with improvement in the rhinologic subdomain ( $p = 0.0041$ ), while presence of S. aureus independently predicted presence of purulence of repeat endoscopy ( $p = 0.0368$ , odds ratio=10.8). Length of followup (14-30, 31-60, 61-90 days) did not statistically impact SNOT-20 scores. **Conclusions:** Endoscopic derived sinus cultures result in clinically meaningful change in the rhinologic subdomain of SNOT-20 scores, and repeat purulence is infrequently noted at followup. The presence of S. aureus at the initial culture may predict persistent infection on repeat endoscopy de-

spite treatment. Further prospective studies are needed to better delineate the role of cultures in CRS management.

**C65. Complications following Primary and Revision Transsphenoidal Pituitary Surgery: Results of a Population Based Study**

James G. Krings, BA, Stanford, CA; Dorina Kallogjieri, MD MPH, St. Louis, MO; Andre Wineland, MD, St. Louis, MO; Kenneth Nepple, MD, Iowa City, IA; Jay F. Piccirillo, MD\*, St. Louis, MO; Anne E. Getz, MD, Denver, CO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to provide patients with an estimate of the incidence of major complications following both primary and revision transsphenoidal pituitary surgery. Participants will also learn certain patient and provider characteristics associated with the occurrence of these complications.

**Objectives:** This study aimed to determine the incidence of major complications following both primary and revision transsphenoidal pituitary surgery. Major complications included endocrine, skull base, orbital, hemorrhagic and thromboembolic complications, respiratory failure and death. Secondly, this study aimed to examine factors associated with the occurrence of complications. **Study Design:** Retrospective cohort analysis of Healthcare Cost and Utilization Project (HCUP) databases from California and Florida from 2005-2008. **Methods:** The major complication rate following both primary and revision transsphenoidal pituitary surgery was calculated. Bivariate analyses were performed to investigate the relationship of patient and provider characteristics with complication occurrence, and a multivariate model was constructed to determine risk factors associated with the occurrence of complications. **Results:** 5,277 primary cases and 192 revision cases met inclusion criteria. There was a 2.57% difference (95% CI -11.00-16.14) between the overall rate of complications following primary (n=443; 8.89%) and revision (n=22; 11.46%) surgeries, however this difference was not statistically significant. Skull base complications were more common after revision surgery (OR=1.90; 95% CI 1.04-3.47). Multivariate analysis showed that patients with Medicare (OR=1.74; 95% CI 1.17-2.61), Medicaid (OR=2.13; 95% CI 1.59-2.86), or a malignant neoplasm (OR=3.10; 95% CI 1.62-5.93) were more likely to have complications. **Conclusions:** The rate of major complications following transsphenoidal pituitary surgery is comparable to earlier retrospective reports. The overall complication rate following revision surgery differed from primary surgery; and, revision cases were more likely to have a skull base complication such as CSF leak or meningitis. Finally, insurance status and malignant neoplasm were associated with a higher rate of complications.

**C66. Complications of Anterior and Lateral Open Approaches to the Skull Base**

Justin D. Miller, BSPH, Chapel Hill, NC; Allison M. Deal, MS, Chapel Hill, NC; Adam M. Zanation, MD\*, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the impact of open skull base approach laterality and extent on specific surgical complication risks.

**Objectives:** In the endoscopic era, open skull base surgery has undergone a shift towards more complex and higher stage lesions with a multitude of open approaches. There is a paucity of data investigating the complications of current open skull base approaches. Our primary objective was to evaluate complications of anterior, lateral, and anterior-lateral open approaches to the skull base. **Study Design:** Retrospective chart review. **Methods:** Medical records of 102 patients who underwent 117 open skull base surgeries by a single surgeon from 12/2008-12/2012 were reviewed. Multi-group statistical comparisons and odd ratios were calculated for complications based on the surgical approach. **Results:** Malignancies comprised 58% of cases and the overall complication rate was 45%. Anterior, lateral, and anterior-lateral approaches were used in 25 (21%), 56 (48%), and 36 (31%) surgeries, respectively. Postoperative complications occurred in 9 (36%), 24 (43%), and 20 (56%) anterior, lateral and combined approaches, respectively (p=0.294). Approaches extended intracranially in 49 (42%) cases with postoperative complications occurring in 22 (45%; p=1.00) of these cases. Intraoperative cerebrospinal fluid (CSF) leaks were found to be more likely during anterior approaches (OR=3.9, 95% CI:1.4-10.8). Combined approaches were significantly associated with postoperative medical complications (OR=3.2, 95% CI:1.2-9.3). No associations were found between intracranial extension and complications. **Conclusions:** In the endoscopic era, open skull base surgery is largely reserved for high stage malignant lesions. To our knowledge, this is the first study to assess the relationship of approach laterality and extent with surgery complications. Approach laterality did have an impact on specific complication risks; however intracranial access did not result in increased complications. These results will aid in patient expectations and preoperative counseling.

**C67. EQ-5D Derived Health Utility Values in Patients with Chronic Rhinosinusitis**

Aaron K. Remenschneider, MD MPH, Boston, MA; Stacey T. Gray, MD, Boston, MA; Eric H. Holbrook, MD, Boston, MA; Richard E. Gliklich, MD, Boston, MA; Ralph B. Metson, MD\*, Boston, MA

**Educational Objective:** At the conclusion of this presentation, participants should be able to define health utility valuation in chronic disease, explain how to measure health utility values for any otolaryngologic condition, understand pre and postoperative health utility in chronic rhinosinusitis and appreciate the growing importance of cost utility research for the field of otolaryngology.

**Objectives:** The EuroQol 5 Dimension outcome instrument (EQ-5D) delivers numerical values of health status that may be used to perform cost utility and cost effectiveness assessments. The goal of this study is to determine EQ-5D derived health utility values (HUV) in patients with chronic rhinosinusitis (CRS). **Study Design:** Prospective cohort study. **Methods:** Patients with CRS completed the EQ-5D questionnaire before and after sinus surgery. HUVs were compared to those reported in the general US population and to pa-

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tients suffering from other chronic diseases. **Results:** Baseline EQ-5D surveys were completed by 544 patients. Mean utility values (SD) were 0.819 (0.128). Female gender, revision surgery and the use of intraoperative image guidance were all associated with significantly lower HUVs. HUV correlated well with both visual analog scores (Pearson's  $\rho=0.518$ ,  $p<0.001$ ) and SNOT-22 scores (Pearson's  $\rho=-0.481$ ,  $p<0.001$ ). HUV improved significantly at 3 months to 0.892 (0.125) and remained improved at 0.877 (.114) at 1 year ( $p<0.01$ ). Baseline HUVs in CRS appear appropriately positioned between other common chronic conditions, including migraine and asthma. **Conclusions:** The EQ-5D has been used extensively in chronic disease to perform cost utility assessments. The determination of an accurate value for health utility for patients with CRS is an important step towards the performance of cost effectiveness research in the field of otolaryngology.

### C68. Comparison of Methods for Determining Health Utility in Chronic Rhinosinusitis

Vanessa C. Stubbs, BS, Chicago, IL; Alcina K. Lidder, BA, Chicago, IL; Rakesh K. Chandra, MD, Chicago, IL; David B. Conley, MD, Chicago, IL; Robert C. Kern, MD\*, Chicago, IL; Bruce K. Tan, MD, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand methods for calculating health utility and discuss health utility as it pertains to CRS.

**Objectives:** Chronic rhinosinusitis (CRS) is often assessed by its impact on quality of life (QOL). Health utility provides a means of quantifying QOL and calculating cost effectiveness. This study aims to compare methods of assessing health utility in CRS. **Study Design:** Prospective cross-sectional study. **Methods:** CRS patients ( $n=101$ ) presenting to a tertiary care practice were interviewed to determine health utility values using standard methods of visual analog scale (VAS), time tradeoff (TTO), and standard gamble. General QOL measures were obtained via the 36 item Short Form Health Survey (SF-36) and translated into health utility using previously established methods. A selected subgroup of patients ( $n=39$ ) not initiating surgery or new treatment for CRS were re-interviewed within three weeks to assess test-retest reliability of SG and TTO. **Results:** The mean health utilities determined via VAS/TTO/SG/SF36 were 0.69 (SD=0.195, range: [0.18-1.00]), 0.78 (SD=0.279, range: [0.05,1.00]), 0.94 (SD=0.112, range: [0.50,1.00]), and 0.73 (standard deviation 0.136, range: [0.34,0.97]) respectively ( $p<0.001$ ). Test-retest reliability of TTO and SG was strong ( $p<0.0001$  for both,  $R^2=0.57$  and  $0.78$  respectively). However, correlations between the methods for determining health utility were weak but significant ( $p<0.001$ ) with TTO correlating better with SG ( $R^2=0.28$ ) than VAS ( $R^2=0.22$ ) and SF-36 ( $R^2=0.14$ ). CRS patients interviewed during an exacerbation and those with treatment recalcitrant disease reported similar health utility values to general CRS patients. **Conclusions:** CRS patients show significant impairment in QOL with health utility values lower than published values for asthma (0.89), moderate angina (0.832) and renal failure on dialysis (0.84). The method of ascertainment significantly affects measured health utility.

### C69. Medical Now-casting in Otolaryngology: Analysis of Sinusitis Related Internet Search Activity

Thomas J. Willson, MD, San Antonio, TX; Erik K. Witzel, MD, San Antonio, TX; Kevin C. McMains, MD, San Antonio, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to define the term medical now-casting as demonstrated by the data presented. In addition, correlation of environmental factors with changes in regional internet search activity related to symptoms of sinusitis will be demonstrated.

**Objectives:** To investigate the possible correlation between real time pollen, mold, and pollutant counts and internet search activity related to sinusitis symptoms. **Study Design:** Retrospective time series analysis. **Methods:** Regional Google Trends data was collected for the time period January 2008 through 2013. Terms specified in the search were designed to encompass those defined in EPOS summary 2012. Data for the following terms was collected: congestion, sinus pressure, snot, sinus infection. Using a visual analytical approach these data were compared with mold, pollen, and pollutant counts to assess for correlation. **Results:** The selected symptom terms appear to have distinct periodicity when search activity is analyzed over time. Search interest does not appear to be influenced by the selected environmental factors. **Conclusions:** Environmental factors that may irritate nasal mucosa do not seem to lead to increased search activity related to sinusitis. A seasonal spike in activity related to these terms can be seen and is predictable. This study demonstrates the possibility of using Google Trends to facilitate medical now-casting in otolaryngology.

## Facial Plastic & Reconstructive

### C70. State of Art Biomechanical Simulation and Study of Maxillofacial Trauma

Kaete A. Archer, MD, Syracuse, NY; Andrew L. Darling, PhD, Syracuse, NY; David M. Ferrone, MD, Syracuse, NY; Robert M. Kellman, MD\*, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the state of art in frame testing systems for simulating and testing maxillofacial trauma.

**Objectives:** To present an accurate and reproducible uniaxial frame testing system for simulating and testing maxillofacial trauma. **Study Design:** Design and methodology. **Methods:** The frame, based upon drop testing devices for commercial appliances, is 188 cm high by 56 cm square at the base. A crossbar anvil is positioned at the top of the frame. It falls and delivers an impact force to the maxillofacial skeleton of a fresh cadaver head. The head is constrained at the frame base in a suspension of plastic and nylon making

the system both adjustable and resistant to deformation. This design eliminates the possible confounding data from radial stress points in previous frame testing systems. The head constraint drops after the anvil contacts the head, which both simulates the recoil of a sudden impact and prevents repeated impacts on the head due to bouncing of the anvil. This testing system has been used at our institution to study the value of paranasal sinuses as crumple zones. **Results:** The frame testing system has been validated with high speed camera technology and Image J software. The average momentum of the anvil upon impact is 27.8 N. The average acceleration is 7.8 m/s<sup>2</sup>, indicating reproducibility and minimal losses in the system due to friction. **Conclusions:** An accurate, reproducible, and adaptable uniaxial frame testing system to simulate maxillofacial trauma has been developed. Its uses to study maxillofacial trauma are diverse.

**C71. NOT BEING REPLACED**

**C72. Nanophase Bone Substitute Material for Craniofacial Load Bearing Application: Design and Pilot Animal Testing**  
Jonathan Z. Baskin, MD, Cleveland, OH; Steven J. Eppell, PhD, Cleveland, OH; Alvin B. Ko, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss issues involved in developing load bearing bone substitutes, explain why nanophasic composite design can be advantageous for engineering biomimetic and mechanically robust materials, and explain how compositional and physical changes to collagen/apatite composite materials affect osteointegration. Finally, the participants will be able to recognize some of the challenges in translating biologics from the laboratory to clinical practice.

**Objectives:** To design, fabricate, and test a load bearing resorbable bone substitute. Data is presented on a recently patented nanoapatite collagen composite manufactured as a nanophase bone substitute (NBS). **Study Design:** Exploratory animal pilot which motivated in vitro NBS hypothesis testing. **Methods:** Animal pilot: Using a mandibular critical size defect (CSD) 4 groups of rats (n=3) were implanted for 8 weeks with a variation of the NBS: baseline NBS, hyper-densified NBS (causing decreased porosity/increased strength), NBS doped with rhBMP2, and D-ribose crosslinked hyper-densified rhBMP2 doped NBS. In the latter groups rhBMP2 was applied post-implant fabrication. In vitro study: NBS samples doped with rhBMP2 a) pre- and b) post-collagen assembly (fibrillogenesis) were compared by measuring rhBMP2 levels in serial washings (ELISA) followed by collagenase exposure and final rhBMP2 measurements. **Results:** Densification alone had little effect on NBS in-vivo behavior. Post-fabrication rhBMP2 doping caused complete bony remodeling in the CSD volume, however, coupling crosslinking with hyper-densification (to maximize strength and wet modulus) thwarted rhBMP2 uptake and healing causing implant fibrous encapsulation. Pre- and post-fibrillogenesis doping results in similar rhBMP2 release levels until exposed to collagenase when pre-fibrillogenesis samples release an average 32.4ng/ml rhBMP2 and post-fibrillogenesis samples release 0.28ng/ml (p<<0.05). **Conclusions:** NBS samples doped with rhBMP2 post-fabrication exhibit complete bone healing in the rodent mandibular CSD. However, crosslinking and hyper-densification, necessary to increase mechanical properties, disrupts rhBMP2 uptake and osteointegration making an alternate rhBMP2 loading strategy necessary. Burst rhBMP2 release after collagenase digestion of in vitro samples doped prior to fibrillogenesis indicates rhBMP2 is likely intra-fibrillar resulting in potentially favorable in vivo release kinetics.

**C73. Trauma Patterns, Symptoms, and Complications Associated with External Auditory Canal Fractures**  
Daniela M. Burchhardt, MD, Detroit, MI; John M. David, BA, Detroit, MI; Natasha L. Robinette, MD, Detroit, MI; Michael A. Carron, MD, Detroit, MI; Giancarlo F. Zuliani, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the incidence of external auditory canal fractures and their association with mandibular and temporal bone trauma and demonstrate an increased awareness for their occurrence and possible complications.

**Objectives:** External auditory canal trauma has been linked to mandibular and temporal bone trauma and can have long term adverse outcomes. However, as they are rare occurrences, they can easily be missed in the trauma setting and much remains to be known about their patterns, treatments, and outcomes. This study aims to investigate the frequency of external ear canal injury in association with mandibular and temporal bone trauma and to investigate clinical intervention strategies and complications. **Study Design:** A retrospective chart review study was conducted to identify external auditory canal fractures in patients who had sustained mandibular and/or temporal bone fractures. **Methods:** Charts from hospitals affiliated with our department of otolaryngology were identified based on ICD-9 codes for temporal and/or mandibular fractures from the year 2005 to 2013. Over 300 CT scan images were reviewed to identify external auditory canal fractures. These charts were further reviewed and patient demographics, presenting signs and symptoms as well as interventions were recorded. Finally, followup data from our otolaryngology clinics was collected if present to follow long term sequelae. **Results:** 47.5% of temporal bone fractures were found to involve the external auditory canal. Of mandibular fractures, 5.2% were associated with an external auditory canal fracture and 19.4% of these fractures were associated with a fracture involving the condyle or subcondyle. Interestingly, one case was found with bilateral external auditory canal fractures despite only a unilateral condylar fracture. Patients sustaining these included all adult age ranges, with a predilection for men aged 20s-40s. Injury mechanisms were evenly distributed among assaults, falls, and bicycle injuries for mandible associated trauma, while falls, assault, and MVAs shared an increased representation in temporal trauma associated canal fractures. The most common presenting sign and symptoms were blood in the external auditory canal (62.5% for mandible and 88% for temporal trauma with EAC fracture). Others include hearing loss, hemotympanum or a laceration. While 2 patients with condylar and EAC fractures underwent exam under anesthesia and removal of

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debris as well as stenting as treatment, about half of the patients were placed on otic drops (52%). Followup data was only available for a quarter of the patients. Hearing loss from otic capsule involving or ossicular chain disruption were the main followup complaints, however one patient developed persistent canal stenosis and conductive hearing loss that eventually resolved by 6 months post-injury. **Conclusions:** External auditory canal trauma is present in a significant proportion of mandibular and temporal bone trauma and can lead to complications such as canal stenosis. Increased awareness can guide treatments and intervention. However, additional outpatient followup is still needed to help further elucidate long term complications and shape treatment recommendations.

### C74. Creation of a Head and Neck Keloid Quality of Life Questionnaire

William M. Guy, MD, Houston, TX; Prasanth Pattisapu, BA, Houston, TX; Julina Ongkasuwan, MD, Houston, TX; Anthony E. Brissett, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the features of head and neck keloids and their impact on the quality of life of patients.

**Objectives:** 1) Create a head and neck keloid quality of life questionnaire; and 2) assess the keloid specific quality of life questionnaire with regards to question reliability and test-retest reliability. **Study Design:** Prospective cohort study. **Methods:** Patients presenting to a keloid clinic in a tertiary referral institution between April 2012 and October 2013 were enrolled on their first visit. They were administered a questionnaire assessing demographics and a 21 question keloid specific survey assessing symptomatology, self-esteem, social functioning, and therapeutic motivation during their first three visits. Reliability of the keloid questionnaire was assessed for internal consistency (Cronbach's alpha) and test-retest correlations. Patients were treated with Kenalog steroid injections at each visit. The 126 point total score from the questionnaire was then compared to each subscale (physical symptoms, self-esteem, social function, and medical motivation) using a Pearson coefficient. **Results:** The keloid quality of life questionnaire showed a Cronbach's alpha of 0.86 for the overall questionnaire and ranged from 0.84 to 0.87 for individual questions. The test-retest reliability was 0.67 between visits 1 and 2 and 0.76 between visits 2 and 3. The Pearson correlation between symptoms, self-esteem, social functioning, and medical motivation subscales and the overall subscale 0.79, 0.75, 0.79, and 0.54, respectively. **Conclusions:** Global quality of life scales fail to properly address the quality of life burden of specific diseases. This head and neck keloid specific quality of life questionnaire proved to be a reliable method of assessing the affliction of keloids on these patients.

### C75. Utility of Post-Reduction Radiographic Analysis of Orbital Floor Fractures

William M. Guy, MD, Houston, TX; Gregory K. Low, BA, Houston, TX; Anthony E. Brissett, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the lack of benefit of post-reduction imaging for orbital floor fractures and discuss the associated costs of those images.

**Objectives:** Recognize that immediate post-reduction films for orbital floor fractures 1) have a significant associated cost; and 2) do not alter patient care. **Study Design:** Retrospective review of the medical record. **Methods:** Patients with orbital floor fractures operated on by the otolaryngology-head and neck surgery service between August 1, 2008 to August 31, 2013 were evaluated. The post-reduction imaging modalities were determined as well as if any changes in care were initiated by that image. Those patients who do have repeat imaging were evaluated to determine what led to the second image and what action was taken. **Results:** Forty-two patients met inclusion criteria. Preliminary results show that all patients had both a pre and post-reduction computed tomography (CT) at a cost of \$1,965 per scan. There were no changes in patient care based on the results of the post-reduction images. In the subgroup of patients receiving a second post-reduction CT, no changes in care were dictated by that image either. Persistent post-reduction proptosis was the most common complaint that led to a patient returning to the operating room (100%). **Conclusions:** Post-reduction films of orbital floor fractures do not alter patient management and have a significant associated cost. Appropriate followup with assessment of patient symptoms is a better surrogate for dictating patient care.

### C76. Objective Assessment of Postoperative Outcomes in Endonasal Spreader Grafts

Caroline C. Jeffery, MD, Edmonton, AB Canada; Khalid Kal Ansari, MD, Edmonton, AB Canada; David W.J. Cote, MD, Edmonton, AB Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) appreciate the relevant surgical anatomy of the internal nasal valve and its contribution to nasal obstruction; 2) understand the lack of objective evidence for measuring effectiveness of endonasal spreader grafts for relieving nasal obstruction; and 3) appreciate the utility of using acoustic rhinometry for measuring changes in internal nasal valve cross-sectional area.

**Objectives:** To use acoustic rhinometry to objectively measure the functional outcomes of endonasal spreader grafts in patients undergoing surgical correction of internal nasal valve collapse. **Study Design:** Prospective Study cohort study. **Methods:** Eighteen adult patients undergoing open septoplasty with unilateral or bilateral endonasal spreader graft placement were recruited. Patients were asked to undergo preoperative and postoperative acoustic rhinometry to measure changes in cross-sectional area of the internal nasal valve. Postoperative subjective nasal symptoms as measured by SNOT-22 and NOSE scores were also compared to preoperative values. **Results:** Patients undergoing septoplasty with endonasal spreader graft placement had statistically significant increase in the

cross-sectional area of the internal nasal valve ( $p < 0.05$ ). This was concomitant with mild improvement in SNOT-22 and NOSE scores postoperatively ( $p < 0.05$ ). **Conclusions:** This study provides objective evidence of an increase in internal nasal valve area after placement of endonasal cartilage spreader grafts in combination with septoplasty.

**C77. Restoration of Oral Competence with Large Volume Fat Grafting: Going Beyond Conventional Reconstructive Options**

Patricia S. McAdams, MD, Tacoma, WA; Jacqueline A. Anderson, MD, Tacoma, WA; Del R. Sloneker, MD, Tacoma, WA; Kathryn E. Marshall, PhD, Tacoma, WA; Joseph Shvidler, MD, Tacoma, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a novel application of autologous fat grafting for restoration of oral competence.

**Objectives:** The use of autologous fat grafting for aesthetic facial recontouring has been described extensively in the literature while functional applications for fat grafting have rarely been reported. Oral incompetence has traditionally been treated with reconstructive surgery. Our objective was to describe a novel application of autologous fat grafting for restoration of oral competence. **Study Design:** Case series and literature review. **Methods:** We present two cases of oral incompetence treated with autologous fat grafting. **Results:** The first patient is a 60 year old female who underwent a left infrastructure maxillectomy and fibular free flap reconstruction with post-operative XRT for squamous cell carcinoma of the hard palate. She had a complicated postoperative course requiring revision maxillectomy, pedicled temporoparietal fascial flap, Abbe lip switch and commissuroplasty. She had severe scarring resulting in whistle deformity and oral incompetence which were treated successfully with autologous fat grafting. The second patient is a 52 year old female with a history of congenital bilateral facial nerve palsy and Duane's syndrome status post multiple procedures including bilateral temporalis transfer. She presented to ENT clinic with severe oral incompetence with inability to close her lips. Fat grafting dramatically improved disarticulation and dysphagia in addition to cosmesis. **Conclusions:** Restoration of oral competence is a novel functional application for autologous fat grafting in patients who are poor candidates for extensive reconstructive procedures as well as patients who have failed conventional surgical treatments.

**C78. Outcomes of Fasciocutaneous Free Flaps Reconstruction for Hypopharyngeal Defects: A Prospective Study**

Cesare Piazza, MD, Brescia, Italy; Francesca M. Del Bon, MD, Brescia, Italy; Valentina Taglietti, MD, Brescia, Italy; Alberto Paderno, MD, Brescia, Italy; Stefano A. Mangili, MD, Brescia, Italy; Piero Nicolai, MD, Brescia, Italy

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the importance of the use of fasciocutaneous free flaps with long lasting bypass salivary stent for the reconstruction of pharyngeal defect, demonstrated by our low rate of pharyngocutaneous fistula and stricture when compared to other reconstructive techniques.

**Objectives:** Evaluation of reconstructive options after total laryngectomy (TL) with partial (PH) or circumferential hypopharyngectomy (CH) considering flap success rate, complications, pharyngocutaneous fistula (PCF), and pharyngoesophageal stricture (PES) occurrence. **Study Design:** Comparison between a retrospective cohort (group A) reconstructed by pedicled/free flaps alone vs. a prospective cohort (group B) reconstructed by fasciocutaneous free flaps with long lasting bypass salivary stent (BPSS). **Methods:** Group A (n=89) was reconstructed by pectoralis major pedicled flap (PMPF) in 39 cases, radial forearm (RF) in 46, or anterolateral thigh (ALT) free flaps in 4. Forty-four (49%) received preoperative radiotherapy. Group B (n=79) was reconstructed by RF in 34 or ALT in 45 with long lasting (45 days) BPSS and antibiotic prophylaxis. Forty-five (57%) received preoperative radiotherapy. **Results:** Among group A, flap failure occurred in 4 (4%) cases all rescued by PMPF. We encountered 25 (28%) PCFs: 17 cured by medical treatment, 8 by surgery (direct suture in 2 and PMPF in 6). Fifteen patients had late PES, managed by endoscopic dilatations in 11, a second free flap in 1, and permanent gastrostomy in 3. Among group B, flap failure occurred in 4 (6%) cases and was managed by PMPF. We encountered 5 (6%) PCFs: 2 cured by medical treatment and 3 by direct suture. Three (4%) patients experienced late PES, managed by endoscopic dilatations. **Conclusions:** The first line use of RF and ALT fasciocutaneous free flaps for TL associated to PH/CH with long lasting BPSS seems to lead to low PCF (6%) and pharyngoesophageal stricture (4%) rates.

**C79. A Comparison between Autograft Alone, Bone Cement, and Demineralized Bone Matrix in Cranioplasty**

Ann W. Plum, MD, Syracuse, NY; Sherard A. Tatum, MD\*, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the differences in cosmetic outcomes and complications in patients following cranioplasty based on whether autograft alone, bone cement or bone matrix was used for repair of craniofacial defects.

**Objectives:** To compare the difference between autograft alone, bone cement and demineralized bone matrix in cosmetic outcomes and complications following cranioplasty for reconstruction of cranial defects. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review was performed of patients who underwent cranioplasty at a single institution between 1992 and 2012. The patients were divided based on whether they had bone autograft alone, demineralized bone matrix group, or bone cement used for reconstruction of their craniofacial defect. Complications and cosmetic outcomes were examined for each group. **Results:** There was no significant difference between groups regarding followup and age at time of surgery. The bone cement group had a higher infection

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rate. There was more dehiscence, scaring and scaring requiring intervention in the autograft and bone cement groups. However, residual bone defects and the need for a revision cranioplasty were higher in the bone matrix group. Likewise, patient, parent and surgeon satisfaction with the appearance was lower in the bone matrix group. **Conclusions:** There appears to be a trend towards lower success rate with bone matrix compared to autograft alone and bone cement in cranioplasties. However, one should use bone cement with caution in the patients who have poor wound healing due to a higher infection rate.

**C80. Novel Technique: Anterolateral Thigh Free Fascial Flap for Mandibular Salvage in Cases of Osteoradionecrosis**  
Karthik Rajasekaran, MD, Cleveland, OH; Timothy Haffey, MD, Cleveland, OH; Peter Revenaugh, MD, Cleveland, OH; Michael Fritz, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) identify controversies in the theories behind, and treatment of osteoradionecrosis; and 2) identify the anterolateral thigh free fascial flap as a potential treatment option in halting the progression of moderate osteoradionecrosis.

**Objectives:** Osteoradionecrosis (ORN) is a known complication of radiation therapy. It classically presents with late exposure of bone which does not heal for at least 3 months. The primary etiology of ORN is thought to be devitalization and devascularization of bone by radiation. We describe a novel application of a vascularized free anterolateral thigh (ALT) fascial flap to the mandible to provide mucosal coverage and restore nutrient blood flow after a marginal mandibulectomy for osteoradionecrosis. **Study Design:** Case series. **Methods:** A marginal mandibulectomy was performed by the ablative oral surgeon while the ALT fascia flap was simultaneously harvested. The surgical defect involved about half the height of the mandible from angle to mid-body and a portion of oral mucosa. Defect repair was accomplished with an ALT fascia lata perforator flap vascularized via a minimal access incision which exposed the facial artery and vein. Total operative time was less than 4 hours. **Results:** Five patients underwent this procedure. Each patient was discharged home on postoperative day 1 and kept on a soft diet for 3 weeks. Repeat Panorex exams at 6 and 12 months demonstrated both preservation and increasing density of remaining mandible over time. **Conclusions:** Use of ALT fascia flap provides the advantages of low morbidity, ease of harvest, 2 team approach to ablation and reconstruction, and quick recovery resulting in short stay free flap surgery. Although conclusions must be tempered by a single clinical experience, the ALT fascia lata flap may hold promise in halting the destructive progression of moderate to advanced ORN in select cases.

**C81. Alar Batten Graft vs Lateral Suture Suspension for Relief of Internal Nasal Valve Collapse**  
Jordan J. Rihani, MD, Dallas, TX; Demetri J. Arnaotakis, MD, Dallas, TX; Yoni I. Samura, BS, Dallas, TX; Joseph L. Leach, MD\*, Dallas, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare two effective methods of relieving internal valve collapse and demonstrate improved understanding of patient satisfaction for such surgeries. We hope to achieve better long term results and discuss indications for both types of procedures.

**Objectives:** Compare two techniques of upper lateral cartilage suture suspension (SS) vs alar batten graft (ABG) placement for relief of internal valve collapse. **Study Design:** Patients that underwent either surgery by the primary author were included. Charts and questionnaire were reviewed for data collection. **Methods:** Retrospective case series with chart review. **Results:** Over 80 consecutive patients underwent SS or ABG between 2003 and 2013. 26 patients (12 suture suspension and 14 alar batten graft) were available for followup questionnaire. Average followup was 46 months (range 2 months to 10 years). 92% of SS patients reported immediate improvement in breathing compared to 64% in the ABG group. However at the time of last followup, 75% of SS vs 93% of ABG reported improvement ( $p=.09$ ). Patient satisfaction scores trended higher in the ABG group. Complications in SS group included lid deformity in 2 patients and palpable suture in 1 patient. In the ABG group, palpable cartilage and excessive scar tissue was present in 2 patients. **Conclusions:** Suture suspension and batten graft placement both relieve internal valve collapse. Alar batten graft placement may have higher patient satisfaction scores and improved long term results when compared to suture suspension of the upper lateral cartilage.

**C82. Use of Fluorescent Angiography to Assess Donor Site Perfusion Prior to Free Tissue**  
Steven R. Taylor, MD, Columbia, MO; Jeffrey B. Jorgensen, MD, Columbia, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a novel use of fluorescent angiography in head and neck reconstructive surgery to evaluate donor site perfusion prior to graft harvest.

**Objectives:** To describe a novel use of fluorescent angiography in assessing donor limb perfusion prior to free tissue harvest in microvascular free tissue transfer. **Study Design:** Retrospective case series. **Methods:** From January 2012 to June 2013, 59 patients underwent head and neck microvascular free tissue reconstruction. Evaluation of donor site perfusion via indocyanine green (ICG) fluorescent angiography was utilized in 12 patients and 13 free flaps. Eleven cases were radial forearm free flaps (RFFF) and 2 were fibula free flaps (FFF). Preoperatively, RFFF patients were evaluated with Allen's testing, Doppler ultrasound, or both. FFF patients underwent MRA imaging. ICG was used intraoperatively to evaluate donor limb perfusion prior to free flap harvest. Intraoperative and postoperative complications of the donor limb were evaluated. **Results:** Average followup was 5.3 months. Preoperative Allen's testing

was normal in 6 patients and ultrasound was performed in 8 patients. One patient had a normal ultrasound, 3 showed minimal dampening, and 4 exhibited severe waveform flattening. There were no intraoperative complications using ICG. All 12 patients displayed adequate donor limb perfusion intraoperatively via fluorescent angiography. No digital or acute ischemic events were identified intraoperatively or postoperatively. There was no significant decrease in functionality or mobility of the donor limb. One patient noted mild arm pain with increased use. **Conclusions:** Fluorescent angiography appears to be a safe, effective method for evaluating donor site perfusion prior to free tissue harvest with low risk of side effects. Collateral hand perfusion may be more robust than previously thought for RFFF harvest.

**C83. Does Histopathologic Margin Distance Correspond with Survival in Resection of Cutaneous Melanoma of the Head and Neck?**

James A. Teng, MD, Charlottesville, VA; Travis W. Halbert, BS, Charlottesville, VA; Timothy L. McMurry, BS, Charlottesville, VA; Paul A. Levine, MD\*, Charlottesville, VA; John J. Christophel, MD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the impact of the histopathologic margin of cutaneous melanoma resection on survival.

**Objectives:** Treatment of cutaneous melanoma involves surgical excision with wide clinical margins. There are no guidelines regarding a safe histopathologic margin distance. We hypothesize that histopathologic margin, as measured from the closest cut edge of the specimen, correlates with overall survival in resection of cutaneous melanoma of the head and neck. **Study Design:** Retrospective chart review. **Methods:** A total of 637 patients were treated for cutaneous melanoma of the head and neck between February 2001 and June 2011. A data set was created using demographics, tumor characteristics, histopathologic margin distance (from a pathology database), and survival data from state health registries and health system clinical data repositories. Cox regression models and Kaplan Meier curves were used to analyze the data, adjusting for age, tumor location, ulceration, and depth of invasion (DOI). **Results:** When analyzing for overall survival, Cox multivariate regression analysis showed that age (HR=1.0-1.1), DOI (HR=1.2-1.5), ulceration (HR=1.3-3.8), and subsite (ear [HR=1.0-3.7]) were significant predictors of survival. Histopathologic margin distance was not statistically significant for predicting survival (HR=0.7-1.1). Three percent of histopathologic margins were less than 1 mm. **Conclusions:** In a large data set of head and neck cutaneous melanoma, known factors associated with overall survival (age, DOI, ulceration, subsite) proved significant, validating the data set. The effect of histopathologic margin distance on survival, controlling for these known factors, failed to reject the null hypothesis. Margin distance as measured by histopathology does not affect survival. According to this data set, a negative histopathologic margin, regardless of how close, can be considered safe.

**C84. Optimization of Needle Based Electromechanical Long Term Reshaping of Ear Cartilage in an in Vivo New Zealand Rabbit Model**

Tjason Tjoa, MD, Irvine, CA; Cyrus T. Manuel, BS, Irvine, CA; Brian J.F. Wong, MD PhD\*, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the application of electromechanical reshaping as a minimally invasive cartilage reshaping tool.

**Objectives:** We have previously shown that electromagnetic reshaping (EMR) can produce shape change in the intact rabbit pinna in vivo. This study aims to optimize the voltage and time parameters to produce the optimal shape change and to examine the long term tissue effects of EMR. **Study Design:** Prospective randomized control trial. **Methods:** Three groups of New Zealand rabbit pinnae were treated via EMR and reshaped using a custom made jig. The first group was treated with EMR using 4V 5min (n=4), the second group with 5V 4min (n=5), and the control group with 0V 5min (n=4). Ears were bolstered and the rabbits survived for 6 months. Upon euthanasia, pinnae were photographed and harvested. Tissue injury was assessed by cross-sectional distance between live cells as viewed under fluorescent confocal microscopy. To examine cellular structural changes, tissue was stained with hematoxylin and eosin staining. **Results:** Shape retention of the pinnae was more prominent in the 5V group versus the 4V group. Bend angles of the ears on average were 126 ± 21 degrees for 5V and 101 ± 19 degrees for 4V. Histologic staining of the ears show fibrosis, cell injury, and neochondrogenesis limited to areas of electrode insertion. Cross-sectional tissue injury area was 0.96mm - 3mm for 4V 5min group and 0.88 - 3.3mm for the 5V 4min group. **Conclusions:** We have shown herein that EMR is a promising minimally invasive reshaping modality that can retain its results long term. Using 5V produces a greater shape change than 4V, however, with slightly greater areas of tissue injury around electrode insertion sites.

## Head & Neck

**C85. Tracheal Reconstruction with Radial Forearm Free Flap and Cartilage Graft: A Case Report**

Caitlin R. Bertelsen, BA, Los Angeles, CA; Niels Kokot, MD, Los Angeles, CA (Presenter)

**Educational Objective:** At the conclusion of this presentation, the participants should be familiar with the use of radial forearm free flap and cartilage graft as an option for tracheal reconstruction with preservation of speech and swallowing functions.

**Objectives:** Circumferential tracheal defects less than 4-6 cm may be safely resected with primary anastomosis. Larger or irregular defects often require reconstructive surgery, which presents multiple challenges. A successful tracheal reconstruction maximally pre-

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serves respiratory epithelium and local blood flow, and includes flexible and rigid components to prevent inspiratory airway collapse. No consensus exists regarding an optimal solution to this problem. We present a case of tracheal reconstruction with a radial forearm free flap and costal cartilage graft as a method of restoring tracheal continuity while preserving speech and swallowing functions. **Study Design:** Tracheal reconstruction surgery was planned as described in the methods section. **Methods:** The patient's tracheal adenoid cystic carcinoma was resected, leaving an irregular tracheal defect of more than 5.5 cm in length. A 3.5 cm costal cartilage graft was sutured to a radial forearm fasciocutaneous flap. Microvascular anastomosis was performed and the cartilage bolstered flap was sewn into the tracheal defect. Tracheostomy and nasogastric tubes were placed intraoperatively. **Results:** The patient was able to swallow by postoperative day 7, allowing removal of the nasogastric tube. The patient was tolerating a normal diet by postoperative day 14 and his tracheostomy tube was also removed at this time. Eighteen months after his operation, the patient maintains a patent airway with good speech and swallowing functions and has had no complications. **Conclusions:** Radial forearm free flap with cartilage graft represents a safe way to repair large tracheal defects while preserving speech and swallowing functions. Advantages of the procedure described include applicability to a wide variety of defects as well as ability to be carried out in a single stage.

### C86. The Value of a Collaborative Course for Advanced Head and Neck Surgery in East Africa

Kyle J. Chambers, MD, Boston, MA; Joyce Aswani, MBChB MMed, Nairobi, Kenya; Asmeeta Patel, MBBS MS, Nairobi, Kenya; Christopher E. Fundakowski, MD, Nashville, TN; Derrick T. Lin, MD, Boston, MA; James L. Netterville, MD\*, Nashville, TN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain several models for increasing the number of well trained head and neck surgeons in east Africa and discuss the potential value of collaborative training courses in advanced topics.

**Objectives:** To determine the value of a collaborative course for advanced head and neck surgery in east Africa. **Study Design:** A pre- and post-course self-evaluation survey. **Methods:** A three day course in advanced head and neck surgery was designed for otolaryngologists and trainees from Kenya and surrounding countries through a collaborative effort between institutions in Kenya and the United States. Course topics included neck dissection, parotidectomy, total laryngectomy, parapharyngeal space tumor excision, and pectoralis myocutaneous flap reconstruction. A pre- and post-course self-evaluation survey was administered to course participants as a means of measuring course impact. **Results:** A total of 18 otolaryngologists and trainees participated in the course, with 17 completing course surveys. The majority of participants (72% percent) were from Kenya. Prior to the start of the course, 41%, 71%, 23%, 12%, and 0% of participants indicated they could complete a neck dissection, parotidectomy, total laryngectomy, parapharyngeal space mass excision, and pectoralis myocutaneous flap, respectively. Following the course, 50%, 94%, 69%, 25%, and 38% of participants indicated they could complete a neck dissection, parotidectomy, total laryngectomy, parapharyngeal space mass excision, and pectoralis myocutaneous flap, respectively, with a statistically significant increase identified for pectoralis myocutaneous flap ( $p < 0.001$ ) and total laryngectomy ( $p = 0.009$ ). There was also a trend toward an increase in number of participants indicating an ability to complete parotidectomy following the course ( $p = 0.085$ ). **Conclusions:** This survey demonstrates the potential value of a collaborative course in advanced head and neck surgery as one useful model for increasing the number of well trained head and neck surgeons in east Africa.

### C87. Patterns of Cervical Metastases in T1/T2 Squamous Cell Carcinoma of the Tongue Base

Kara S. Davis, MD, Pittsburgh, PA; Davis A. Clump, MD PhD, Pittsburgh, PA; Simon I. Chiosea, MD, Pittsburgh, PA; Robert L. Ferris, MD PhD\*, Pittsburgh, PA; Jonas T. Johnson, MD\*, Pittsburgh, PA; Umamaheswar Duvvuri, MD PhD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the nodal drainage patterns of T1/T2 squamous cell carcinoma of the tongue base. In addition, participants should be able to appreciate the association of HPV status with nodal drainage patterns.

**Objectives:** Treatment of tongue base squamous cell carcinoma (BOT SCC) in the era of human papilloma virus (HPV) is evolving. Understanding of nodal metastases has not been subdivided by oropharyngeal subsite of the primary tumor. The influence of HPV status on such patterns is also unknown. **Study Design:** Retrospective cohort study. **Methods:** Institutional database records, imaging studies, and pathology reports of 89 patients with T1/T2 BOT SCC were reviewed. Patients with previously treated primary tumors were excluded. **Results:** The most frequent nodal stage was N2b ( $n = 34$ , 38.2%). 96.5% of patients presenting with clinical evidence of cervical metastasis presented with at least ipsilateral level 2 or level 2/3 junction disease. Fourteen (15.7%) lesions were described as approaching or meeting the midline, and 16 (18%) were described as involving the ipsilateral valleculae. Neither of these subjective descriptions was associated with contralateral metastases. 82 (92.1%) patients had HPV+ tumors. Bilateral nodal metastases was associated with p16 positivity ( $p = 0.032$ ). Patients with p16+ tumors had improved 2 year recurrence free survival ( $p < 0.000$ ). Laterality of nodal metastases at presentation was not associated with improved 2 year recurrence free survival ( $p = 0.891$ ). Bilateral neck dissection was performed in 11 patients. Of those, 4 patients were discovered to have bilateral cervical metastases. Two patients with bilateral disease were clinically occult. **Conclusions:** Bilateral nodal metastases in T1/T2 BOT SCC are associated with p16 positivity. In a small subset of patients undergoing bilateral neck dissection, 18% had clinically occult contralateral disease. Subjective radiographic descriptions of the primary tumor were not reliably associated with pattern of nodal metastases.

- C88.           Neurons Increase the Migration of Head and Neck Squamous Cell Carcinoma Cells through a HER3 Dependent Mechanism**  
 Ronak B. Dixit, BA, Pittsburgh, PA; Benjamin L. Hodnett, MD PhD, Pittsburgh, PA; Brian K. Dragoo, BS, Pittsburgh, PA; Young-ho Kim, PhD, Pittsburgh, PA; Seungwon Kim, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that an interaction with neurons increases the speed of migration of head and neck squamous cell carcinoma cells through a HER3 dependent mechanism.

**Objectives:** To determine if an interaction between head and neck squamous cell carcinoma (HNSCCa) cells and neurons affects migration of HNSCCa cells and to determine the role of HER3 in this interaction. **Study Design:** Quantitative in vitro model. **Methods:** Murine dorsal root ganglia were extracted and dissociated into a sensory neuronal culture. Both FaDu HNSCCa cells and FaDu cells with HER3 knocked down via shRNA (FaDu/shHER3) were plated in two cell columns with a measurable gap between columns. The speed of FaDu cell migration was measured by the percent decrease in gap size over a 12 hour period. Migration speed was assessed both in the presence and absence (control) of a sensory neuronal co-culture. **Results:** Each experiment was performed nine times (N=9). When neurons were absent from the culture, there was no difference in the percent decrease of gap size by FaDu and FaDu/shHER3 cells (15.8% vs. 11.8%,  $p>0.05$ ). With neurons present, gap size was decreased in both FaDu cells and FaDu/shHER3 at 12 hours vs. control (47.6% vs. 15.7%,  $p<0.05$  and 33.2% vs. 11.8%,  $p<0.05$ ; respectively). The difference in gap size closures between FaDu cells and shHER3 cells was also significantly different (47.6 vs. 33.2%,  $p<0.05$ ). **Conclusions:** The presence of neurons increases the speed of migration of HNSCCa cells, but this effect is significantly diminished when HER3 is knocked down.

- C89.           Death from Hypocalcemia Does not Occur after Thyroid Surgery**  
 William S. Duke, MD, Augusta, GA; Mohammed Al-shehri, MD, Augusta, GA; David J. Terris, MD\*, Augusta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss the prevalence of hypocalcemia after thyroidectomy; 2) describe the progressive stages of hypocalcemia leading to death; 3) discuss the incidence of hypocalcemia related mortality after thyroid surgery as it is reported in the medical literature; and 4) implement a postoperative regimen of routine calcium supplementation to decrease the risk of hypocalcemia related complications.

**Objectives:** To determine if postoperative hypocalcemia directly contributes to patient death in the era of modern thyroid surgery. **Study Design:** Analysis of a single surgeon experience, review of medical literature and physician survey. **Methods:** Post-thyroidectomy mortality for a single surgeon over 9 years was evaluated. A systematic review of the Ovid/Medline database from 1946 to 2012 was performed to identify reports of hypocalcemia related mortality after thyroid surgery. All English language publications related to thyroidectomy complications, particularly hypocalcemia, hypoparathyroidism and death, were identified and then filtered using specific exclusion criteria. Finally, a questionnaire was sent to all active members of the American Head and Neck Society (AHNS) regarding their experience with post-thyroidectomy hypocalcemia and death. **Results:** A single surgeon experience of 1365 thyroidectomies revealed no perioperative hypocalcemia related mortality. 150 publications reporting on 152,623 patients between 1971 and 2012 met inclusion criteria. There were 64 deaths reported after thyroidectomy but none directly attributable to postoperative hypocalcemia. The questionnaire sent to all 889 members of the AHNS received 170 responses (19%). There were no verifiable deaths related to hypocalcemia, although two respondents cited deaths possibly associated with low calcium. Six other cases were excluded based on details provided. **Conclusions:** There is no evidence in the modern medical literature that hypocalcemia after thyroidectomy results in patient death. It is possible that 2 deaths occurred based on the survey results, but even if verified, it is clear that this is a rare and unlikely occurrence given the predictable and sequential symptoms that occur with progressively severe hypocalcemia.

- C90.           Efficacy of Doxycycline and Sodium Tetracycl Sulfate Sclerotherapy in Pediatric Head and Neck Lymphatic Malformations**  
 Soroush S. Farnoosh, BS, Los Angeles, CA; Debra M. Don, MD, Los Angeles, CA; Jeffrey A. Koempel, MD MBA, Los Angeles, CA; Andre E. Panossian, MD, Los Angeles, CA; Dean M. Anselmo, MD, Los Angeles, CA; Philip P. Stanley, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the efficacy and safety of the sclerosant agents mentioned in the study and demonstrate an understanding of the relationship of the lesion type and outcome.

**Objectives:** The purpose of this study is to evaluate the safety and efficacy of percutaneous sclerotherapy with doxycycline and 3% Sotradecol as primary treatment for pediatric head and neck lymphatic malformations, and to assess outcomes based on lesion classification, location and sclerosant used. **Study Design:** This study is a retrospective review and analysis of the pediatric patients who underwent percutaneous sclerotherapy of lymphatic malformations of the head and neck region. **Methods:** The medical records and imaging studies of 38 children who underwent percutaneous sclerotherapy of LMs in the head and neck region at our tertiary care center between January 2006 and February 2011 were reviewed. Pertinent data regarding the lymphatic malformations was recorded and analyzed using Microsoft Excel and IBM SPSS 20. **Results:** A mean average of 2.9 (range 1-10) sclerotherapy sessions per child were performed. Lymphatic malformations involved primarily the face (61.3%), posterior neck (48.4%), submental area (45.2%), and

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anterior neck (35.5%). Twenty-nine subjects had adequate followup data, with 51.7% demonstrating complete resolution, 27.6% moderate improvement, and 20.7% no response. There was no significant difference in the outcome based on the sclerosant agent used or location of the lesion. Lesion type did effect outcome and macrocystic lesions were found to have a significantly higher resolution rate (95.2%) than microcystic or mixed lesions ( $p < 0.05$ ). The total number of complications was similar between agents and all were minor. **Conclusions:** Our results indicate that percutaneous therapy with doxycycline and Sotradecol is safe and effective for children with LMs of the head and neck. Better outcomes were observed with macrocystic lymphatic malformations.

### C91. Feasibility of Sparing the Submandibular Gland in Level I Neck Dissection for Squamous Cell Carcinoma of the Head and Neck

Michelle D. Fisher, MD, Augusta, GA; Mariah B. Pate, MD, Augusta, GA; Michael W. Groves, MD, Augusta, GA; Jimmy J. Brown, MD DDS\*, Augusta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the rate of cancerous involvement of submandibular gland (SMG) in patients with squamous cell cancer (SCC) of the head and neck as well as the feasibility of sparing the SMG in level I neck dissections.

**Objectives:** To determine the rate of cancerous involvement of the SMG in patients with SCC of the head and neck and to understand that sparing the SMG in level I neck dissection may be feasible in select patients. **Study Design:** Retrospective review. **Methods:** A retrospective chart review from 2003-2013 of all patients with SCC of the head and neck who underwent a neck dissection at a tertiary medical center. **Results:** 505 patient charts were reviewed. 331 neck dissections that included level I as well as SMG pathology results were included in the study. The mean age was 62 years old with a male to female ratio of 2.6:1. Fifty-four (16.3%) of cases had level one disease. SMG involvement was found in 6 of the 331 cases (0.018%) with 1 (0.003%) glands revealing cancerous metastasis within the gland itself. **Conclusions:** Involvement of the SMG in primary SCC of the head and neck is extremely rare. When the gland is involved, it is as a result of direct extension from the primary tumor or neighboring lymph nodes rather than metastasis. If the tumor is not contiguous with the gland, it is unlikely that the gland will harbor metastasis. Therefore, preservation of the SMG during level I neck dissection in these cases is a feasible option.

### C92. Assessing the Diagnostic Utility of Computed Tomography in Detecting Central Compartment Lymph Node Metastases from Primary Papillary Thyroid Carcinoma

Andrew B. Davis, MS4, Valhalla, NY; Roy A. Holliday MD, New York, NY; Stimson P. Schantz, MD\*, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the current methods of diagnosis of central compartment lymph node metastases from a differentiated thyroid carcinoma and compare the advantages and disadvantages of each method. The participants will also be able to discuss the usefulness of CT scans in the diagnosis of central compartment metastases versus technician dependent methods such as ultrasound.

**Objectives:** This study assessed the utility of computed tomography (CT) scans in detecting central compartment lymph node (CCLN) metastases from primary papillary thyroid carcinoma. **Study Design:** Retrospective chart review. **Methods:** Pathology reports were obtained from 149 patients who had a total thyroidectomy and a CCLN dissection due to papillary thyroid carcinoma. Of these 149 patients, seventy-four individuals were excluded because they did not undergo CT scan evaluation. Twenty-nine patients who had a CT scan but no CCLN dissection were, likewise, excluded from the study. Forty-six patients remained who had both a CT scan demonstrating CCLN lymph nodes as well as a CCLN dissection. The positive predictive value (PPV) of CT detected lymph nodes to predict metastatic disease was then calculated based on pathologic assessment of the CCLN. **Results:** The overall PPV of a CT scans ability to detect CCLN metastases from a primary papillary thyroid carcinoma was 76%. 21 patients were noted to have Hashimoto's thyroiditis on pathologic assessment of thyroid gland. Of these patients, 14 had CCLN metastases as compared to 21 of 25 patients without Hashimoto's thyroiditis had CCLN metastases. The PPV of CT scan to predict CCLN metastases in patients with thyroiditis was 67% versus 84% of those without thyroiditis. Of the patients with thyroiditis, 86% were female, therefore, thyroiditis was far more likely to be identified in women. **Conclusions:** This study shows that preoperative CT scans identifying CCLN in patients with papillary thyroid carcinoma is highly correlated with CCLN metastases. The PPV value, however, is diminished in the presence of Hashimoto's thyroiditis.

### C93. Presentation, Management, and Outcomes of Iatrogenic Cervical Esophageal Injury

Joelle Glick, MD, New York, NY; Karan Dhir, MD, Beverly Hills, CA; Eric M. Genden, MD\*, New York, NY; Marita S. Teng, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the challenges facing otolaryngologists in the management of iatrogenic cervical esophageal perforations.

**Objectives:** Esophageal perforation is a potentially fatal condition that poses difficult diagnostic and therapeutic challenges. The objective of this study was to review the presentation, management, and outcomes of iatrogenic cervical esophageal perforations from a single institution. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review was performed on all patients

treated with iatrogenic perforations of the cervical esophagus from 1998 to 2013 at a single institution. There were 29 patients; mean age, 54 years; range 18-83 years old. Demographic and clinical parameters were identified and correlated with poor outcomes, such as the need for multiple surgeries. **Results:** Nine (31%) perforations occurred after anterior cervical discectomy and fusion (ACDF), eight (28%) after Zenker's diverticulectomy, three (10%) after transesophageal echocardiogram (TEE), three (10%) after esophagoscopy, two (7%) after nasogastric tube placement (NGT), two (7%) after intubation, one (3%) after esophageal dilation, and one (3%) after an excisional biopsy of a tracheoesophageal groove mass. A diagnosis of esophageal perforation was made within 24 hours of injury in nine (31%) patients. Patients were managed both surgically and nonsurgically. Seventy-five percent of patients failed initial treatment (surgical and nonsurgical), subsequently requiring additional interventions. Presentation from an outside hospital and the interval between perforation and diagnosis were independent predictors of the need for multiple surgeries. **Conclusions:** Multiple surgeries are often necessary to manage iatrogenic cervical esophageal injury. Our study suggests that early detection of the injury may limit the number of procedures performed.

**C94. Trajectory Mapping Using a Magnetic Tracker in the Flexible Snake Robot System**

Neal R. Godse, BS, Pittsburgh, PA; Stephen Tully, PhD, Pittsburgh, PA; Daniel Clayburgh, MD PhD, Pittsburgh, PA; Howie Choset, PhD, Pittsburgh, PA; Umamaheswar Duvvuri, MD PhD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain how magnetic tracking was used to define snake robot trajectory, how users were able to modify their performance over time, and discuss the implications of trajectory tracking on autonomous device delivery.

**Objectives:** Flexible robotic systems are the next frontier in surgical robots. We previously described the viability of a novel flexible robot for transoral surgery; however, autonomous delivery of a nonlinear device into a body cavity has not been accomplished. To facilitate this, we sought to determine the trajectory and path length of the robot as it was driven into the oropharynx and larynx. **Study Design:** During the first phase we used magnetic tracking to acquire position data as the robot was driven to four targets in an airway mannequin - left and right base of tongue, epiglottis, and vocal folds. During the second phase we quantified changes in path length, mediated by user learning, while driving the robot to the vocal folds. **Methods:** The robot was driven to the targets and position data was gathered over multiple trials. We then calculated path length and compared this to a manually measured path length. During the second phase, over five days, we observed two novice medical students as they drove to the vocal folds and calculated path length, driving time, and driving velocity. **Results:** Comparison of calculated path length to measured path length showed that the magnetic tracker accurately captured the trajectory of the robot. Learning data revealed that medical students increased their driving velocity by an average 79% by reducing driving time and path length. **Conclusions:** Our data suggests that users rapidly improve their performance and that snake robot trajectories can be reliably mapped with the magnetic tracker - the first step towards autonomous surgical intervention.

**C95. Novel Nuclear Targeted Gold Nanospheres as Selective Radiosensitizers for Treatment of Squamous Cell Carcinoma of the Head and Neck**

Calvin L. Gruss, MS, Nashville, TN; Ivan H. El-Sayed, MD, San Francisco, CA (Presenter); Young Wook Jun, PhD, San Francisco, CA; Daeha Seo, PhD, San Francisco, CA; Sarah T. Arron, MD PhD, San Francisco, CA; John P. Murnane, PhD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss how gold nanoparticles can be manipulated for treatment of cancer by modifying the surface with targeting agents and exerting therapeutic effect.

**Objectives:** Squamous cell carcinoma of the skin and aerodigestive tract of the head and neck can require aggressive and disfiguring treatment with extensive surgery and/or radiotherapy. Nuclear targeted conjugated gold nanospheres (CGNS) enter the cell nucleus and cause apoptosis in malignant SCCA. The objective of this study is examine the ability nuclear targeted CGNS to 1) selectively decrease SCCA survival alone; and 2) in combination with radiation therapy. **Study Design:** Cell culture model. **Methods:** 30nm gold nanospheres (GNS) were modified with a combination of 1) PEG, 2) a cytoplasm directed peptide (RGD) without; or 3) with a nuclear localizing sequence (NLS) peptide. Two squamous cell carcinoma cell lines, one oral derived (HSC 3) and one epithelial derived (SCC12) were compared to one immortalized epithelial cell line. Cells were treated with various doses of the CGNS alone or in conjunction with radiation. Cell localization of nanoparticles, cell survival, and double strand breaks were recorded. **Results:** HaCat cell viability decreased by approximately 15% when treated with 0.5nM CGNS, while the HSC-3 and SCC viability decreased by 30% and 65% respectively. In the presence of radiation (3Gy) HaCat cell viability decreased by 19.8% compared to a decrease of 41.4% for HSC-3 and 73.7% for SCC12. **Conclusions:** Nuclear targeted CGNS are selectively toxic to the SCCA cancerous cell populations tested than to noncancerous immortalized epithelial line HaCat. A combined strategy of nuclear targeted CGNS may be useful to decrease the overall dose of radiation necessary to treat squamous cell cancers of the head and neck.

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### C96. Primary Hyperparathyroid Surgery with Preoperative 4D-CT and Ultrasound Localized Single Gland Disease: Is Intraoperative Parathyroid Hormone (iPTH) Monitoring Necessary?

Thomas E. Heineman, BA, New York, NY; William I. Kuhel, MD, New York, NY; David I. Kutler, MD\*, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to analyze critically the role of intraoperative parathyroid hormone monitoring in select cases of directed parathyroidectomy for primary hyperparathyroidism. We demonstrate that preoperative localization with modified 4D-CT done in combination with sonography in patients with single gland PHPT provides sufficient sensitivity and specificity to forgo intraoperative parathyroid hormone monitoring, thereby reducing cost and operating time.

**Objectives:** In this article, we examine the utility of intraoperative parathyroid hormone monitoring over a fifteen year period in patients with primary hyperparathyroidism who had preoperatively localized single gland disease using a modified 4D computed tomography in combination with ultrasonography (Mod 4D-CT/US). **Study Design:** Retrospective medical record review at a university based academic medical center. **Methods:** Patients for this study were drawn from consecutive parathyroidectomies for hyperparathyroidism between January 1998 and June 2013 by the senior authors. All included patients had primary hyperparathyroidism and underwent a Mod 4D-CT/US study that showed a single, concordant gland. Additionally, these patients had preoperative, intraoperative, and post-operative parathyroid hormone levels drawn. Results from preoperative localization studies were compared with operative findings, pathologic data, and biochemical measurements to assess whether intraoperative parathyroid hormone levels changed surgical decision making and resulted in improved outcomes. **Results:** Out of 356 patients who underwent parathyroid surgery, 206 met inclusion criteria for this study. Eight patients (3.9%) had one gland removed with an intraoperative parathyroid level that met the Miami criteria but had persistent hyperparathyroidism. Thirteen patients (6.3%) had multigland disease, as indicated by persistently high intraoperative parathyroid hormone levels that was not seen on the preoperative localization study. The authors have performed 14 procedures without intraoperative PTH monitoring, all of which have had cures without complication. **Conclusions:** Intraoperative parathyroid hormone monitoring in selected cases does not improve clinical outcomes, increases cost and operating room time, and may in fact lead to increased surgical morbidity by triggering unnecessary searches for a nonexistent, second foci of disease.

### C97. Development of an in Vitro Model for Studying Perineural Invasion of Head and Neck Squamous Cell Carcinoma

Benjamin L. Hodnett, MD PhD, Pittsburgh, PA; Ronak Dixit, BA, Pittsburgh, PA; Mark R. Gilbert, MD, Pittsburgh, PA; Young-ho Kim, PhD, Pittsburgh, PA; Simon C. Watkins, PhD, Pittsburgh, PA; Seungwon Kim, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to develop an in vitro model for studying perineural invasion using a head and neck squamous cell carcinoma cell line.

**Objectives:** To develop an in vitro model of perineural invasion of head and neck squamous cell carcinoma (HNSCCa). **Study Design:** Qualitative in vitro model. **Methods:** Murine dorsal root ganglia (DRG) were extracted and embedded in matrigel. FaDu HNSCCa cells were co-cultured with the DRG and multiple imaging methods were utilized to visualize the neurite and cell interactions. DRG were also dissociated into a sensory neuronal culture and co-cultured with FaDu cells and similarly imaged. Time delayed images were recorded starting at 24 hours after co-culture. Two and three dimensional imaging techniques are also being utilized with GFP- and RFP-labeled FaDu cells. **Results:** DRG when embedded in matrigel developed neurites that interacted with co-cultured FaDu cells with the cells growing along the neurites towards the DRG. Dissociated cells also interacted with co-cultured FaDu cells. **Conclusions:** This study presents a model of perineural invasion which has not been previously described using an HNSCCa cell line. Both in vitro methods have demonstrated reproducible perineural invasion of FaDu cells when co-cultured with either intact murine DRG or dissociated neuronal cells isolated from DRG. Ongoing studies are further quantifying the rate of perineural invasion as well as elucidating regulators and modulators of the neuron cell interactions. The models are also being adapted to study chemotaxis in vitro.

### C98. Predictors of Nondiagnostic Cytology in Surgeon Performed Ultrasound Guided FNA of Thyroid Nodules

Andre I. Isaac, MD, Edmonton, AB Canada; Caroline C. Jeffery, MD, Edmonton, AB Canada; Jeffrey R. Harris, MD MHA FRCS, Edmonton, AB Canada; Hani A. Marzouki, MD, Edmonton, AB Canada; Hadi S. Seikaly, MD MSc FRCS, Edmonton, AB Canada; Daniel H. O'Connell, MD FRCS, Edmonton, AB Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the problems associated with nondiagnostic FNA of thyroid nodules, and the factors that may be predictive of nondiagnostic cytology.

**Objectives:** To determine the factors that are predictive of nondiagnostic cytology in surgeon performed ultrasound guided FNA of thyroid nodules, such that patients can be appropriately triaged, with early referral to other clinicians. **Study Design:** Retrospective chart review. **Methods:** Patients included all adults who underwent thyroid nodule FNA by a staff, fellow, or resident otolaryngologist at our center between January 2011 and June 2013. Cytology was interpreted by a staff cytopathologist according to the Bethesda classification system. The predictive factors analyzed were patient age, sex, BMI, thyroid gland size, thyroid function, presence of multinodular goiter, presence of Grave's disease or thyroiditis, nodule size, location, vascularity, echogenicity, calcifications, cystic component, level of performer training, and level of FNA experience. Results were analyzed using chi-squared, Fisher's exact test, or unpaired t-

test. **Results:** 190 patients were reviewed, for a total of 301 nodules. The average age was 53, with an 88% female predominance. The overall nondiagnostic rate was 23%. Nodules with a predominant cystic component and those less than 1cm were more likely to yield nondiagnostic cytology ( $p=0.04$ ,  $p=0.05$  respectively). FNA performed by a trainee with experience of less than 50 FNA were also more likely to yield nondiagnostic cytology ( $p=0.04$ ). No other factors significantly influenced the nondiagnostic rate. **Conclusions:** Cystic nodules and nodules less than 1cm are more likely to yield nondiagnostic cytology in surgeon performed thyroid FNA. Caution should be used in trainee performed FNA for which the nondiagnostic risk is high. These patients may benefit from early referral to other clinicians.

**C99. Scapular Free Flap for Total Lower Lip and Mandible Reconstruction**

Lia K. Jacobson, MS, Los Angeles, CA; Raj D. Dedhia, BS, Los Angeles, CA; Ara A. Chalian, MD FACS, Philadelphia, PA; Niels C. Kokot, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss and consider the use of a single scapular free flap for reconstruction of large composite defects of the total lower lip and mandible.

**Objectives:** To present the use of a single stage scapular osteocutaneous free flap as an alternative to double fibula and radial forearm free flaps for reconstruction of large composite defects of the total lower lip and mandible. **Study Design:** A case review was conducted on three patients from two academic medical centers who presented with stage IVA squamous cell carcinoma involving greater than 90% of the lower lip with bony invasion into mandible. All patients underwent resection and subsequent reconstruction with the described approach. **Methods:** Following composite cancer resection, a scapular osteocutaneous free flap was used for reconstruction of the mandible, inner mucosal lining, lip and cheek defects with anastomosis of the subscapular vessels to the recipient facial artery and vein. Scapular osteotomies were performed to recontour the mandible. The harvested bone was extended medially beyond the lateral border to add height when the soft tissue paddle was draped over the bone to reconstruct the lip and restore oral competence. **Results:** All flaps survived and all patients achieved oral competence by 9 months. Patient #1 developed an orocutaneous fistula following radiation therapy at five months postoperative which healed with advanced wound care. Patient #2 required a subsequent commissuroplasty for sialorrhea. Cosmesis was satisfactory in all patients. **Conclusions:** A single, osteocutaneous scapular free flap is an appropriate alternative to a double flap for reconstruction of large composite defects of total lower lip and mandible. Extending the bone harvest medially adds height to the new lip, allowing for oral competence with a single flap.

**C100. Manual Therapy May Improve Swallowing Outcomes in Post-Treatment Head and Neck Cancer Patients**

Gina D. Jefferson, MD MS, Chicago, IL; Sarah E. Bailey, MD, Jackson, MS; Myrna L. Burks, MS CCC-SLP, Jackson, MS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate a benefit of adjuvant myofascial release/manual therapy for the treatment of fibrosis related dysphagia.

**Objectives:** It is well established that either surgical treatment or radiation based treatment for head and neck cancer can impact a patient's swallowing in all phases. Either treatment modality results in some degree of fibrosis of the tongue, pterygoids and/or pharyngeal constrictor musculature resulting in swallow dysfunction. Several therapeutic strategies are reported to variably improve dysphagia. There are no reports in the literature regarding manual therapy for treatment of dysphagia. Our objective was to demonstrate improvement in post-treatment dysphagia for head and neck cancer (HNC) patients using adjunctive myofascial release therapy. Secondly, we aim to show sustainable muscle function gain with combined oropharyngeal exercises. **Study Design:** Case series. **Methods:** The electronic medical record of patients undergoing myofascial release to treat dysphagia was reviewed. The treatment algorithm included myofascial release and speech therapy directed exercises designed to sustain muscular function gains. In-office FEES, MBSS and QOL data were obtained. This information was compared from baseline at 8-12 weeks following treatment, 3 months and 1 year post-treatment. **Results:** Three patients met criteria. Quantitative and qualitative improvements in dysphagia were observed in patients undergoing adjuvant myofascial release therapy when compared to speech therapy alone. **Conclusions:** Although our patient database is small, our data suggests that myofascial therapy greatly improves fibrosis related dysphagia. Sustained functional gains are observed when this treatment strategy is coupled with oropharyngeal exercises. Manual therapy may significantly benefit this complicated patient population. Future study will directly compare manual therapy combined with oropharyngeal exercises to oropharyngeal speech therapy alone.

**C101. Three Dimensional Assessment of Tongue Volume after Free flap Reconstruction: Validation of Technique and Correlation with Function**

Caroline C. Jeffery, MD, Edmonton, AB Canada; Gabriela Constantinescu, MSc-SLP R SLP S-LP(C), Edmonton, AB Canada; Jeff R. Harris, MD, Edmonton, AB Canada; Dan A. O'Connell, MD, Edmonton, AB Canada; Hadi Seikaly, MD, Edmonton, AB Canada; David W.J. Cote, MD, Edmonton, AB Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) appreciate the challenges in tongue base reconstruction to enhance functional outcomes; 2) understand the value of three dimensional assessments of tongue base volume; and 3) appreciate the importance of tongue base bulk and pharyngeal wall contact in enhancing postoperative swallowing outcomes.

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**Objectives:** Use three dimensional volumetric analysis of postoperative CT scans to characterize tongue volume and correlate measured values with swallowing function. **Study Design:** Retrospective chart review of prospectively collected data. **Methods:** 15 patients treated with surgical resection and free flap reconstruction of the oral and base of tongue with or without postoperative irradiation between 2010 to 2012 were included in the study. Mimics (R) program was used to obtain measurements of the oral tongue and tongue base volume, tongue base to oropharyngeal volume ratio, and tongue base to posterior pharyngeal wall distance by analyzing the post-operative 6 month and 1 year CT scans. Prospectively collected functional outcomes data, including aspiration/penetration score, perceptual evaluation of intelligibility, and G-tube dependence rates were evaluated and correlated with dimensional analysis measures. **Results:** Adequate, but not excessive tongue base volume correlated with reduced aspiration/penetration score and improved speech intelligibility. Oral tongue volume did not correlate with functional outcomes. Overall G-tube dependence rate was low in this cohort (13.3%). **Conclusions:** Three dimensional analysis of tongue volume can be used to help predict postoperative swallowing outcomes.

**C102. Utility of PET-CT in Detecting Nodal Metastasis in cN0 Early Stage Oral Cavity Squamous Cell Carcinoma**  
Caroline C. Jeffery, MD, Edmonton, AB Canada; Vincent L. Biron, MD PhD, Sacramento, CA; Han Zhang, MD, Edmonton, AB Canada; Dan A. O'Connell, MD, Edmonton, AB Canada; Jeff R. Harris, MD, Edmonton, AB Canada; Hadi Seikaly, MD, Edmonton, AB Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand the challenges in managing the clinically N0 neck in early stage oral cavity SCC; 2) appreciate the various imaging modalities available for assessing the neck in early stage oral cavity; and 3) recognize the limited advantages of PET-CT over traditional CT for detecting occult nodal metastasis in early oral cavity SCC.

**Objectives:** To determine if PET-CT offers a diagnostic advantage over traditional CT neck in assessing the clinically N0 neck in patients with T1 and T2 oral cavity squamous cell carcinoma (OCSCC). **Study Design:** Retrospective review. **Methods:** We performed a review of patients in a cancer registry, a prospective database. We included all patients with cT1 or cT2N0M0 OCSCC who underwent elective unilateral or bilateral elective neck dissections. Patients were categorized into those who underwent preoperative whole body PET-CT versus those who underwent CT neck alone. Diagnostic imaging reports were reviewed for number of suspicious lymph nodes identified. Surgical pathology reports were reviewed to obtain the total number of nodes sampled and number of malignant nodes. **Results:** Between 2009 and 2011, 148 patients were diagnosed with cT1 or T2N0M0 OCSCC. Of these, 62 patients underwent elective neck dissections. Fourteen patients underwent preoperative whole body PET-CT while 48 patients underwent CT neck alone. Based on final surgical pathology, 6 nodes out of 499 nodes sampled were falsely FDG avid in the PET-CT group while 3 nodes out of 1800 were falsely identified as suspicious on CT neck alone. The overall false positive rate of PET-CT is significantly higher than CT alone (1.2% vs. 0.2%,  $p < 0.001$ ). Both modalities have excellent specificity of >98% for benign nodes in these patients. **Conclusions:** In patients with cT1 and T2 of the oral cavity and no palpable lymphadenopathy, PET-CT is no better than CT alone for ruling out nodal metastasis and may have a higher false positive rate.

**C103. The Challenges of Prospective Biomarkers: Promising Preclinical Indicators and Their Failure to Predict Response in Two Prospective Clinical Trials Using the VEGF Inhibitor Bevacizumab for Recurrent/Metastatic HNSCC**  
Jason I. Kass, MD PhD, Pittsburgh, PA; Seungwon W. Kim, MD, Pittsburgh, PA; William E. Gooding, MS, Pittsburgh, PA; Jennifer R. Grandis, MD\*, Pittsburgh, PA; Julie E. Bauman, MD MPH, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the challenges in evaluating potential biomarkers for HNSCC and the role of bevacizumab in treatment of metastatic/recurrent HNSCC.

**Objectives:** To evaluate candidate anti-angiogenesis biomarkers as predictors of response to bevacizumab, a monoclonal antibody against vascular endothelial growth factor (VEGF), in recurrent/metastatic HNSCC. **Study Design:** Microvascular density and VEGF expression correlate with shortened disease free survival in HNSCC. We evaluated a predetermined panel of biomarkers for associations with bevacizumab response, in two single arm phase II trials investigating bevacizumab combinations in recurrent/metastatic HNSCC: pemetrexed/bevacizumab (trial 1;  $n=40$ ) or cetuximab/bevacizumab (trial 2;  $n=46$ ). **Methods:** Archival tumor was evaluated by immunohistochemistry for: CD 31 (priority analyte), VEGFR, pVEGFR, Stat3, pStat3, pHER2, EGFR, pEGFR and Ki67. Semi-quantitative H scores were analyzed against best response and significance calculated using an asymptotic 2 tailed Jonckheere-Terpstra test for trend. Multiple testing was corrected by the method of Benjamini and Hochberg. **Results:** Sufficient, quality archival tissue was available for approximately 50% of patients. No candidate biomarker demonstrated a statistically significant association with treatment response. CD 31, an endothelial cell antigen indicating degree of tumor angiogenesis, showed no association with response in trial 1 ( $p=0.0819$ ) or 2 ( $p=0.8303$ ). pStat3 exhibited a positive association with response in trial 2 ( $p=0.038$ ) that was neither significant when corrected for multiple testing ( $p=0.342$ ) nor significant in trial 1 - thus represents false discovery. **Conclusions:** In two clinical trials evaluating the efficacy of bevacizumab in HNSCC, neither CD31 nor a panel of other biomarkers predicted response. Before discarding promising preclinical data, we must consider the inherent limitations including specimen availability, preanalytic tissue processing, and small sample size. Small, correlative biomarker analyses highlight the risk of both type I and type II error.

**C104. Eosinophilic Cellulitis Presenting as Head and Neck Cutaneous Malignancy**

Tristan B. Klosterman, MD, Syracuse, NY; Adam M. Bied, MD, Syracuse, NY; Ramsey S. Farah, MD, Syracuse, NY; Amar C. Suryadevara, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the manifestations of eosinophilic cellulitis in otolaryngology.

**Objectives:** To present a case of eosinophilic cellulitis imitating head and neck cutaneous malignancy. **Study Design:** Case report and literature review. **Methods:** A retrospective review of a unique clinical case was conducted at our institution with review of the literature. IRB exemption was obtained. **Results:** Eosinophilic cellulitis (Wells' syndrome) is an uncommon entity that has not been described in otolaryngology literature. Occurring most frequently on the extremities it is often diagnosed in cases of bacterial cellulitis nonresponsive to antibiotics. Due to its rarity and initial similarity to other more common lesions, diagnosis may be delayed resulting in increased morbidity and hospitalization. We present an elderly gentleman who presented with a three month history of presumed head and neck cellulitis refractory to intravenous, oral and topical antibiotics. The patient had been evaluated during multiple outside hospital stays by dermatology and internal medicine consultants with minimal resolution of symptoms. Superficial biopsies revealed cellulitis with necrosis. Subsequent development of subdermal plaques in the neck concerning for cutaneous malignancy with lymph node metastasis prompted otolaryngology consultation at our institution. Deep skin biopsies and fine needle aspiration were performed and revealed eosinophilic cellulitis. The patient was started on topical and oral corticosteroids with immediate improvement of symptoms. **Conclusions:** Eosinophilic cellulitis is a rare disease that should be considered in cases of cellulitis refractory to antibiotics and may present resembling head and neck cutaneous malignancy.

**C105. Do Stage Migration Effects from Pre-Treatment PETCT Alter Stage Specific Survival in Head and Neck Squamous Cell Carcinoma?**

Phillip H. Lee, BA, Minneapolis, MN; Noah P. Parker, MD, Boston, MA; Zuzan Cayci, MD, Minneapolis, MN; Bevan Yueh, MD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the effects of PET-CT imaging on pre-treatment staging and stage specific survival of patients with HNSCC.

**Objectives:** To determine the effects of positron emission tomography computed tomography (PET-CT) imaging on pre-treatment staging and stage specific survival when compared to staging based on CT imaging alone in head and neck squamous cell carcinoma (HNSCC). **Study Design:** Retrospective cohort study. **Methods:** After institutional approval, subjects were identified by International Statistical Classification of Diseases 9 codes. Inclusion criteria were: 1) pathologic diagnosis of HNCSS of the oral cavity, oropharynx, hypopharynx, larynx, or unknown primary; 2) staging CT and PET-CT; and 3) at least 3 year followup from initiation of treatment. American Joint Committee on Cancer criteria (7th edition) were used for TNM and overall staging based on CT and PET-CT. Three year survival data were acquired using the Social Security Death Index. Stage specific survival based on CT and PET-CT staging was compared using Fisher's exact test. **Results:** Ninety-eight patients were identified. Subsites included: oral cavity (n=12, 12.4%), oropharynx (n=57, 58.8%), supraglottis (n=18, 18.6%), glottis (n=4, 4.1%), hypopharynx (n=5, 5.2%) and unknown (n=1, 1.0%). Compared to staging with CT alone, PET-CT imaging resulted in TNM restaging in 27/98 (27.6%) patients (19 upstaged; 8 downstaged). PET-CT imaging resulted in overall restaging in 14/98 (14.3%) patients (13 upstaged; 1 downstaged). Among overall upstaged patients, 8/13 (61.5%) were due to the discovery of distant metastases, while the remaining 5/13 (38.5%) were attributed to identification of additional regional disease. Changes in stage specific survival were not statistically significant. **Conclusions:** In patients with HNSCC, PET-CT imaging altered TNM staging and overall staging compared to CT alone, but not stage specific survival.

**C106. Changing Trends in Parathyroid Surgery: Analysis of California Ambulatory Surgery and Hospital Discharge Data 2005-2011**

Hossein Mahboubi, MD MPH, Irvine, CA; David Shamouelian, MD, Irvine, CA; William B. Armstrong, MD\*, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the prevalence and trends of parathyroid surgeries in recent years, prevalence and most common complications associated with these surgeries, most common diagnoses in these surgeries, and outcomes of surgeries.

**Objectives:** We sought to examine the trends in surgical volume, demographics, and outcomes of parathyroidectomies in the inpatient and outpatient settings. **Study Design:** Analysis of comprehensive datasets of inpatient and outpatient surgical procedures in the state of California. **Methods:** All parathyroid surgeries performed in California from 2005 to 2011 were examined. Cases were identified through ICD-9-CM and CPT codes for parathyroidectomy. Postoperative complications were also identified through review of relevant ICD-9-CM codes. **Results:** 13,096 inpatient and 8,788 outpatient parathyroidectomies were performed between 2005 and 2011 in California. The annual case volume increased by 46% ( $p < 0.001$ ) and the population adjusted surgery rate (per 100,000 residents) increased by 38% ( $p = 0.001$ ). Outpatient surgical volume rose 288% from 557 to 2,162 ( $p < 0.001$ ) and inpatient surgical volume decreased 20% from 2,047 to 1,643 cases ( $p = 0.01$ ) during the study period. The percentage of patients with chronic kidney disease increased and the trend showed tenfold increase in the outpatient and twofold increase in the inpatient setting. PTH monitoring increased from 8.1%

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to 18% ( $p=0.01$ ). Complications were recorded in 8% of inpatient and 1.1% of outpatient surgeries and remained stable. The most common complication was hypoparathyroidism/hypocalcemia (3.6% inpatient and 0.5% outpatient). Mortality was very uncommon (0.2% inpatient and 0% outpatient). **Conclusions:** We performed the first study in recent literature looking at trends in parathyroid surgery over time. The volume of parathyroidectomies increased between 2005 and 2011. There was a nearly fourfold increase in outpatient volume and modest decrease in inpatient surgical volume. The percentage of patients with chronic kidney disease increased significantly in both settings.

### C107. Tumors of the Lacrimal Apparatus: A 14 Year Review

Jon M. Mallen-St. Clair, MD PhD, Los Angeles, CA; Armin A. Arshi, BS, Los Angeles, CA; Fernando P. Palma Diaz, MD, Los Angeles, CA; Elliot A. Abemayor, MD PhD\*, Los Angeles, CA; Maie S. St. John, MD PhD\*, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the clinical presentation of carcinoma of the lacrimal apparatus, to describe the different types of cancer found within the lacrimal apparatus, and discuss treatment options for these rare tumors as related to patient survival.

**Objectives:** To evaluate the subtypes of tumors of the lacrimal apparatus, and to evaluate treatment modalities and outcomes as related to patient survival over a 14 year period at a single institution. Given the rarity of these tumors there are few series available for review. We compared our results to the published literature. **Study Design:** Retrospective case review. **Methods:** Review of records and pathology of 42 patients with tumors of the lacrimal apparatus at a medical center from 1998-2012. **Results:** The histopathology of 42 patients with tumors of the lacrimal apparatus was analyzed. 21 (50%) of these tumors represented mucosal associated lymphoma tumors or lymphoma. Of the 21 epithelial tumors, 7 (33%) were represented by squamous cell carcinoma (SCC), 7 (33%) were represented by adenoid cystic carcinoma (ACC), 3 (14%) by adenocarcinoma, and 2 (10%) each were represented by mucoepidermoid carcinoma and mixed tumors. For patients with ACC, followup varied between 12 - 121 months (median, 54 months). Overall survival at 3 and 5 years was 80% and 60% respectively. For patients with SCC, followup varied between 9 - 79 months (median, 45 months). Overall survival at 3 and 5 years was 83% and 33% respectively. **Conclusions:** In our series, the predominant epithelial carcinomas of the lacrimal apparatus are ACC and SCC. All patients with ACC and SCC underwent surgical resection. ACC was associated with an overall relatively high survival; in contrast to SCC, postoperative radiation was not associated with improved overall survival in patients with ACC.

### C108. Retrospective Analysis of Oropharyngeal Squamous Cell Carcinoma with p16 Immunohistochemistry

Jonathan R. Mark, MD, Norfolk, VA; Mohammad Ali, MS, Norfolk, VA; Tina D. Cunningham, PhD, Norfolk, VA; Marc L. Silverberg, MD, Norfolk, VA; Matthew J. Bak, MD, Norfolk, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the demographics and features of human papillomavirus (HPV) associated oropharyngeal squamous cell carcinoma (OPSCC) as a distinct clinical entity from non-HPV associated OPSCC.

**Objectives:** Analyze the OPSCC experience of a single tertiary referral center and comparing overall survival, demographic data, and qualitative functional status measures in HPV associated OPSCC to non-HPV associated OPSCC. **Study Design:** Retrospective chart review. **Methods:** We evaluated 34 consecutive cases of OPSCC during 2009-2010 from our tertiary referral center. Archived tissue was reanalyzed with p16 immunohistochemistry and chart review was performed. Patients with <10 pack year history of smoking and p16 positive OPSCC (group A) were grouped and compared to the remainder of the cohort (group B). Fisher exact test was used for statistical analysis of overall survival, demographic information, and functional measures. **Results:** Our data cohort consisted of 85% stage IV disease. There was a statistically higher 3 year overall survival in group A compared to group B. Functional status post-treatment was not found to be significantly different between groups. 35% of patients remained gastrostomy dependent, 15% of patients remained tracheostomy dependent. Demographic characteristics correlated with p16+ status included Caucasian race, younger age at presentation, and male gender. **Conclusions:** Group A patients have an improved overall survival and are clinically distinct from group B patients. National demographic trends and outcomes observed in HPV associated OPSCC are corroborated at our institution in the setting of advance stage disease.

### C109. Challenges of Changing to Ultrasound versus CT or MRI for Evaluation of Salivary Gland Disorders

Bruce H. Matt, MD MS\*, Indianapolis, IN; Sanjeev M. Balamohan, MD, Gainesville, FL; Ahmed S. Sufyan, MD, Latham, NY; Gunther Pabst, MD, Luzern, Switzerland; Mimi S. Kokoska, MD MHCM, Indianapolis, IN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) learn a new paradigm using office based ultrasound for evaluating and managing salivary gland diseases, including sialolithiasis and neoplasms, and its integration with sialoendoscopy; 2) learn how ultrasound for these clinical indications reduces costs, inconvenience, time to diagnosis, exposure to ionizing radiation, intravenous contrast and laboratory tests.

**Objectives:** Demonstrate the utility of ultrasound in the evaluation and management of salivary gland disorders. **Study Design:** Cost effectiveness analysis and decision analysis; diagnostic accuracy; retrospective review; years study conducted: 2002-2012.

**Methods:** Adults with sialolithiasis and salivary gland neoplasms were evaluated in a university academic or veterans administration hospital with CT, MRI and/or ultrasound. Outcome measurements: type of treatment; resolution of abnormality. Independent variables: age of patient; type of pathology. **Results:** CT scan and occasionally multiple CT scans or MRI were the most frequent primary diagnostic study used to confirm, evaluate or follow salivary gland disorders including sialolithiasis and neoplasms. Ultrasound identified and differentiated salivary gland disorders including sialolithiasis, non-neoplastic conditions and benign or malignant neoplasms. Over the last three years, our paradigm has shifted to increased use of ultrasound in lieu of CT or MRI for evaluating salivary gland disease. There are surmountable barriers to the use of ultrasound in the evaluation of salivary gland disease. **Conclusions:** Office based ultrasound should be the diagnostic study of choice for evaluation of suspected salivary gland disorders including sialolithiasis and neoplasms. Ultrasound reduces costs, risks, inconvenience to the patient, time to diagnosis, exposure to radiation and improves system efficiency.

**C110. Accuracy of Computed Tomography in the Prediction of Extracapsular Spread in p16 Positive Squamous Cell Carcinoma of the Head and Neck**

Jessica H. Maxwell, MD MPH, Pittsburgh, PA; Tanya J. Rath, MD, Pittsburgh, PA; William G. Albergotti, MD, Pittsburgh, PA; Jonas T. Johnson, MD\*, Pittsburgh, PA; Barton F. Branstetter IV, MD, Pittsburgh, PA; Robert L. Ferris, MD PhD\*, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the benefits and limitations of computed tomography in predicting extracapsular spread and “matted nodes” among patients with p16 positive head and neck cancer.

**Objectives:** To determine the accuracy of computed tomography (CT) in the diagnosis of extracapsular spread (ECS) in cervical lymph node metastases from p16 positive head and neck squamous cell carcinoma (HNSCC). **Study Design:** Retrospective observational study. **Methods:** Sixty-five patients with p16 positive HNSCC diagnosed between 2004 and 2013 who underwent primary surgical treatment with cervical lymph node metastases measuring at least one centimeter in diameter on pathological assessment were included. Subjects were independently assigned a score for the presence of ECS (five point scale) and matted nodes (binary scale) by two board certified neuroradiologists based on pre-treatment CT scans. Receiver operating characteristic (ROC) curves were generated and sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) was calculated for each observer. **Results:** The majority of patients (58%) had ECS on histological analysis. The area under the ROC curve for observer 1 and observer 2 was 0.647 (95% confidence interval [CI]:0.524-0.770) and 0.694 (95% CI:0.572-0.816), respectively. For observer 1, PPV and NPV for ECS detection was 72% (95% CI:53%-87%) and 53% (95% CI:36%-70%), respectively. For observer 2, PPV and NPV for ECS detection was 82% (95% CI:60 %-95%) and 53% (95% CI:38%-69%), respectively. Inter-observer agreement was fair (weighted kappa value = 0.372 [95% CI:0.221-0.524]). The PPV of matted nodes for predicting ECS was 80% (95% CI:52%-96%) and 100% (95% CI:54%-100%) for observers 1 and 2, respectively. **Conclusions:** CT is not an accurate method for determining the presence of ECS and inter-observer agreement in the radiographic reporting of ECS is only fair in p16 positive HNSCC patients.

**C111. Human Papillomavirus Vaccine and Oropharyngeal Cancer Prevention: The Potential Clinical and Economic Impact on the US Population**

Vikas Mehta, MD, Shreveport, LA; Elizabeth A. Sugar, PhD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the annual clinical and economic impact of disease for HPV positive OPSCCA based on current vaccination trends.

**Objectives:** The incidence of HPV related oropharyngeal squamous cell carcinoma (OPSCCA) is increasing at an epidemic rate. Despite this, current vaccination rates for US adolescents remain low, especially in males who are disproportionately affected by HPV positive OPSCCA. We performed an investigation outlining the current, annual impact of HPV positive OPSCCA, the associated healthcare costs, and the potential clinical and economic benefit of vaccination on the US population. **Study Design:** Cross-sectional analysis. **Methods:** The annual disease burden for OPSCCA was estimated in healthy life years lost (HeaLYs). Further investigations stratified by HPV status, gender, and race were performed using available incidence data. The annual cost of treatment for OPSCCA, the theoretical cost for vaccination of all US 12 year olds, and the cost per HeaLY saved for OPSCCA were also determined. **Results:** HPV positive OPSCCA accounts for 10.84 HeaLYs lost per 100,000 people annually in the US. HeaLYs lost for US adult males were approximately 4 times the amount for women (16.35 vs 4.34). Caucasians were disproportionately affected with 8.6 vs 2.8 HeaLYs lost for African Americans. Based on current vaccination rates for females and males, only 13.4% of the possible HeaLYs are being saved annually. The cost of vaccinating all current US 12 year olds would be approximately \$32,033 per HeaLY (cost of vaccination-cost of treatment) gained due to prevention of OPSCCA. **Conclusions:** These data estimate the current burden of HPV positive OPSCCA on the US population and the potential clinical and economic benefits of vaccination. The results could help to direct and concentrate future vaccination efforts to higher risk populations.

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### C112. Outcomes in Recurrent Head and Neck Cancer after Salvage Surgery with and without Flap Reconstruction with Postoperative Reirradiation

Annika M. Meyer, BS, New York, NY; Allen S. Ho, MD, New York, NY; Nadeem Riaz, MD, New York, NY; Rahmatullah W. Rahmati, MD, New York, NY; Colleen M. McCarthy, MD, New York, NY; Nancy Y. Lee, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to assess the effects of reirradiation in head and neck cancer patients who have undergone salvage surgery.

**Objectives:** Recurrent head and neck malignancies create a therapeutic challenge due to limited treatment options. Salvage surgery with adjuvant radiotherapy (RT) may offer locoregional control. Tissue transfer may offer defect coverage as well as decrease RT toxicity. We evaluated outcomes of patients treated with salvage surgery and adjuvant reirradiation (re-RT). **Study Design:** Retrospective outcomes analysis of patients treated with salvage surgery with and without flap reconstruction and re-RT at a single academic cancer center from 1996-2011. **Methods:** Retrospective outcomes analysis of patients treated with salvage surgery (+/- flap reconstruction), and re-RT at a single academic cancer center from 1996-2011. Tumor histology, flap type, mode of reirradiation, acute and delayed toxicities, flap complications, and survival outcomes were calculated using Kaplan-Meier methodology. **Results:** Of 118 salvage surgery patients, 50 required flap reconstruction (37 free, 13 pedicled). Median primary RT dose was 6,440 cGy and median re-RT dose was 6,000 cGy. There was no significant difference in the incidence of acute mild (52% of non-flap vs 38% of flap,  $p=0.12$ ) or severe (18% vs 28%,  $p=0.25$ ) toxicity after re-RT. Non-flap patients were significantly more likely to experience mild late toxicities (24% vs 10%,  $p=0.02$ ). Severe late toxicity was not significantly different (16% vs 16%,  $p=0.98$ ). There were no cases of flap breakdown or failure. Median time to last recorded followup was 16.6 months. 3 year overall survival was not significantly different between groups (39.5% vs 39%,  $p=0.72$ ). **Conclusions:** Salvage surgery and postoperative re-RT affords the prospect of locoregional control with a reasonable toxicity profile for select patients without affecting flap viability. Unradiated, vascularized tissue in a previously radiated field may reduce mild late toxicity of a second therapeutic dose of radiotherapy.

### C113. Tumor Evolution and Intratumor Heterogeneity of an Oropharyngeal Squamous Cell Carcinoma Revealed by Whole Genome and Whole Transcriptome Sequencing

Ryan M. Mitchell, MD PhD, Seattle, WA; Xinyi C. Zhang, PhD, Seattle, WA; Chang Xu, PhD, Seattle, WA; Wenhong Fan, PhD, Seattle, WA; Lue Ping Zhao, PhD, Seattle, WA; Eduardo Mendez, MD MS, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the concept of intratumor heterogeneity at the genome and transcriptome levels in head and neck squamous cell carcinoma.

**Objectives:** Head and neck squamous cell carcinoma is characterized by significant genomic instability which could lead to clonal diversity. Intratumor clonal heterogeneity likely facilitates tumor progression and treatment resistance. This study was designed to identify intratumor heterogeneity at the genome and transcriptome level. **Study Design:** Basic science study. **Methods:** Whole genome sequencing (WGS) and whole transcriptome sequencing (RNA-Seq) were performed on three separate regions of an HPV positive oropharyngeal squamous cell carcinoma and two separate regions from one corresponding cervical lymph node metastasis. **Results:** WGS demonstrated that only 41% of somatic point mutations (SPMs) were shared by all samples. The large degree of heterogeneity in the distribution of SPMs allowed phylogenetic reconstruction of the tumor's evolutionary pathway which revealed the late development of metastatic cells. RNA-Seq resulted in an average of over 18.5 million mapped reads per sample. This confirmed the expression of 28 of 78 exonic SPMs predicted from WGS and confirmed heterogeneous expression of non-synonymous mutant alleles which varied by tumor region. Each tumor region had between one and 18 genes which were uniquely up- or down-regulated at least five-fold compared to all other tumor samples. Transcripts with altered expression in lymph node metastases were associated with pathways involved in epithelial cell growth, differentiation and metastasis. **Conclusions:** The degree of intratumor heterogeneity showed that a single biopsy will not identify the complete genome or transcriptome in HNSCC tumors, but sampling multiple tumor regions and next generation sequencing technology may be utilized to potentially reveal the tumor evolutionary process and enable the development of improved targeted therapies.

### C114. Sialendoscopy after Prior Surgical Intervention for Sialolithiasis

Mara C. Modest, MD, Rochester, MN; Lauren Galinat, BS, Philadelphia, PA; Mindy R. Rabinowitz, MD, Philadelphia, PA; Joseph M. Curry, MD, Philadelphia, PA; David Rosen, MD, Philadelphia, PA; David M. Cognetti, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain how interventional sialendoscopy can be used in patients with a history of transoral intervention or sialadenectomy.

**Objectives:** To evaluate the use of interventional sialendoscopy in patients who have previously been treated with surgical intervention for sialolithiasis. **Study Design:** Retrospective chart review. **Methods:** Retrospective chart review of all patients presenting to a tertiary care hospital for sialolithiasis with a history of transoral intervention or sialadenectomy between June 2008 and December 2012. **Results:** Seventeen patients who had undergone prior transoral intervention, and four patients who had undergone prior sialadenectomy, presented to our clinic with recurrent sialadenitis due to sialolithiasis and subsequently underwent sialendoscopy. The mean age was 53 years (range 33 to 77), and included 9 males and 12 females. The majority of patients presented with submandibular complaints

(17/21). Sialodochoplasty was the most common prior transoral intervention (8). Other interventions included gland excision (4), transoral cutdown to the stone (7), in-office dilation (1), and the use of the combined approach (1). The time between initial transoral manipulation or gland excision and subsequent sialendoscopy ranged from one month to 30 years (median 2.5 years). Successful cannulation of the duct occurred in 86% of cases (18/21). Stone removal was successful in 93.3%, with 50% using the combined approach for removal. **Conclusions:** Sialendoscopy is an effective tool for the management of recurrent sialolithiasis in patients with a history of prior transoral intervention or sialadenectomy.

**C115. Anti-Tumor Activity of PI3K/mTOR Inhibitor PF-5212384 in Head and Neck Cancer Models**

Suresh Mohan, BS, Bethesda, MD; Robert J. Vander Broek, BS, Bethesda, MD; Jamie F. Coupar, BS, Bethesda, MD; Danielle F. Eytan, BS, Bethesda, MD; Zhong Chen, MD PhD, Bethesda, MD; Carter Van Waes, MD PhD, Bethesda, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the efficacy of the novel phosphoinositide 3-kinase (PI3K) and mammalian target of rapamycin (mTOR) molecular antagonist PF-5212384 (PF-384) as a potential candidate for clinical trials in head and neck squamous cell carcinoma (HNSCC) based on its effects in vitro and in vivo.

**Objectives:** To determine in vitro and in vivo activity of PI3K/mTOR inhibitor PF-384 in head and neck squamous cell carcinomas (HNSCC) exhibiting activation of PI3K/mTOR pathways. **Study Design:** PF-384 IC50 and effects on PI3K/mTOR signaling were conducted in a panel of 12 HNSCC lines in vitro. Efficacy of PF-384 or docetaxel alone, and in combination were investigated in two HNSCC SCID mouse xenograft models. **Methods:** In vitro, the IC50 was determined by XTT cell proliferation assay, and the effects on cell cycle, death and molecular signaling were measured by cytofluorometry, Western blot, and RNA interference assays. In vivo, the drugs were delivered through intravenous or intraperitoneal injection, and tumor growth, survival benefit, and the biomarkers were monitored. **Results:** The PF-384 IC50 was 0.75nM-133nM for 12 HNSCC lines in vitro. The drug increased the number of cells in sub-G0 and G0/G1 phase, while decreasing the total in S and G2/M phases, indications of cell cycle arrest and death. The drug potently inhibited direct targets of PI3K and mTOR, and partially inhibited MEK-ERK and NF-κB pathways. Combination of PF-384 with docetaxel revealed synergism in vitro. PF-384 alone or in combination with docetaxel slowed tumor growth and prolonged host survival in vivo. **Conclusions:** PF384 strongly inhibits HNSCC cell growth and PI3K/mTOR targets in vitro, and shows antitumor activity as a single agent and in synergy with docetaxel in vivo. This drug may be useful in the ~60% of HNSCC patients with genetic alterations in the growth factor receptor-PI3K pathway.

**C116. Disparities in Survival Outcomes for Oropharyngeal Carcinoma at an Equal Access Health System**

David A. Reiersen, MD, Shreveport, LA; Tara N. Moore-Medlin, BA, Shreveport, LA; Fleurette W. Abreo, PhD, Shreveport, LA; Jason D. Pou, BA, Shreveport, LA; Cherie-Ann O. Nathan, MD\*, Shreveport, LA; Vikas Mehta, MD, Shreveport, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role HPV and improved access of care has on disparities in survival outcomes for oropharyngeal cancer.

**Objectives:** Several studies have demonstrated that African Americans and the uninsured have worse head and neck cancer survival outcomes. Access to care has been proposed as an explanation for these results. Our institution is unique in that there is universal access regardless of insurance status due to state funding. Our objective was to evaluate disparities in outcomes of oropharyngeal cancer and determine independent variables impacting survival in an equal access system. **Study Design:** Retrospective review of 171 patients treated for oropharyngeal cancer from 1996-2011. **Methods:** Outcomes were measured in 5 year OS and DFS. Variables analyzed included age, race, gender, stage, recurrence, T-stage, N-stage, treatment received and insurance status. Survival was calculated with Kaplan-Meier and log rank methods. Chi-square, Fisher, and Cox Proportional Hazard models were used to determine independent factors affecting survival. **Results:** The HPV positive patients experienced significantly improved 5 year OS and DFS when compared to their HPV negative counterparts (67.3% and 72.8% vs 36.1% and 40%, respectively). African American patients had significantly lower HPV positive rate (19.5% vs. 73.1%, p<0.01), which coincided with worse survival outcomes (OS 32.9% vs. 62.1%, p<0.01) and recurrence rates (53.8 vs 24.5%, p<0.01). However, when controlled for HPV status, race was not an independent factor affecting survival. Lack of insurance was not significantly associated with HPV status and not a significant factor for either death or recurrence. **Conclusions:** This single institution's experience with oropharyngeal cancer suggests that the known racial disparity in outcomes may be due to variability in HPV positivity. Demonstrated survival disparities may be overcome by universal access to care.

**C117. An In Depth Look at Swallowing Function after Chemo/XRT vs. Chemo/XRT/Salvage Surgery in Oropharyngeal Cancer Patients**

Philip K. Robb Jr., MD, Little Rock, AR; Sinehan B. Bayrak, BA, Little Rock, AR; Mauricio A. Moreno, MD, Little Rock, AR; Amanda G. Davis, MS CCC-SLP, Little Rock, AR; Ozlem E. Tulunay-Ugur, MD, Little Rock, AR; Emre A. Vural, MD, Little Rock, AR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better understand the swallowing effects by the different treatment modalities of oropharyngeal cancer patients. This will directly affect patient counseling and discussions regarding treatment modalities as swallowing are such a large component of quality of life.

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**Objectives:** To evaluate dysphagia/PO intake in oropharyngeal cancer patients with chemo/XRT treatment vs. chemo/XRT/salvage surgery. **Study Design:** Retrospective chart review. **Methods:** Patient charts were reviewed at presentation, examination, workup, medical history, operative notes, and swallow studies. Gastrostomy tube (GT) dependence and duration was recorded. Swallow studies before and after treatment modalities were used to evaluate swallowing function. **Results:** 27 patients were included in the study. Average age at diagnosis was 55.8 years (range 34-69 years). Thirteen patients were treated with chemo/XRT alone and 14 were treated with chemo/XRT followed by salvage surgery. The rate of long term change in swallowing function in the two treatment groups was not statistically significant ( $p=0.77$ ). The median date of surgery was February 2012. 11/14 (79%) of the salvage surgery group and 11/13 (85%) of the nonsurgical group had a GT at some point (no difference  $p=1.0$ ). The average period of requiring GT feeds between the two groups was near significant ( $p=0.19$ ). 6/13 (46%) nonsurgical patients still have their GT in place while 8/14 (57%) of the chemo/XRT/salvage surgery patients still require GT feeds ( $p=0.63$ ). **Conclusions:** Oropharyngeal cancer has devastating effects to swallowing function. 22/27 (81%) patients in our study required GT during treatment. Long term swallowing function was not statistically different between the salvage surgery patient population and the chemo/XRT alone. End point changes in swallowing function, GT requirements, or duration of gastrostomy dependence were all not significant. 11% more of the salvage surgery patients still have their GT in place.

### C118. Implementation and Measurement of a Perioperative Nutritional Intervention in a High Risk Head and Neck Cancer Population

Nicholas R. Rowan, MD, Pittsburgh, PA; Brenda K. Smith, MSN RN, Pittsburgh, PA; Christina E. Fratangelo, CRNP, Pittsburgh, PA; Patricia A. Kemerer, Pittsburgh, PA; Jonas T. Johnson, MD\*, Pittsburgh, PA; Robert L. Ferris, MD PhD\*, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the value of perioperative immunonutrition in acute postoperative clinical outcomes in the head and neck surgery patient population.

**Objectives:** To investigate the impact of preoperative immunonutrition on acute postoperative clinical outcomes and the feasibility of measurement of perioperative nutritional markers in high risk head and neck cancer surgical patients. **Study Design:** Retrospective chart review. **Methods:** High risk head and neck cancer surgical patients were enrolled in a 5 day preoperative course of an arginine based nutritional supplement. Outcome measures included postoperative complications (e.g. wound infection, pharyngocutaneous fistula formation and free flap failure), length of hospitalization, and measurement of laboratory markers of nutritional status. **Results:** In a nonrandomized comparison cohort of 145 high risk head and neck cancer surgical patients 47% of the identified patients used the nutritional supplement, 51% did not. Postoperative complications ranging from wound infection to mortality were observed in 28% of those that consumed the supplement compared to 42% in those that did not ( $p=0.08$ ). Average length of hospitalization was reduced by 2.55 days in those that took the supplement ( $p=0.13$ ). Higher preoperative prealbumin and lower C-reactive protein levels were measured in those that received the supplement ( $p=0.02$  and  $0.019$  respectively) while operative day levels of the same measurements failed to reveal a statistically significant difference ( $p=0.72$  and  $0.43$ ). **Conclusions:** Compliance with a preoperative nutritional intervention was approximately 50%, but marked differences in clinical outcomes could be observed. The delivery of nutritional intervention is feasible in a high risk population and has the potential improve patient's postoperative course and result in significant healthcare cost savings. Rigorous evaluation of nutritional measures and emerging immune markers may help to account for the differences in outcomes.

### C119. Afatinib, a Dual EGFR/Her2 TKI, Inhibits the Proliferation of EGFR-Positive and EGFR-Negative Head and Neck Squamous Cell Carcinoma Cells

Luis E. IV Santaliz-Ruiz, MD, Columbus, OH; Theodoros N. Teknos, MD, Columbus, OH; Quintin Pan, PhD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate that afatinib inhibits proliferation of EGFR-positive and EGFR-negative head and neck squamous cell carcinoma cells.

**Objectives:** Afatinib, a dual EGFR/Her2 TKI, is currently being investigated in several clinical trials for head and neck squamous cell carcinoma (HNSCC). It is believed that EGFR/Her2 levels may be predictive of response to afatinib since afatinib preferentially inhibits EGFR/Her2 kinase activity. However, there is limited experimental evidence to support this supposition. In this study, we determined the efficacy of afatinib in EGFR/Her2-positive and EGFR/Her2-negative HNSCC cells. **Study Design:** N/A. **Methods:** The effect of afatinib on cell proliferation and clonogenic survival was assessed in EGFR/Her2-positive CAL27 and EGFR/Her2-negative UMSCC74A HNSCC cells. In addition, clonogenic survival was performed in EGFR/Her2-positive CAL27 using a sequential treatment protocol of afatinib → RT or RT → afatinib. **Results:** Single agent afatinib inhibited the proliferation and clonogenic survival of EGFR/Her2-positive CAL27 and EGFR/Her2-negative UMSCC74A HNSCC cells. Afatinib suppressed the proliferation (24 hours) of CAL27 cells with an  $IC_{50}$  of  $3.2 \mu M$  and UMSCC74A cells with an  $IC_{50}$  of  $10.3 \mu M$ . Interestingly, using the long term clonogenic survival assay (8 days), the efficacy of afatinib was similar in CAL27 and UMSCC74A cells;  $IC_{50}$  of  $1.9 \mu M$  and  $3.3 \mu M$ , respectively. In CAL27 cells, sequential treatment of afatinib and RT was more active ( $p=0.01$ ) than afatinib or RT monotherapy. Moreover, afatinib → RT was more potent than RT → afatinib resulting in a further 38.7% reduction in clonogenic survival ( $p<0.01$ ). **Conclusions:** Afatinib is an active anti-cancer therapeutic in HNSCC regardless of EGFR/Her2 levels. In addition, pre-treatment with afatinib sensitizes EGFR/Her2-positive HNSCC

cells to RT. The clinical implication of our result is that afatinib may have therapeutic efficacy in EGFR/Her2-negative HNSCC patients.

**C120. Salivary Endoscopy: Getting Started, How Long Does it Take?**

David T. Kent, MD, Pittsburgh, PA; Rohan R. Walvekar, MD, New Orleans, LA; Barry M. Schaitkin, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to approach the dilation portion of salivary endoscopy better informed and with an algorithm for moving forward when the procedure is not progressing.

**Objectives:** 1) To define the time required to dilate the papilla for insertion of the salivary endoscope; 2) to suggest an algorithm for approaching difficult papilla. **Study Design:** Consecutive patients had prospective time data gathered regarding dilation of the papilla to prepare for salivary endoscopy. **Methods:** 100 consecutive patients from 2 institutions with experienced salivary endoscopists had time studies done to time the process of dilation of the papilla. Data was analyzed by gland, side, age of patient, and pathology. **Results:** 90% of patients can have the papilla navigated with the scope ready to begin the procedure in less than 6 minutes. All patients were able to be operated upon. Patients who failed all standard dilation techniques were accessed by a cut down on the papilla and this group had the longest surgical times. **Conclusions:** Dilation of the papilla is the starting point of salivary endoscopy and often creates the biggest challenge for the novice. With practice the duct can be accessed in every case in relatively short order. We review our surgical dilation times highlighting a hierarchy of interventions when standard dilation fails.

**C121. Microvascular Arterial Anastomosis Simulation Using a Chicken Thigh Model: Interval vs. Massed Training**

Stephen S. Schoeff, BS, Charlottesville, VA; Derek J. Robinson, MD, Charlottesville, VA; Mark J. Jameson, MD PhD, Charlottesville, VA; David C. Shonka, MD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the impact of interval vs. massed training regimens on technical improvement and resident confidence and explain the value of simulated training in supplementing resident education.

**Objectives:** Compare the effectiveness of interval vs. massed training for teaching residents microvascular anastomosis techniques using a chicken thigh artery model. **Study Design:** Randomized prospective study using a surgical training model. **Methods:** Residents were randomly assigned to one of two groups. Group A underwent 3 distinct 30 minute practice sessions, separated by at least 1 week. Group B underwent a single 90 minute practice session. Participants watched a 15 minute training video and were given written instructions before recording a 5 minute pre-test. Following completion of the final session, they recorded a 5 minute post-test. The videos were graded by two blinded expert reviewers using a validated microvascular OSATS tool, which includes a task specific score (TSS, maximum 12 points) and a global rating scale (GRS, maximum 25 points). **Results:** 14 residents participated in the study with 7 in each group. Group A had greater average improvement in both TSS (+3.14, p=0.008) and GRS (+5.57, p=0.009) than group B (+1.14, p=0.20 and + 2.71, p=0.089, respectively). Average pre-test GRS, post-test TSS and GRS were strongly correlated with residency year with R2 values of 0.96, 0.93, and 0.95, respectively. Regardless of training style, individuals significantly improved on average (TSS, p=0.0034, GRS, p=0.0016). All subjects had improved confidence in handling micro-instruments, performing microvascular anastomosis, and operative microscopy (p<0.001). **Conclusions:** Compared to massed training, interval training results in greater improvement in early development of microvascular anastomosis skills. Self-directed learning using a chicken thigh artery model improves microsurgical skills, competence, and confidence for resident surgeons.

**C122. Does Size Matter? Parathyroid Adenoma Weight and Parathyroid Hormone Levels**

Tara Elena Song, MD, Oakland, CA; Deepak Gurushanthaiah, MD, Oakland, CA

**Educational Objective:** Participants should be able to appreciate the challenges of parathyroidectomy and understand that there is no direct correlation between parathyroid adenoma weight and PTH levels.

**Objectives:** Solitary parathyroid adenomas are a common cause of primary hyperparathyroidism. It is logical to think that there is a correlation between increased adenoma size and weight and increased serum parathyroid hormone (PTH) levels. Limited and conflicting information exists in the literature concerning this question. We hope to shed light on whether preoperative laboratory values can help predict intraoperative findings with parathyroid adenomas. **Study Design:** A retrospective review of pathology records obtained over a 2 year period from January 1, 2010 to December 31, 2011. **Methods:** The analysis includes a determination of statistical correlation between preoperative PTH and calcium levels and parathyroid adenoma weight. Pearson and Spearman correlation coefficients were calculated. **Results:** 748 medical records were reviewed of which 384 met inclusion criteria. We did not find a direct correlation between preoperative PTH and calcium levels and parathyroid gland weight. **Conclusions:** Higher levels of PTH and calcium do not necessarily predict a greater parathyroid adenoma weight. Hence, size does not matter.

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## C123. Spatiotemporal Imaging Spectroscopy as a Novel Imaging Modality to Rapidly Distinguish Head and Neck Squamous Cell Carcinoma from Surrounding Normal Tissue

Bobby A. Tajudeen, MD, Los Angeles, CA; Adria G. Sherman, BS, Los Angeles, CA; Jim Garritano, BS, Los Angeles, CA; Zachary D. Taylor, PhD, Los Angeles, CA; Warren S. Grundfest, MD, Los Angeles, CA; Maie St. John, MD PhD\*, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the technique of spatiotemporal spectroscopy (STS) and how it can be used to distinguish head and neck squamous cell carcinoma (HNSCC) from surrounding normal tissue.

**Objectives:** To demonstrate the feasibility of spatiotemporal spectroscopy (STS) to demarcate head and neck squamous cell carcinoma (HNSCC) from surrounding normal tissue. **Study Design:** Ex vivo study using fresh HNSCC composite resections. **Methods:** Patients undergoing surgery for HNSCC were identified and consented for involvement in this IRB approved study. Following resection, specimens were immediately sectioned into multiple samples containing tumor and contiguous normal tissue. STS images were created using a novel, wide field STS system developed at our institution. Samples were then processed for standard histological assessment by head and neck pathologists. Mean relative fluorescence temporal signatures were calculated for tumor, muscle, fat and collagen. Statistical analyses were performed using Welch's t-test. **Results:** Nine patients were included in this pilot study with 23 samples analyzed. Total image acquisition and creation time was five seconds per image. Qualitative analysis of STS images revealed microscopic characterization sufficient for tissue type identification comparable to histology. Quantitative analysis revealed a statistically significant difference ( $p < 0.05$ ) between tumor and collagen among nine of eleven band-pass filters utilized, between tumor and muscle in six filters, and between fat and tumor in five filters. **Conclusions:** This ongoing pilot study demonstrates a novel imaging modality capable of rapidly distinguishing HNSCC from surrounding normal tissue. Further advances in STS may allow for the development of an intra-operative instrument to rapidly detect HNSCC from surrounding normal tissue allowing for margin demarcation and directed frozen biopsies.

## C124. Endoscopic Endonasal Access to the Circle of Willis and Basilar Artery: A Clinical Case Series and Anatomic Classification System

Robert J. Taylor, BS, Buffalo, NY; Brian D. Thorp, MD, Chapel Hill, NC; Kibwei A. McKinney, MD, Chapel Hill, NC; Adam M. Zanation, MD\*, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe endoscopic endonasal approaches to the circle of Willis during skull base surgery and discuss their feasibility and rate of complications.

**Objectives:** Describe the endoscopic endonasal approaches to the circle of Willis (CW) and evaluate their surgical outcomes and perioperative complications. **Study Design:** Anatomic classification system and case series at a tertiary medical center. **Methods:** Retrospective review of 42 consecutive endoscopic endonasal skull base surgeries requiring CW dissection. Generation of a clinically applicable classification system for ventral CW access utilizing clinical experience and cadaveric dissection. **Results:** An anatomic classification system for endoscopic CW access is proposed, emphasizing that different planes of approach to the anterior and posterior circulation are required as the CW angle is tangential to the vertical plane of the skull by approximately 30 degrees. In the presented case series, 7 patients had successful, concurrent dissection of the anterior and posterior intracranial circulations. Gross total tumor resection was achieved in 19/40 (47.5%) applicable cases, with subtotal resections secondary to benign intraoperative pathological findings and/or lesion adherence to critical neurovascular structures. There were two intraoperative vascular complications (4.8%): one ACA laceration and one ophthalmic artery aneurysm tear during clip closure, both managed successfully without permanent sequelae. In total, 13/42 (30.1%) cases experienced at least one perioperative complication, with all complications managed successfully without any resulting mortality. **Conclusions:** Endoscopic endonasal skull base surgery with CW dissection is feasible. The proposed anatomic classification system describes approaches to the individual CW segments during endoscopic endonasal surgery. Treatment at experienced multidisciplinary cranial base centers is key to successfully managing any potential intradural arterial hemorrhage and minimizing the risk of perioperative complications.

## C125. Endoscope Assisted Approach to Excision of Branchial Cleft Cysts

Stephanie E. Teng, MD, New York, NY; Mark Fritz, MD, New York, NY; Benjamin Paul, MD, New York, NY; David Myssiorek, MD\*, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the steps of an endoscope assisted surgical technique for excision of branchial cleft cysts, and the risks and benefits of the described procedure compared to the standard approach.

**Objectives:** 1) Describe the endoscope assisted surgical technique for the excision of a branchial cleft cyst; and 2) describe the possible risks and benefits of the described procedure compared to the standard approach. **Study Design:** Retrospective cohort study. **Methods:** Branchial cleft cyst cases between October 2007 to June 2013 performed by a single attending at 2 academic medical centers were reviewed. Twenty-four patients (25 cases) were included, 7 of which were endoscope assisted. Patient charts were reviewed

and the two techniques were compared through analysis of incision size, operative time, and surgical outcomes. **Results:** During procedures in which an endoscope was used, the incision length ranged from 2-2.5 cm (mean=2.2; n=7), which was significantly smaller than the standard approach (p=0.012) in which incision length was 2 cm-6 cm (mean=3.9; n=8). Average operating time was significantly greater in the standard approach (mean=157 minutes; p=0.03) when compared to the minimally invasive approach (mean=89 minutes). No postoperative complications or recurrences were reported for patients who underwent the endoscope assisted procedure. For the standard approach, one patient underwent a second operation for recurrence; another required subsequent operations for repair of a pharyngocutaneous fistula. **Conclusions:** Endoscope assisted resection of branchial cleft cysts is a feasible technique for uncomplicated cases that provides better cosmetic results than the standard approach and does not appear to increase operative time or increase the chance of recurrence.

**C126. Laryngeal Cancer Diagnosis: Time Intervals and Delay Factors**

Kevin H. Wang, MD, Oakland, CA; Jennifer B. Do, MD, Oakland, CA; Christopher G. Tang, MD, Oakland, CA; Debbie A. Postlethwaite, RNP MPH, Oakland, CA; Jeanne A. Darbinian, MS MPH, Oakland, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the time intervals and factors which cause delay in the diagnosis of laryngeal cancer.

**Objectives:** To quantify time intervals involved in laryngeal cancer diagnosis and factors associated with diagnostic delays and stage of disease at diagnosis. **Study Design:** Retrospective cohort study. **Methods:** Squamous cell carcinoma of the larynx (SCCL) cases diagnosed between 2007-2010 were identified through the institutional cancer registry. Time intervals from symptom onset to treatment initiation were measured. Symptom quality, age, ethnicity, gender, subsite, stage, and treatment modality were collected. **Results:** Two hundred thirty-nine SCCL cases consisted of 72% glottic, 23% supraglottic, 3% transglottic, and 2% subglottic. Most common symptoms were hoarseness (93%) and sore throat (15%). Median time from symptom onset to primary care provider (PCP) presentation was 12.0 weeks; from PCP to head/neck surgeon (HNS), 1.6 weeks; from HNS to pathology confirmed diagnosis, 2.0 weeks; from diagnosis to treatment, 4.7 weeks. Median time from symptom onset to treatment was 26.4 weeks. Men presented at earlier stages than women (66% vs. 47%, p=.017). Patients presenting with <12 weeks of symptoms were more likely to have early stage disease compared with those waiting longer, though not statistically significant (66% vs.57%, p=.20). **Conclusions:** To our knowledge, this is the first study to evaluate factors associated with delays to diagnosis of SCCL in a large US integrated healthcare system. Most of the diagnostic delay was associated with the patients. After initial presentation, subsequent diagnosis and treatment were relatively efficient. Patient delays in seeking medical evaluation may lead to higher stage disease at diagnosis. Ways to reduce diagnostic delays for SCCL merit further investigation.

**C127. P16 Expression in Metastatic Squamous Cell Carcinoma to the Neck with an Unknown Primary**

Andrea S. Wang, MD, New York, NY; Dennis Kraus\*, MD, New York, NY; Luc Morris, MD, New York, NY; James P. O'Neill, MD, Dublin, Ireland

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss p16 as a prognostic factor for carcinoma of unknown primary.

**Objectives:** p16 has been found to be an appropriate marker for HPV associated oropharyngeal squamous cell cancer and is a positive prognostic indicator. Carcinoma of unknown primary (CUP), which is commonly thought to result from an undiscovered oropharyngeal source, may be associated with p16 expression. The aim of this study is to determine the prevalence of p16 expression in metastatic carcinoma to the neck associated with an unknown primary and to determine whether it may also serve as a prognostic marker for CUP. **Study Design:** Retrospective chart review. **Methods:** Thirty-two patients with true unknown primary cancer of the neck were treated with neck dissection, radiation, and/or chemotherapy. The tissue of the neck dissection was analyzed for p16 expression. **Results:** Patients with a p16 positive tumor had a significantly higher 5 year overall survival compared with patients with a p16 negative tumor (OS; 93% vs. 63%, p=0.002). Disease free survival for patients with p16 positive tumors was 93% compared with 74% for patients with p16 negative tumors; however, this did not reach statistical significance. **Conclusions:** In patients presenting with carcinoma of unknown primary, p16 overexpression may serve as a positive prognostic indicator.

**General/Clinical Fundamentals**

**C128. Imaging the Dynamic Airway in Professional and Amateur Wind Musicians Using Cine MR Techniques**

Tiffany Peng, BA, New York, NY; C. D. Phillips, MD, New York, NY; Jonathan P. Dyke, PhD, New York, NY; Michael G. Stewart, MD MPH\*, New York, NY

**Educational Objective:** At the end of this presentation, the participants should be able to discuss the differences in the oropharyngeal airway between professional and amateur musicians during instrument performance, and demonstrate understanding of the potential applications of cine MRI techniques to diagnostic studies of the oral airway.

**Objectives:** Playing a wind instrument is known to increase risk for certain oropharyngeal disorders, and there is limited evidence of modified risk for other medical conditions. The purpose of this study was to use cine MRI (CMR) to first assess the feasibility of dynamic

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assessment of the upper airway during instrument playing, and then to evaluate for anatomical differences in the upper airway between professional and amateur wind musicians. **Study Design:** Pilot study. **Methods:** Subjects were imaged in the mid-sagittal plane using T1 weighted CMR in an 8 channel head coil in a Siemens Trio® 3T MRI, and asked to perform a series of tasks, including phonation, playing specific notes, and a scale. Our study population was 15 professional and 15 amateur musicians, including 10 each saxophonists, trombonists, and trumpeters. Anatomic measurements were taken at five consistent locations in the oral cavity and oropharynx, and data were analyzed for displacement, percentage change from baseline, and consistency across trials. Comparisons were made between amateur and professional musicians, and instruments. **Results:** There was no difference between amateurs and professionals in phonation; however, professionals utilized a narrower oropharyngeal airway during performance. Analysis showed shorter mid-tongue-to-palatal height in professional brass players ( $p=0.01-0.05$  across all trials), decreased narrowest point among all professionals ( $p=0.01-0.08$ ), and decreased airway area among all professionals ( $p=0.07-0.4$ ). **Conclusions:** Professionals performed with a narrower airway than amateurs, accomplished by elevating the tongue toward the hard palate. Cine MR is a useful tool for assessment of dynamic motion in the oral airway.

### C129. Are Otolaryngology Residency Websites Sufficiently Informative?

Peter F. Svider, MD, Detroit, MI; Amar Gupta, MD, Detroit, MI; Andrew P. Johnson, MD, Detroit, MI; Giancarlo Zuliani, MD, Detroit, MI; Jean Anderson Eloy, MD, Newark, NJ; Adam J. Folbe, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the comprehensiveness of otolaryngology residency websites and potential areas for improvement.

**Objectives:** Prior to applying or interviewing, most prospective applicants turn to the internet when evaluating residency programs, making maintenance of a comprehensive site critical. While certain intangibles such as reputation may not be communicated effectively online, residency websites are invaluable for conveying other aspects of a program. Prior analyses have reported that certain criteria such as research experience and didactics are important considerations for applicants. Our objectives were to evaluate the comprehensiveness of otolaryngology residency websites. **Study Design:** Observational. **Methods:** Websites of 99 residency programs were searched for the presence of 23 criteria. **Results:** Description of the following was noted on program websites: comprehensive faculty listing (87.9%), didactics (78.8%), contact E-mail (76.7%), current residents (73.7%), description of facilities (70.1%), intern schedule (69.7%), research requirements (68.7%), otolaryngology rotation schedule (63.6%), other courses (60.6%), ERAS link (54.5%), year to year responsibility progression (46.5%), call schedule (40.4%), active/past research projects (37.4%), area information (34.3%), message from the program director (33.3%) or chair (23.2%), selection criteria (30.3%), salary (directly on site) (23.2%), surgical statistics (18.2%), parking (9.1%), meal allowance (7.1%). The proportion of these criteria present on websites did not differ upon organizing programs by region (range 42.2%-48.6%). Sites for large programs (>3 residents per year) were more comprehensive (48.6%±1.8 SEM vs. 42.3%±2.6 SEM,  $p=0.04$ ). **Conclusions:** While further survey of prospective applicants would be invaluable in determining which factors are of greatest interest, many residency websites appear to be inadequately comprehensive. Only 5 programs contained at least three-quarters of the criteria analyzed; on average programs reported less than 50% of information sought.

### C130. Conservative Management of Cervical Esophageal and Hypopharyngeal Perforation: A Case Series and Review

Joseph Zenga, MD, St. Louis, MO; Jason T. Rich, MD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the treatment of acute perforations of the hypopharynx or cervical esophagus and compare conservative and surgical treatment strategies.

**Objectives:** Currently there are no definitive guidelines for when conservative management of cervical esophageal or hypopharyngeal perforations is indicated. Our objectives were to 1) evaluate the outcomes of immediate surgical drainage vs. conservative management for patients with acute perforations; 2) identify criteria when conservative observation is safe and appropriate; and 3) perform a literature review. **Study Design:** Retrospective cohort study. **Methods:** Patients were identified using the Clinical Investigation Data Exploration Repository (CIDER). Medical records were then reviewed to obtain baseline characteristics, clinical presentation, and outcomes. **Results:** Twenty-eight patients were identified, 12 were managed conservatively and 15 underwent immediate surgical drainage. There were no significant differences between the groups in baseline characteristics, location or etiology of perforation. Within the conservative and surgical groups, 7 and 10 patients ate prior to diagnosis of the perforation, respectively. Five of the observed group developed systemic toxicity and required eventual surgical drainage compared to 1 patient in the immediate surgical arm that required reoperation. Of the conservatively managed group that ate prior to diagnosis, 71% developed systemic toxicity and required surgical drainage compared to 0% of those who did not eat prior to diagnosis and were observed only ( $P = 0.028$ ). In the immediate surgical drainage group, eating prior to diagnosis did not correlate to requiring reoperation. There were no mortalities. Of the 20 patients who eventually received surgical drainage, a reinforcing muscle flap or primary closure was performed for 10 perforations while a simple drainage procedure was done for the rest. There was no significant difference in long term complications or need for further procedures between these two groups. **Conclusions:** Patients with upper esophageal or hypopharyngeal perforations who have not eaten prior to diagnosis can be considered for conservative observation, whereas those who have eaten prior to diagnosis should undergo surgical drainage. For those patients undergoing surgery, a simple drainage procedure is as effective as primary suture repair or muscle flap closure.

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## The Laryngoscope

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## Triological Society National Awards

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### The Triological Society Gold Medal

1933	Max. A. Goldstein, MD
2001	Byron J. Bailey, MD
2005	Michael M.E. Johns, MD
2009	Patrick E. Brookhouser, MD
2013	Harold C. Pillsbury, MD

### Patrick E. Brookhouser, MD Award for Excellence

2013	Gerald B. Healy, MD FACS
2014	H. Bryan Neel III, MD PhD FACS

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## Executive Secretaries

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1896 to 1900	Robert C. Myles, MD
1901 to 1906	Wendell C. Phillips, MD
1907 to 1916	Thomas J. Harris, MD
1917 to 1924	William H. Haskins, MD
1925 to 1936	Robert L. Loughran, MD
1936 to 1962	C. Stewart Nash, MD
1962 to 1968	Victor R. Alfaro, MD
1968 to 1974	Louis E. Silcox, MD
1974 to 1980	Richard R. Ruggles, MD
1980 to 1984	William M. Tribble, MD
1984 to 1988	Frank N. Ritter, MD
1989 to 1992	Michael E. Johns, MD
1993 to 1996	Robert H. Miller, MD
1997 to 2004	Patrick E. Brookhouser, MD
2005	Gerald B. Healy, MD
2006 to 2011	Patrick E. Brookhouser, MD
2011 to 2013	Gerald B. Healy, MD

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## Executive Vice Presidents

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2013 to 2014	Myles L. Pensak, MD
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## Presidents

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* 1896	Edward B. Dench, MD	* 1909	Christian R. Holmes, MD
* 1897	Frank Hyatt, MD	* 1910	James F. McKenna, MD
* 1898	William H. Daley, MD	* 1911	Chevalier Jackson, MD
* 1899	S.E. Solly, MD	* 1912	G. Hudson Jakuen, MD
* 1900	D. Brayden Kyle, MD	* 1913	H. Holbrook Curtis, MD
* 1901	Robert C. Myles, MD	* 1914	Joseph A. White, MD
* 1902	Charles W. Richardson, MD	* 1915	Robert Levy, MD
* 1903	J.A. Stuckey, MD	* 1916	S. MacCuen Smith, MD
* 1904	Norval H. Pierce, MD	* 1917	Thomas J. Harris, MD
* 1905	Frederick F. Cobb, MD	* 1918	George L. Richards, MD
* 1906	James E. Logan, MD	* 1919	Herbert S. Birkett, MD
* 1907	Wendel C. Phillips, MD	* 1920	Harris P. Mosher, MD
* 1908	Ewing W. Day, MD	* 1921	Lee Wallace Dean, MD

## Presidents continued

* 1922	Lewis A. Coffin, MD	* 1970	Joseph L. Goldman, MD
* 1923	Dunbar Roy, MD	* 1971	Victor Goodhill, MD
* 1924	Hanau W. Loeb, MD	* 1972	Victor R. Alfaro, MD
* 1925	William H. Haskin, MD	* 1973	Walter P. Work, MD
* 1926	John M. Ingersoll, MD	* 1974	Raymond E. Jordan, MD
* 1927	Burt R. Shurly, MD	* 1974	Louis E. Silcox, MD
* 1928	John F. Barnhill, MD	* 1975	David D. DeWeese, MD
* 1929	Hill Hastings, MD	* 1976	James A. Harrill, MD
* 1930	Ross Hall Skillern, MD	* 1977	Joseph H. Ogura, MD
* 1931	Max A. Goldstein, MD	* 1978	Daniel Miller, MD
* 1932	Edmund Prince Fowler, MD	* 1979	Francis A. Sooy, MD
* 1933	Joseph C. Beck, MD	* 1980	Beverly W. Armstrong, MD
* 1934	J.W. Jervey, MD	* 1981	G. O'Neill Proud, MD
* 1935	Perry G. Goldsmith, MD	* 1982	John A. Kirchner, MD
* 1936	Thomas E. Carmody, MD	* 1983	Robin Michelson, MD
* 1937	George M. Coates, MD	* 1984	Carl N. Patterson, MD
* 1938	Samuel J. Kopetzky, MD	1985	William H. Saunders, MD
* 1939	Harold I. Lillie, MD	* 1986	Wesley H. Bradley, MD
* 1940	Lee M. Hurd, MD	1987	Roger Boles, MD
* 1941	J. Mackenzie Brown, MD	* 1988	Harold G. Tabb, MD
* 1942	James A. Babbitt, MD	* 1989	Malcolm H. Stroud, MD
* 1943	James G. Dwyer, MD	1990	M. Stuart Strong, MD
* 1944	H. Marshall Taylor, MD	1991	Paul H. Ward, MD
* 1945	Albert C. Furstenberg, MD	* 1992	A. Paul Keller, Jr., MD
* 1946	Albert C. Furstenberg, MD	* 1993	Frank N. Ritter, MD
* 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		
* 1969	Jerome A. Hilger, MD		

\* denotes deceased Presidents

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## Guests of Honor Since 1947

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1947	J. McKenzie Brown, MD	1981	Ben Senturia, MD
1948	Harold Walker, MD	1982	Harold Schuknecht, MD
1949	Claude C. Cody, Jr., MD		Ugo Fisch, MD
1950	Harris P. Mosher, MD	1983	Walter Work, MD
1951	Duncan McPherson, MD		Roy B. Cohn, MD
1952	D.C. Jarvis, MD	1984	Beverly Armstrong, MD
1953	Charles A. Thigpan, MD	1985	G.O. Proud, MD
1954	J. Parsons Schaeffer, MD	1986	Daniel Miller, MD
1955	Edward P. Fowler, MD	1987	Paul Ebert, MD
1956	Harold L. Lillie, MD	1988	Robert W. Brown, MD
1957	Not Available	1989	Hallowell Davis, MD
1958	Arnold S. Diehl, MD	1990	George Reed, MD
1959	Frederick T. Hill, MD	1991	Victor Goodhill, MD
1960	Terence Cawthorne, MD	1992	Roger Boles, MD
1961	Milton J. Robb, MD	1993	C. Ryan Chandler, MD
1962	Thomas C. Galloway, MD	1994	John Conley, MD
1963	Robert C. Martin, MD	1995	Paul H. Ward, MD
1964	C. Stewart Nash, MD	1996	Bobby Ray Alford, MD
1965	Georges Portmann, MD	1997	Robert Cantrell, MD
1966	Gordon D. Hoople, MD	1998	Patrick J. Doyle, MD
1967	Albery C. Furstenberg, MD	1999	Richard L. Goode, MD
1968	Francis E. LeJeune, MD	2000	A. Paul Keller, MD
1969	Lawrence R. Boies, MD	2001	Charles W. Cummings, MD
1970	Victor Alfaro, MD	2002	Stanley M. Shapshay, MD
1971	Vern O. Knudsen, PhD	2003	Brian F. McCabe, MD
1972	Carlos Munoz-MacCormick, MD	2004	Byron J. Bailey, MD
1973	Dean Lierle, MD	2005	Robert H. Miller, MD MBA
1974	Raymond Jordon, MD	2006	Gerald B. Healy, MD
1975	Frank Lathrop, MD	2007	William F. House, MD
1976	John Bordley, MD	2008	Patrick E. Brookhouser, MD
1977	Max Soni, MD	2009	Harry R. van Loveren, MD
	W.E.N. Harrison, MD	2010	Gady Har-El, MD
1978	Moses Lurie, MD	2011	Harold C. Pillsbury, MD
1979	Shirley Baron, MD	2012	Paul A. Levine, MD
1980	Frank Lathrop, MD	2013	Robert H. Mathog, MD
	Harry Rosen-Wasser, MD	2014	Michael M.E. Johns, 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. Netteville, 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		

## **Fifty Year Club**

### **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

Jack W. Pou, MD . . . . . Shreveport, LA

### **1959**

Seymour J. Brockman, MD . . . . . Beverly Hills, CA

L. Reed Cranmer, MD FACS . . . . . Toledo, OH

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 . . . . . Morgan City, 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**

Francis I. Catlin, MD . . . . . Houston, TX

Ned I. Chalut, MD FACS . . . . . Grosse Pointe, MI

Daniel J. Fahey, MD FACS . . . . . Williamsville, NY

Sidney S. Feuerstein, MD FACS . . . . . Palm Beach, FL

Merrill Goodman, MD FACS . . . . . Manhasset, NY

John C. Lillie, MD . . . . . Rochester, MN

**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 2013 Annual Program.

		<b>Elected</b>	<b>Died</b>
William F. Baxter, MD . . . . .	Stanford, CA . . . . .	1965 . . . . .	unknown
Herbert G. Birck, MD . . . . .	Columbus, OH . . . . .	1968 . . . . .	2009
Robert E. Boswell, MD . . . . .	Riviera Beach, FL . . . . .	1949 . . . . .	unknown
Linda Brodsky, MD FACS . . . . .	Buffalo, NY . . . . .	1991 . . . . .	2014
David E. Brown, MD . . . . .	Monterey, CA . . . . .	1956 . . . . .	unknown
Irving I. Cramer, MD . . . . .	Scarsdale, NY . . . . .	1957 . . . . .	unknown
Robert I. Dickson, MD . . . . .	Vancouver, BC . . . . .	1980 . . . . .	2013
Nelson Fernandez-Blasini, MD . . . . .	Santurce, PR . . . . .	1972 . . . . .	unknown
Robert A. Jahrsdoerfer, MD . . . . .	Afton, VA . . . . .	1978 . . . . .	2014
Hueston C. King, MD . . . . .	Venice, FL . . . . .	1970 . . . . .	2013
John A. Kirchner, MD . . . . .	Hamden, CT . . . . .	1958 . . . . .	2011
Charles J. Krause, MD FACS . . . . .	Marco Island, FL . . . . .	1979 . . . . .	2013
Diran O. Mikaelian, MD . . . . .	Wynnewood, PA . . . . .	1978 . . . . .	2014
Nels R. Olson, MD . . . . .	Ann Arbor, MI . . . . .	1981 . . . . .	2012
Claude L. Pennington Jr., MD FACS . . . . .	Macon, GA . . . . .	1963 . . . . .	2013
John A.T. Ross, MD . . . . .	Ketchum, ID . . . . .	1969 . . . . .	2014
Richard L. Ruggles, MD . . . . .	Chagrin Falls, OH . . . . .	1959 . . . . .	2013
Malcolm H. Stroud, MD . . . . .	Dallas, TX . . . . .	1967 . . . . .	2013
Robert J. Toohill, MD FACS . . . . .	Milwaukee, WI . . . . .	1974 . . . . .	2013
Charles W. Vaughan, MD FACS . . . . .	Hingham, MA . . . . .	1976 . . . . .	2014



## 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  
Philip F. Anthony, MD  
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  
Michael Broniatowski, MD FACS  
Dale H. Brown, MD  
Jimmy J. Brown, MD FACS  
J. Dale Browne, MD FACS  
Craig Alan Buchman, MD FACS  
Jeffrey M. Bumpous, MD FACS  
Lawrence P. A. Burgess, MD FACS  
James A. Burns, MD FACS  
Nicolas Y. Bu-Saba, 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 Guang-Yu Chiu, MD  
Sukgi S. Choi, MD FACS  
Richard A. Chole, MD PhD  
Daniel I. Choo, MD FACS  
Francisco J. Civantos, MD FACS  
Keith F. Clark, MD PhD FACS  
Lanny Garth Close, MD FACS  
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Stephen F. Conley, MD FACS  
Steven P. Cook, MD FACS  
Peter D. Costantino, MD FACS  
Robin T. Cotton, MD FACS  
Stanley W. Coulthard, 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  
Ziad E. Deeb, MD FACS  
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  
Robert A. Dobie, MD  
H. Peter Doble II, MD FACS  
Donald T. Donovan, MD FACS  
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Amelia F. Drake, MD FACS  
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Sigsbee Walter Duck, MD FACS  
Larry G. Duckert, MD PhD FACS  
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Roland D. Eavey, MD FACS  
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David W. Eisele, MD FACS  
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Joel A. Ernster, MD FACS  
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Jose N. Fayad, MD  
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Berrylin J. Ferguson, MD FACS  
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Samuel R. Fisher, MD FACS  
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L. Arick Forrest, MD  
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David R. Friedland, MD PhD  
Ellen M. Friedman, MD FACS  
Michael Friedman, MD FACS  
Rick A. Friedman, MD PhD  
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Thomas J. Gal, MD FACS  
Bruce J. Gantz, MD FACS  
Glendon M. Gardner, MD  
C. Gaelyn Garrett, MD  
Eric M. Genden, MD FACS  
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W. Jarrard Goodwin, MD FACS  
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Jennifer Rubin Grandis, MD FACS  
J. Douglas Green Jr., MD FACS  
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Joseph Haddad Jr., MD FACS  
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Stacey L. Halum, MD  
Paul E. Hammerschlag, MD FACS  
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Matthew M. Hanasono, MD FACS  
Steven D. Handler, MD MBE FACS  
Marlan R. Hansen, MD  
Gady Har-El, MD FACS  
Willard C. Harrill, MD FACS  
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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. Heman-Ackah, MD FACS  
Robert A. Hendrix, MD FACS  
Douglas G. Hetzler, MD FACS  
Wesley Hicks Jr., MD FACS  
Kevin M. Higgins, MD

# Member Directory

## Active Fellows

Allen D. Hillel, MD FACS  
Raymond L. Hilsinger Jr., MD FACS  
Michael L. Hinni, MD FACS  
Keiko Hirose, MD  
Michael E. Hoffer, MD FACS  
Henry T. Hoffman, MD FACS  
Ronald A. Hoffman, MD  
Norman D. Hogikyan, MD FACS  
Eric H. Holbrook, MD  
Lauren D. Holinger, MD FACS  
James J. Holt, MD FACS  
David B. Hom, MD FACS  
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  
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  
William M. Keane, 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  
Harold W. Korol, MD FACS  
Karen M. Kost, MD  
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  
Wayne F. Larrabee Jr., MD FACS  
Pierre Lavertu, MD FACS  
Joseph L. Leach, MD FACS  
Richard A. Lebowitz, MD FACS  
John P. Leonetti, MD  
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Mark J. Levenson, MD FACS  
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