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## Message from the Vice Presidents

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Welcome to Miami Beach! Thank you for attending our Combined Sections Meeting. It has been a pleasure to serve the membership as Section Vice Presidents this year and we are very proud of the outstanding program that has been assembled by our Program Chair, Dr. Mark Persky, and our Program Committee. The always popular How I Do It session is scheduled on Friday. Panel topics include: Evaluation of the Head and Neck Mass, What They Did Not Teach You about Tinnitus, Modern Surgery/Medical Treatment/Evaluation of Obstructive Sleep Apnea, Management of Laryngomalacia. Four concurrent sessions will be held on Friday which will include head and neck, otology and neurotology, general and sleep disorders, and pediatric otolaryngology. The Great Debate topics include Intraoperative Facial Nerve Monitoring during Parotidectomy (pro/con), and Papillary Thyroid Cancer: Treat it or Just Watch It? (pro/con). This is followed by What's the Latest and Greatest: 3D Printing in Otolaryngology, Endoscopic Otologic Surgery, Cine MRI - Evaluation of Residual OSA after T&A. Friday evening, immediately following the scientific sessions, is an opportunity to socialize and network at the Vice Presidents' Welcome Reception.

Concurrent sessions will also be held on Saturday morning which will include facial plastic/reconstructive surgery, general and sleep medicine, rhinology, and laryngology. Panel topics include Moh's Reconstructive Cases, Electronic Healthcare Records: Tricks on How to Make Your Day Easier, Chronic Rhinosinusitis: Real Cases and Treatment Options, and Late Surgical Rehabilitation for Airway, Voice, and Swallowing. Saturday afternoon activities include the Resident Bowl. Come and cheer for your favorite team and see if you are as smart as the residents. The Thesis Seminar for candidates and prospective candidates will be given by Dr. Dana Thompson. The American Society of Geriatric Otolaryngology will hold a scientific session on Saturday afternoon.

Sunday morning panels include: Controversies in Otolaryngology: Reflux - Is It as Important as We Think?, Masters of Otolaryngology: Scary Cases, My Worst Cases, Career Changing Events, Value Based Medicine: The Future, But What's It All About?, and Health Reform, Ethics, Changes for the Future: The Compromised Surgeon.



Soly Baredes, MD FACS  
Eastern Section Vice President



Brian Nussenbaum, MD FACS  
Middle Section Vice President



Stephen S. Park, MD  
Southern Section Vice President



William B. Armstrong, MD FACS  
Western Section Vice President

## SCHEDULE AT A GLANCE

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### Friday - Americana 1 & 2

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- |               |   |
|---------------|---|
| 8:00 - 9:05   | Welcome and Vice Presidential Citations                               |
| 9:05          | Presidential Address<br>Change  |
| 9:25 - 9:55   | Break/View Posters  |
| 9:55 - 10:10  | Thesis Presentations  |
| 10:10 - 11:05 | How I Do It Video Session   |
| 11:10 - 12:00 | Keynote Address<br>America's Journey to the Triple Aim: Where Are We? |

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## **Friday - Concurrent Session - Americana 1**

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- 1:10 - 2:10 Head and Neck Session
- 2:10 - 3:00 Evaluation of the Head and Neck Mass
- 3:05 - 3:30 Break/View Posters
- 3:30 - 4:29 General and Sleep Disorders Session
- 4:25 - 5:10 Modern Surgery/Medical Treatment/Evaluation of Obstructive Sleep Apnea
- 5:15 - 6:10 The Great Debate (Point/Counterpoint)

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## **Friday - Concurrent Session - Americana 2**

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- 1:10 - 2:05 What They Did not Teach You about Tinnitus
- 2:10 - 3:00 Otology/Neurotology Session
- 3:05 - 3:30 Break/View Posters
- 3:30 - 4:20 Management of Laryngomalacia
- 4:25 - 5:10 Pediatric Otolaryngology Session
- 5:15 - 6:10 What's the Latest and the Greatest?

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## **Saturday - Business Meetings**

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- 7:00 - 7:50 Southern Section - Poinciana 1
- 7:00 - 7:50 Western Section - Poinciana 2

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## **Saturday - Concurrent Session - Americana 1**

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- 8:05 - 9:05 Facial Plastic/Reconstructive Surgery
- 9:05 - 9:55 Moh's Reconstructive Cases
- 10:00 - 10:30 Break/View Posters
- 10:30 - 11:25 Chronic Rhinosinusitis: Real Cases and Treatment Options
- 11:30 - 12:30 Rhinology Session
- 12:30 Adjourn

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## **Saturday - Concurrent Session - Americana 2**

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- 8:05 - 9:00 Electronic Healthcare Records: Tricks on How to Make Your Day Easier
- 9:05 - 9:55 General and Sleep Medicine Session
- 10:00 - 10:30 Break/View Posters
- 10:30 - 11:25 Laryngology Session
- 11:30 - 12:30 Late Surgical Rehabilitation for Airway, Voice, and Swallowing after Prior Radiation and Surgery
- 12:30 Adjourn

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## **Saturday - Afternoon Activities**

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- 12:45 - 2:30     Triological Thesis Seminar - Americana 2
- 12:45 - 2:30     Resident Bowl - Poinciana 3 & 4
- 12:45 - 2:45     Physician/Scientist Meeting - Americana 3 & 4
- 12:45 - 5:30     Golf Outing
- 1:00 - 5:00     ASGO Scientific Session - Americana 1

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## **Sunday - Business Meetings**

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- 7:00 - 7:50     Eastern Section - Poinciana 1
- 7:00 - 7:50     Middle Section - Poinciana 2

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## **Sunday - Scientific Session - Americana 1 & 2**

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- 8:05 - 8:55     Controversies in Otolaryngology: Reflux - Is It as Important as we Think?
- 8:55 - 9:45     Masters of Otolaryngology: Scary Cases, My Worst Cases, Career Changing Events
- 9:45 - 10:10    Break/View Posters
- 10:10 - 11:05   Value Based Medicine: The Future, But What's It all About?
- 11:05 - 12:00   Health Reform, Ethics, Changes for the Future: The Compromised Surgeon
- 12:00            Adjourn



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# COMBINED SECTIONS MEETING LOEWS MIAMI BEACH HOTEL MIAMI BEACH, FLORIDA JANUARY 22-24, 2016

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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 journals, *The Laryngoscope* and *Laryngoscope Investigative Otolaryngology*. The Society promotes research into the causes of and treatments for otolaryngic diseases by attracting promising physicians to scholarly otolaryngology research and supporting their development, providing financial support for the research efforts of young scientists, and promoting the highest standards in the field of otolaryngology-head and neck surgery.

## **Mission 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 journals, *The Laryngoscope* and *Laryngoscope Investigative Otolaryngology*, serve as a means of disseminating the latest basic and clinical research results. The Society encourages research by providing research grants and awards on a competitive basis.

## **Learning Objectives**

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

- Apply high resolution intraoperative endoscopy for evaluation margins of resection of cancers.
- Assess the effectiveness of Botox for various head and neck disorders.
- Better analyze the results of genetic testing of thyroid nodules related to forms of treatment and prognosis.
- Compare the effectiveness of medical versus surgical treatment of obstructive sleep apnea related to etiology.
- Analyze and apply the need for central compartment neck dissection related to the staging of thyroid carcinoma.
- Identify the grades of laryngomalacia in the pediatric population and apply appropriate treatment.

## Exhibits

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

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

## Triological Society Thesis Seminar

This seminar is aimed at Triological Society active candidates as well as those interested in pursuing Active Fellowship in the Triological Society. Seminars are open to Triological Society Fellows. In this seminar, candidates will learn how to select and focus an appropriate topic and research question, how to select a study design based on the research question, select variables, and some basic principles of study conduct. The seminar will also present some useful tips on organizing, analyzing, and presenting the data, and sources of funding for continued investigation. The seminar will be conducted by Dana Thompson, MD, Thesis Committee Chair.

The Seminar will be held immediately following the morning scientific session on Saturday, January 23rd.

## Program Evaluation and CME Certificates

Participant comments on program evaluation forms assist Program Advisory Committees in determining the direction of future educational activities. We appreciate your input and request that you complete a program evaluation in exchange for a CME certificate of attendance. Records are maintained in the Administrative Office of the Society and maintained by the American College of Surgeons for Fellows of the College. Requests may be made by sending a self-addressed envelope to: Triological Society • 13930 Gold Circle, Suite 103 • Omaha, NE 68144 • 402-346-5500

### CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

#### Accreditation

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

#### AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of 14.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.



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## **Program Planning and Advisory Committee**

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**Eastern Section Vice President**  
**Soly Baredes, MD FACS**  
Newark, NJ

**Middle Section Vice President**  
**Brian Nussenbaum, MD FACS**  
St. Louis, MO

**Southern Section Vice President**  
**Stephen S. Park, MD**  
Charlottesville, VA

**Western Section Vice President**  
**William B. Armstrong, MD FACS**  
Irvine, CA

**Program Chair**  
**Mark S. Persky, MD FACS**  
New York, NY

**Douglas D. Backous, MD FACS**  
Seattle, WA

**Craig Alan Buchman, MD FACS**  
St. Louis, MO

**Sujana S. Chandrasekhar, MD**  
New York, NY

**Alexander Guang-Yu Chiu, MD**  
Tucson, AZ

**Sukgi S. Choi, MD FACS**  
Pittsburgh, PA

**Edward J. Damrose, MD FACS**  
Stanford, CA

**Subinoy Das, MD FACS**  
Columbus, OH

**Donald T. Donovan, MD FACS**  
Houston, TX

**David E. Eibling, MD FACS**  
Pittsburgh, PA

**C. Gaelyn Garrett, MD**  
Nashville, TN

**Joseph Haddad Jr., MD FACS**  
New York, NY

**George T. Hashisaki, MD FACS**  
Charlottesville, VA

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

**Stacey L. Ishman, MD MPH**  
Cincinnati, OH

**Robert M. Kellman, MD FACS**  
Syracuse, NY

**Samir Suresh Khariwala, MD**  
Minneapolis, MN

**Dennis H. Kraus, MD FACS**  
New York, NY

**Greg A. Krempf, MD FACS**  
Oklahoma City, OK

**Albert L. Merati, MD FACS**  
Seattle, WA

**Alan G. Micco, MD FACS**  
Chicago, IL

**Natasha Mirza, MD FACS**  
Philadelphia, PA

**Sanjay R. Parikh, MD BSc FACS**  
Seattle, WA

**Karen T. Pitman, MD FACS**  
Gilbert, AZ

**Brent A. Senior, MD FACS**  
Chapel Hill, NC

**Richard V. Smith, MD FACS**  
Bronx, NY

**Timothy L. Smith, MD MPH FACS**  
Portland, OR

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

**David L. Steward, MD FACS**  
Cincinnati, OH

**Fred F. Telischi, MD FACS**  
Miami, FL

**Donald T. Weed, MD FACS**  
Miami, FL

**Gregory J. Wiet, MD FACS**  
Columbus, OH

**Brian J.F. Wong, MD PhD**  
Orange, CA

**Peak Woo, MD FACS**  
New York, NY

**Adam M. Zanation, MD**  
Chapel Hill, NC

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**DISCLOSURE INFORMATION**  
**TRIOLOGICAL SOCIETY 2016 COMBINED SECTIONS MEETING**  
**JANUARY 22-24, 2016**  
**MIAMI BEACH, FLORIDA**

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

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

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

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

SPEAKERS/ MODERATORS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE		
		COMPANY	ROLE	RECEIVED
Samantha Anne, MD MS	X			
Ghedak Nather Ansari, BA MSED	X			
William B. Armstrong, MD FACS	X			
Douglas D. Backous, MD FACS		Cochlear Corporation	surgical advisory board	honorarium
Soly Baredes, MD FACS	X			
Carol A. Bauer, MD FACS	X			
Peter C. Baxter, MD	X			
Michael S. Benninger, MD FACS	X			
Yael E. Bensoussan, MD	X			
John P. Bent III, MD	X			
Regan W. Bergmark, MD	X			
Daniel M. Beswick, MD	X			
Jay M. Bhatt, MD	X			
Neel K. Bhatt, MD	X			
Andrew Blitzer, MD DDS FACS	X			
Emily F. Boss, MD	X			
Carol R. Bradford, MD FACS	X			
Craig A. Buchman, MD FACS		Cochlear Corporation	surgical advisory board member	honoraria
Jeffrey M. Bumpous, MD FACS	X			
C. Ron Cannon, MD FACS	X			
Eric T. Carniol, MD	X			
Garrett G. Casale, BS	X			

SPEAKERS/ MODERATORS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE		
		COMPANY	ROLE	RECEIVED
Roy R. Casiano, MD FACS		(1) Laurimed; (2) Medtronic; (3) Olympus	(1) consultant; (2) consultant; (3) consultant and speaker	(1) nothing received; (2) fee; (3) fee
Sujana S. Chandrasekhar, MD		(1) Scientific Development & Research, Inc.; (2) Otic Pharma, Inc.	(1) intranasal surfactant biotech company shareholder, office bearer; (2) developers of surfactant for ME and ETD, consultant	(1) company shares; (2) nothing received
Hamad Chaudhary, MD	X			
Alexander G. Chiu, MD		(1) Olympus Gyrus; (2) Meda	(1) consultant; (2) advisory board	(1) nothing received; (2) nothing received
Karen Y. Choi, MD	X			
Kevin J. Choi, MD MS	X			
Richard A. Chole, MD PhD	X			
Naweed I. Chowdhury, MD	X			
Francisco J. Civantos, MD FACS	X			
Ted A. Cook, MD FACS	X			
Robin T. Cotton, MD FACS	X			
John D. Cramer, MD	X			
Matthew G. Crowson, MD	X			
Roger L. Crumley, MD MBA FACS	X			
Seth H. Dailey, MD	X			
Edward J. Damrose, MD FACS	X			
Subinoy Das, MD FACS		Teva Pharmaceuticals	speaker	honorarium
Donald T. Donovan, MD FACS	X			
Sigsbee W. Duck, MD	X			
Sunshine M. Dwojak, MD MPH	X			
David E. Eibling, MD FACS	X			
David W. Eisele, MD FACS	X			
Zainab Farzal, BS	X			
David O. Francis, MD	X			
Marvin P. Fried, MD FACS	X			
Laura R. Garcia-Rodriguez, MD	X			
C. Gaelyn Garrett, MD	X			
Eric M. Genden, MD FACS	X			
M. Boyd Gillespie, MD MSc FACS		(1) Inspire Medical; (2) Medtronic; (3) Olympus Medical	(1) researcher; (2) consultant; (3) researcher, consultant	(1) honoraria, research funding; (2) consulting fee; (3) research funding, consulting fee
Douglas A. Girod, MD FACS	X			
Nandini Govil, MD MPH	X			
Evan Michael Graboyes, MD	X			
Glenn E. Green, MD		Materialise	sponsor of clinical trial, inventor	nothing received
Jacqueline J. Greene, MD	X			
Devon W. Greer, MD	X			
Kenneth M. Grundfast, MD FACS	X			
Patrick J. Gullane, MD FACS	X			
Willard C. Harrill, MD FACS	X			
George T. Hashisaki, MD FACS	X			
Gerald B. Healy, MD FACS	X			
Euna Hwang, MD FRCSC	X			

SPEAKERS/ MODERATORS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE		
		COMPANY	ROLE	RECEIVED
Brandon Isaacson, MD		(1) Advanced Bionics; (2) Medtronic; (3) Olympus; (4) Stryker	(1) medical advisory board, consultant; (2) consultant; (3) course instructor, consultant; (4) course instructor, consultant	(1) nothing received; (2) nothing received; (3) nothing received; (4) nothing received
Lisa E. Ishii, MD MHS	X			
Stacey L. Ishman, MD MPH		Acclarent	research grant	research funding
Jad R. Jabbour, MD MPH	X			
Ian N. Jacobs, MD FACS	X			
Michael M. Johns III, MD	X			
Jonas T. Johnson, MD FACS	X			
Rachel J. Kaye, MD	X			
Kanwar S. Kelley, MD JD	X			
Robert M. Kellman, MD FACS	X			
Robert C. Kern, MD FACS	X			
Karen M. Kost, MD	X			
Dennis H. Kraus, MD FACS	X			
Rijul S. Kshirsagar, BS	X			
Ronald B. Kuppersmith, MD FACS	X			
Alex Bradley Labby, BA	X			
Keat-Jin Lee, MD FACS	X			
Alex T. Legocki, BA	X			
Chen Lin, BA	X			
Steven H. Lipstein, MHA	X			
Emily Marchiano, BA	X			
Bruce H. Matt, MD FACS	X			
Patrick O. McGarey, MD	X			
Albert L. Merati, MD FACS	X			
Brett A. Miles, MD DDS FACS	X			
Bailey A. Milne-Davies, AA	X			
Natasha Mirza, MD FACS	X			
John P. Naughton, MD	X			
James L. Netterville, MD FACS	X			
Jacob Pieter Noordzij, MD	X			
Brian Nussenbaum, MD MBA FACS	X			
Adrian A. Ong, MD	X			
Fred D. Owens, MD	X			
Sanjay R. Parikh, MD BSc FACS	X			
Renee E. Park, MD MPH	X			
Stephen S. Park, MD	X			
William J. Parkes, MD	X			
Myles L. Pensak, MD FACS	X			
Julianna E. Pesce, MD	X			
Jay Piccirillo, MD FACS	X			
Ann W. Plum, MD	X			
Charles B. Poon, MS	X			
John D. Prosser, MD	X			
Sidharth Venkata Puram, MD PhD	X			
Anais Rameau, MD MPhil	X			
Vaibhav H. Ramprasad, BA	X			
Camilo A. Reyes, MD	X			
Christopher J. Rizzi, MD	X			
Joshua E. Romero, MD	X			
Christopher R. Roxbury, MD	X			
Michael J. Ruckenstein, MD FACS	X			
Kimberly A. Russell, MD	X			

SPEAKERS/ MODERATORS/ DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE		
		COMPANY	ROLE	REC EIVED
Robert T. Sataloff, MD DMA FACS		(1) Boston Medical; (2) Integra; (3) Jaypee Brothers Publishing; (4) Plural Publishing LLC	(1) instrument creator; (2) instrument creator; (3) author; (4) author	(1) royalties; (2) instrument royalties; (3) royalties; (4) royalties
George A. Scangas, MD	X			
Grace M. Scott, BA MSc	X			
Andrew R. Scott, MD FACS	X			
Michael D. Seidman, MD FACS		Physicianangels	stockholder	stock purchase
Brent A. Senior, MD FACS		(1) ENTvantage; (2) Karl Storz; (3) Olympus; (4) Parion; (5) Stryker	(1) consultant; (2) speaker; (3) consultant; (4) consultant; (5) speaker	(1) nothing received; (2) nothing received; (3) nothing received; (4) nothing received; (5) nothing received
Sophie G. Shay, MD	X			
Sally R. Shott, MD FACS	X			
Richard V. Smith, MD FACS	X			
Timothy L. Smith, MD MPH FACS	X			
Alla Y. Solyar, MD	X			
Maie A. St. John, MD	X			
Robert J. Stachler, MD FACS	X			
Michael G. Stewart, MD MPH FACS	X			
Lucian Sulica, MD	X			
Abtin Tabae, MD	X			
Samantha H. Tam, MD	X			
Matthew L. Tamplen, MD	X			
Sherard A. Tatum, MD FACS	X			
David J. Terris, MD FACS	X			
Erica Robb Thaler, MD FACS	X			
Dana M. Thompson, MD FACS	X			
Travis T. Tollefson, MD MPH FACS	X			
Ralph P. Tufano, MD MBA FACS	X			
Andrew M. Vahabzadeh-Hagh, MD	X			
Mark K. Wax, MD FACS	X			
Randal S. Weber, MD FACS	X			
Julie L. Wei, MD	X			
Gregory J. Wiet, MD FACS		NIH/NIDCD	principal investigator	grant support
Brian J.F. Wong, MD PhD		(1) Aerin Medical, Inc.; (2) OCT Medical Imaging Inc.; (3) Praxis BioSciences, Inc.; (4) Reshape Lifesciences, LLC	(1) patent holder; (2) grant holder; (3) equity holder; (4) sub-contract holder	(1) royalty; (2) grant; (3) equity interest; (4) nothing received
Peak Woo, MD FACS	X			
Gayle E. Woodson, MD FACS	X			
Kathleen L. Yaremchuk, MD MSA	X			
Eunice Yim, BS	X			
Adam M. Zanation, MD	X			

PLANNING COMMITTEE	NOTHING TO DISCLOSE	DISCLOSURE		
		COMPANY	ROLE	REC EIVED
William B. Armstrong, MD FACS	X			
Douglas D. Backous, MD FACS		Medtronics	consultant	consulting fees
Soly Baredes, MD FACS	X			
Craig Alan Buchman, MD FACS		(1) Advanced Bionics; (2) Cochlear Corp.	(1) advisory board; (2) surgical advisory board	(1) travel expenses; (2) honoraria

PLANNING COMMITTEE	NOTHING TO DISCLOSE	DISCLOSURE		
		COMPANY	ROLE	RECEIVED
Sujana S. Chandrasekhar, MD		(1) Kurz; (2) Scientific Development and Research, Inc.	(1) travel expenses for a meeting; (2) stock owner and board member	(1) consultant; (2) stock ownership
Alexander Guang-Yu Chiu, MD		(1) Acclarent; (2) Meda Pharmaceuticals; (3) Olympus	(1) research grant; (2) advisory board and speaker; (3) consultant and speaker	(1) research funding; (2) honorarium; (3) honorarium
Sukgi S. Choi, MD FACS	X			
Edward J. Damrose, MD FACS		(1) Fibrocell Inc.; (2) Olympus Inc.	(1) research grant; (2) consultant	(1) research funding; (2) nothing received
Subinoy Das, MD FACS	X			
Donald T. Donovan, MD FACS	X			
David E. Eibling, MD FACS	X			
C. Gaelyn Garrett, MD	X			
Joseph Haddad Jr., MD FACS	X			
George T. Hashisaki, MD FACS	X			
Lisa E. Ishii, MD MHS	X			
Stacey L. Ishman, MD MPH	X			
Robert M. Kellman, MD FACS	X			
Samir Suresh Khariwala, MD	X			
Dennis H. Kraus, MD FACS	X			
Greg A. Krempf, MD FACS	X			
Albert L. Merati, MD FACS	X			
Alan G. Micco, MD FACS		Med El	surgeon's advisory board	consulting fee
Natasha Mirza, MD FACS		MobileOptx	co-founder	no financial remuneration
Brian Nussenbaum, MD FACS	X			
Sanjay R. Parikh, MD BSc FACS	X			
Stephen S. Park, MD	X			
Mark S. Persky, MD FACS	X			
Karen T. Pitman, MD FACS	X			
Brent A. Senior, MD FACS		(1) ENTvantage; (2) Olympus; (3) Sinuwave; (4) Spirox	(1) consultant; (2) consultant; (3) consultant; (4) consultant	(1) fee; (2) fee; (3) fee; (4) fee
Richard V. Smith, MD FACS	X			
Timothy L. Smith, MD MPH FACS		Intersect ENT	consultant	fee
Maie A. St. John, MD	X			
David L. Steward, MD FACS		Astra Zeneca	clinical trial	nothing received
Fred F. Telischi, MD FACS		(1) Med El Corp.; (2) Medtronic	(1) surgical advisory board; (2) project consultant	(1) consulting fee; (2) consulting fee
Donald T. Weed, MD FACS	X			
Gregory J. Wiet, MD FACS		(1) HHS AHRQ; (2) NIH/NIDCD	(1) ad hoc study section member; (2) research PI	(1) nothing received; (2) research funding
Brian J.F. Wong, MD PhD		(1) Aerin Medical, Inc.; (2) Lockheed-Martin, Inc.; (3) OCT Medical Imaging, Inc.; (4) Praxis BioSciences, Inc.; (5) Reshape LifeSciences LLC	(1) patent holder; (2) grant holder; (3) grant holder; (4) equity holder; (5) consultant	(1) patent royalties; (2) grant support; (3) grant support; (4) equity interest; (5) nothing received
Peak Woo, MD FACS	X			

PLANNING COMMITTEE	NOTHING TO DISCLOSE	DISCLOSURE		
		COMPANY	ROLE	RECEIVED
Adam M. Zanation, MD		(1) Acclarent; (2) Intuitive Surgical; (3) Medtronic; (4) Stryker	(1) consultant; (2) surgical proctor; (3) consultant; (4) consultant	(1) fee; (2) nothing received; (3) fee; (4) fee

Rev 05-2015

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## **Guests of Honor**

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**Eastern Section** Andrew Blitzer, MD DDS FACS, New York, NY  
**Middle Section** Richard A. Chole, MD PhD, St. Louis, MO  
**Southern Section** Ted A. Cook, MD FACS, Portland, OR  
**Western Section** James L. Netterville, MD FACS, Nashville, TN

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## **Citation Awardees**

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Anthony F. Jahn, MD FACS, New York, NY  
Jean Anderson Eloy, MD FACS, Newark NJ  
Rosalie Greenberg, MD, Montclair, NJ

### **Southern Section**

Dee Neitz, Charlottesville, VA  
Paul A. Levine, MD FACS, Charlottesville, VA  
Robert W. Cantrell, MD, Charlottesville, VA

### **Middle Section**

Mark L. Urken, MD, New York, NY  
Bradley F. Marple, MD, Dallas, TX  
Theodoros N. Teknos, MD FACS, Columbus, OH

### **Western Section**

Roger L. Crumley, MD MBA FACS, Irvine, CA  
Maisie Shindo, MD, Portland, OR  
David W. Eisele, MD FACS, Baltimore, MD

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## **Keynote Speaker**

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Steven H. Lipstein, MHA, President/CEO, BJC HealthCare, St. Louis, MO

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## **Middle Section George Adams Young Faculty Awardees**

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Matthew L. Carlson, MD, Mayo Clinic, Rochester, MN  
Bruce Tan, MD, Northwestern University, Chicago, IL

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## **Resident Research Awardees**

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### **Eastern Section**

Krupal B. Patel, MD - Western University - William W. Montgomery, MD Resident Research Award  
Sidharth Venkata Puram, MD PhD - Massachusetts Eye and Ear Infirmary - John J. Conley, MD Resident Research Award  
Rachel J. Kaye, MD - Montefiore Medical Center - Richard J. Bellucci, MD Resident Research Award

### **Middle Section**

Jacqueline J. Greene, MD - Northwestern University - Henry Williams, MD Resident Research Award  
John D. Cramer, MD - Northwestern University Feinberg School of Medicine - Dean Lierle, MD Resident Research Award  
Todd J. Wannemuehler - Indiana University School of Medicine - John R. Lindsay, MD Resident Research Award

### **Southern Section**

Brian W. Hixon, MD - University of Kentucky - John E. Bordley, MD Resident Research Award  
Matthew G. Crowson, MD - Duke University Medical Center - Lester A. Brown, MD Resident Research Award

### **Western Section**

Jay M. Bhatt, MD - University of California at Irvine - Vice President's Resident Research Award  
Sophie G. Shay, MD - University of California at Los Angeles - Shirley Baron Resident Research Award

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## **Triological Society Research Grant Programs**

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The Society continues to promote research into the causes of and treatments for otolaryngic diseases by providing financial support for the research efforts of young otolaryngologists-head and neck surgeons. The Society has awarded in excess of \$4 million to otolaryngologists-head and neck surgeons in support of clinical and basic research. These competitive research grant programs have included funding for resident research projects, research training grants, and career development grants.

**CLINICAL SCIENTIST DEVELOPMENT AWARDS:** The Triological Society and the American College of Surgeons combined competitive grant program provides supplemental funding to otolaryngologists-head and neck surgeons who have received a new NIH Mentored Clinical Scientist Development Award (K08/K23) or have an existing award with a minimum of 3 years remaining in the funding period. This award is a means to facilitate the research career development of otolaryngologists with the expectation that the awardee will have sufficient pilot data to submit a competitive R01 proposal prior to the conclusion of the K award. This award provides financial support in the amount of \$80,000 per year for up to five years, or for the remainder of the term of existing grants, to supplement the K08/K23 award.

**The 2015-2016 Triological/American College of Surgeons Clinical Scientist Development Awardees (TRIO/ACS) and the funded projects are:**

- New -- Alexander Tell Hillel, MD - *Immune Cell Modulation in Laryngotracheal Fibrosis*
- Renewal -- Devraj Basu, MD PhD FACS - *Targeting Mesenchymal-Like Cells in Oral Cancer to Overcome Cetuximab Resistance*
- Renewal -- Akihiro J. Matsuoka, MD PhD - *Nanotechnological Regeneration of Spiral Ganglion Neurons with Human Stem Cells*
- Renewal -- Bruce Kuang-Huay Tan, MD - *Role for B-cell Mediated Olfactory Loss in Chronic Sinusitis with Nasal Polyps*

**The 2015-2016 Triological Society Clinical Scientist Development Awardee and the funded project is:**

- Steven J. Eliades, MD PhD - *Cortical Mechanisms of Auditory-Vocal Interaction*

**CAREER DEVELOPMENT AWARDS:** The purpose of the Career Development awards is to provide support for the research career development of otolaryngologists-head and neck surgeons whose projects have specific application in the field of otolaryngology-head and neck surgery. Categories of projects that qualify for submission are:

1. CLINICAL RESEARCH - Prospective or retrospective clinical data collection with direct clinical application
2. BASIC RESEARCH - Laboratory studies, in vivo, in vitro; animal studies, genetic studies
3. HEALTH SERVICES AND OUTCOMES RESEARCH - Patient outcomes, health related QOL; epidemiology, diversity, population statistics; cost analysis, modeling, decision analysis, etc.
4. TECHNOLOGY/PROCEDURE DEVELOPMENT - Development, standardization, beta testing of new technology; equivalency studies
5. OTOLARYNGOLOGY STATUS AND TRENDS - Resident and medical education; impact of health care delivery systems in society
6. HISTORICAL PERSPECTIVES - Medical history as it has influenced contemporary otolaryngology knowledge and practice

Letters of Intent were due December 1st and applications are due January 15, 2016. Call for proposals will be available later in 2016.

Guidelines and additional information are available at the Triological website - [www.triological.com/researchgrants.html](http://www.triological.com/researchgrants.html)



**2016 TRIOLOGICAL SOCIETY COMBINED SECTIONS MEETING  
LOEWS MIAMI BEACH HOTEL - MIAMI BEACH, FLORIDA  
JANUARY 22-24, 2016**

**FRIDAY, JANUARY 22, 2016  
AMERICANA 1 & 2**

- 7:00 - 7:55**      **Breakfast with Exhibitors - Americana 3 & 4**
- 7:55**              **Welcome by Vice Presidents**
- 8:00**              **Eastern Section Guest Introductions - Soly Baredes, MD FACS, Newark, NJ**  
**Citation Awardees:**    Anthony F. Jahn, MD FACS, New York, NY  
                                 Jean Anderson Eloy, MD FACS, Newark NJ  
                                 Rosalie Greenberg, MD, Montclair, NJ
- Guest of Honor:**        Andrew Blitzer, MD DDS FACS, New York, NY  
                                 **Refocusing Our Medical Priorities**
- 8:15**              **Southern Section Guest Introductions - Stephen S. Park, MD, Charlottesville, VA**
- Citation Awardees:**    Dee Neitz, Charlottesville, VA  
                                 Paul A. Levine, MD FACS, Charlottesville, VA  
                                 Robert W. Cantrell, MD, Charlottesville, VA
- Guest of Honor:**        Ted A. Cook, MD FACS, Portland, OR  
                                 **Otorhinolaryngology and Head & Neck Surgery--The Long  
Term Winner**
- 8:30**              **Western Section Guest Introductions - William B. Armstrong, MD FACS, Irvine, CA**
- Citation Awardees:**    Roger L. Crumley, MD MBA FACS, Irvine, CA  
                                 Maisie Shindo, MD, Portland, OR  
                                 David W. Eisele, MD FACS, Baltimore, MD
- Guest of Honor:**        James L. Netterville, MD FACS, Nashville, TN  
                                 **Lessons Learned from my Heroes**
- 8:45**              **Middle Section Guest Introductions - Brian Nussenbaum, MD FACS, St. Louis, MO**
- Citation Awardees:**    Mark L. Urken, MD, New York, NY  
                                 Bradley F. Marple, MD, Dallas, TX  
                                 Theodoros N. Teknos, MD FACS, Columbus, OH
- Guest of Honor:**        Richard A. Chole, MD PhD, St. Louis, MO  
                                 **Research in Otolaryngology - Is It Worth the Investment?**
- Introduction of Middle Section George Adams Young Faculty Awardees -**  
Brian Nussenbaum, MD FACS, St. Louis, MO  
**Matthew L. Carlson, MD, Mayo Clinic, Rochester, MN**  
**Bruce Tan, MD, Northwestern University, Chicago, IL**
- 9:05**              **Presidential Address - Fred D. Owens, MD, Dallas, TX**  
**Change**
- 9:20**              **Tribute to Maureen Hannley, PhD - Dana M. Thompson, MD FACS, Chicago, IL**

# Friday

9:25 - 9:55 Break with Exhibitors/View Posters - Americana 3 & 4

9:55 **Honorable Mention 2015 Thesis Presentation**  
**Feasibility of Intraoperative Margin Control Utilizing High Resolution Microendoscopy Optical Imaging for Head and Neck Squamous Cell Carcinoma**  
Brett A. Miles, MD DDS FACS, New York, NY

**Educational Objective:** At the conclusion of this presentation the participants should be able to understand the capabilities and limitations of optical margin assessment with high resolution endomicroscopy.

**Objectives:** High resolution microendoscopy (HRME) provides real time visualization of the mucosal surface in the upper aerodigestive tract. This technology allows noninvasive discrimination of benign and neoplastic epithelium and has potential applications for intraoperative margin detection. **Study Design:** Single institution, prospective, feasibility trial (phase I) of in vivo optical imaging. **Methods:** The study was conducted on patients with squamous cell carcinoma of the upper aerodigestive tract. High resolution microendoscopy images obtained during surgery were correlated with histopathologic diagnosis to determine the ability of HRME to differentiate between benign and malignant mucosa. Blinded reviewers evaluated HRME images and made determinations of the status of the mucosa. Accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and interrater agreement between multiple raters were calculated to determine the accuracy of HRME imaging. **Results:** The mean accuracy of reviewers in differentiating neoplastic or benign mucosa was 95.1% (95% confidence interval [CI], 94%-96 %). Sensitivity and specificity were 96% (95% CI, 94%-99 %) and 95% (95 % CI, 90%-99 %), respectively. The NPV was 98% (95% CI, 97%-99%), and PPV was 91% (95% CI, 85%-98%). The Fleiss kappa statistic for interrater reliability was 0.81, with a standard error of 0.014 and a 95% CI (0.78-0.84). **Conclusions:** High resolution microendoscopy allows real time discrimination between benign and neoplastic mucosa. High levels of sensitivity and specificity can be obtained with this technology when interrogating mucosal surfaces. Despite several technical limitations, HRME shows promise as a technique for intraoperative margin control and platform for molecular imaging technologies.

10:02 **Honorable Mention 2015 Thesis Presentation**  
**The Development of an In Vitro and In Vivo Derived Tissue-Engineered Cartilage for Pediatric Laryngotracheal Reconstruction in a Rabbit Model**  
Ian N. Jacobs, MD FACS, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand the challenges and process to create tissue engineered cartilage; and 2) see a potential application of tissue engineered cartilage.

**Objectives:** To develop an effective rabbit model of in vitro and in vivo derived tissue-engineered cartilage for laryngotracheal reconstruction (LTR). **Study Design:** 1) Determination of the optimal scaffold 1% hyaluronic acid (HA), 2% HA, and polyglycolic acid (PGA) and in vitro culture time course using a pilot study of 4x4 mm in vitro derived constructs analyzed on a static culture versus zero gravity bioreactor for 4, 8 and 12 weeks with determination of compressive modulus and histology as outcome measures. 2) Three stage survival rabbit experiment utilizing autologous auricular chondrocytes seeded in scaffolds, either 1% HA or PGA. The constructs were cultured for the determined in vitro time period and then cultured in vivo for 12 weeks. Fifteen LTRs were performed using HA cartilage constructs and one was performed with a PGA construct. All remaining specimens and the final reconstructed larynx underwent mechanical testing, histology, glycosaminoglycan (GAG) content determination, and compared to cricoid control specimens (n= 13) and control LTR using autologous thyroid cartilage (n=18). **Methods:** 1) One rabbit underwent an auricular punch biopsy and its chondrocytes were isolated and expanded and then encapsulated in eight 4x4 mm discs of 1% HA, 2% HA, PGA either in rotary bioreactor or static culture for 4, 8 and 12 weeks with determination of compressive modulus, GAG content and histology. 2) Sixteen rabbits underwent ear punch biopsy; chondrocytes were isolated and expanded. The cells were seeded in 13x5x2.25 mm UV photopolymerized 1% HA (w/w) or calcium alginate encapsulated synthetic PGA (13x5x2 mm); the constructs were then incubated in vitro for 12 weeks (the optimal time period determined in #1) on a shaker. One HA and one PGA construct from each animal was tested mechanically and histologically, and the remaining 8 (4 HA and 4 PGA) were implanted in the neck. After 12 weeks in vivo, the most optimal appearing HA construct was used as a graft for LTR in 15 rabbits and PGA in one rabbit. The 7 remaining specimens underwent H&E, Safranin O, GAG content determination and flexural modulus testing. At 12 weeks postoperative the animals were euthanized and underwent endoscopy. The larynges underwent mechanical and histological testing. All animals that died underwent postmortem examination including gross and micro-histological analysis of the reconstructed airway. **Results:** Thirteen of the 15 rabbits that under-

went LTR with HA in vitro and in vivo derived tissue-engineered cartilage constructs survived. The 1% HA specimens had the highest modulus and GAG after 12 weeks in vitro. The HA constructs became well integrated in the airway, supported respiration for the 12 weeks and were histologically and mechanically similar to autologous cartilage. **Conclusions:** The engineering of in vitro and in vivo derived cartilage with HA is a novel approach for laryngotracheal reconstruction. The data suggests that the in vitro and in vivo derived tissue engineered approaches may offer a promising alternative to current strategies used in pediatric airway reconstruction as well as other head and neck applications.

**10:10 - 11:05**      **How I Do It Video Session**  
**Moderator:**      Sigsbee W. Duck, MD, Rock Springs, WY  
                         **Simulation in Otolaryngology Training**  
                         Marvin P. Fried, MD FACS, Bronx, NY  
                         **Sleep Endoscopy**  
                         Stacey L. Ishman, MD MPH, Cincinnati, OH  
                         **Botox for Head and Neck Disorders**  
                         Natasha Mirza, MD FACS, Philadelphia, PA

**11:05**              **Q&A**

**11:10 - 12:00**      **Keynote Address: America's Journey to the Triple Aim: Where Are We?**  
Steven H. Lipstein, MHA, President/CEO, BJC HealthCare, St. Louis, MO

**12:00 - 1:10**      **Lunch/Visit Exhibits/View Posters - Americana 3 & 4**

## **CONCURRENT SESSION 1A - HEAD AND NECK AMERICANA 1**

**Moderators: William B. Armstrong, MD FACS, Irvine, CA  
Soly Baredes, MD FACS, Newark, NJ**

**1:10**              **Salvage Transoral Robotic Surgery: Feasibility and Outcomes**  
Karen Y. Choi, MD, Bronx, NY; Caitlin P. McMullen, MD, Bronx, NY; Richard V. Smith, MD, Bronx, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the feasibility of the use of TORS as salvage for the treatment of recurrent or second primary head and neck cancer.

**Objectives:** To review outcomes after salvage transoral robotic surgery (TORS) for second primary (SP) or recurrent head and neck cancer at a tertiary referral center. **Study Design:** Retrospective review. **Methods:** All patients with a history of previously treated head and neck cancer who developed a recurrent/SP tumor and underwent TORS were included. **Results:** Nineteen patients were identified with a median followup time of 10.6 months (1.5 - 58 months). Median time between initial diagnosis of primary tumor to recurrence or SP was two years (3 months to 15 years). Eighteen patients received radiation for primary tumor treatment and thirteen received chemoradiation. The tongue base was the most common site for primary tumor and recurrent/SP tumors. Twenty-one percent of recurrent/SP tumors were T1. Adequate transoral exposure was achieved in all patients. Three patients experienced intraoperative complications: hemorrhage in 1 and a need for open resection for complete ablation in 2. The most common postoperative complication was salivary fistula, occurring in 4 patients (21%) and 2 patients experienced postoperative hemorrhage. Seven patients required feeding tubes, one of which was successfully removed. Seven patients had tracheotomies: 4 were decannulated and 3 were converted to a laryngeal stoma. At last followup, 12 patients had no evidence of disease, 4 had active disease, 3 died of disease and 5 died of other causes. Median survival after TORS was 10.9 months (5 -12 months). **Conclusions:** Surgical salvage with TORS is feasible and may offer reasonable alternative for treatment of recurrent/SP head and neck cancer patients.

# Friday

1:17

## **Occult Pharyngoesophageal Injuries Associated with Cervical Osteomyelitis in Post-Radiation Head and Neck Cancer Patients: A Case Series**

Nandini Govil, MD MPH, Pittsburgh, PA; Nicole C. Schmitt, MD, Pittsburgh, PA; Joon Y. Lee, MD, Pittsburgh, PA; Seungwon Kim, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the treatment of three post-radiation patients with cervical osteomyelitis and discuss the relevant literature on occult pharyngoesophageal injuries in post-radiation head and neck cancer patients.

**Objectives:** Head and neck cancer patients treated with prior radiation are at risk for pharyngoesophageal injury following surgical manipulation. Occult pharyngoesophageal injuries in these patients can lead to severe infections of the cervical spine. There are no guidelines for the treatment of these patients. **Study Design:** Retrospective case series of patients presenting to a tertiary care medical center. **Methods:** We present a retrospective series of 3 patients with history of prior radiotherapy for head and neck cancer and recent surgical instrumentation who presented with C5-C6 or C6-C7 osteomyelitis. **Results:** Patients presented 6 months to 2 years after finishing radiation treatment for laryngeal carcinoma with neck pain and dysphagia. All patients had a history of recent surgical manipulation 2-3 months prior to presentation (pharyngoesophageal dilation or tracheostomy). Two patients had full thickness injuries of the posterior pharyngeal wall. Cervical osteomyelitis was managed in one patient with intravenous antibiotics; the other patients required incision and drainage, cervical fusion, and primary closure of the pharynx with drain placement or local rotational flap.

**Conclusions:** A high index of suspicion for spinal complications is required for head and neck cancer patients with prior radiation therapy who present with dysphagia or neck pain following dilation or other surgical manipulation of the pharynx. We present the successful treatment of three patients with conservative measures including antibiotics, long term tube feeding, and primary closure.

1:24

## **John J. Conley, MD Resident Research Award**

### **Quality Indicators for Head and Neck Oncologic Surgery: Academic versus Nonacademic Outcomes**

Sidharth Venkata Puram, MD PhD, Boston, MA; Neil Bhattacharyya, MD FACS, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss national quality metrics for head and neck cancer (HNCA) surgery and discuss the differences in HNCA surgery outcomes between academic and nonacademic institutions.

**Objectives:** Determine factors influencing quality indicators for HNCA surgery, focusing on academic versus non-academic institutions. **Study Design:** Cross-sectional analysis of national database. **Methods:** HNCA surgery admissions from 2009-2011 from the Nationwide Inpatient Sample were analyzed for preoperative characteristics and postoperative outcomes. Multivariate analyses were used to identify factors influencing quality indicators after HNCA surgery. Quality metrics: length of stay (LOS), inpatient death, return to the operating room (OR), wound complications (infection, dehiscence, hematoma, fistula) and transfusion were compared for academic versus non-academic institutions. **Results:** 38,379 HNCA surgery inpatient admissions (mean age, 56.5 years; 52.4% male) were analyzed (28,288 teaching versus 10,091 non-teaching). Nationally representative quality metrics for HNCA surgery were mean LOS: 4.26±0.12 days, return to OR: 3.3±0.2%, inpatient mortality: 0.7±0.1%, wound infection rate: 0.9±0.1%, wound complication rate: 4.3±0.2%, and transfusion rate: 4.3±0.3%. HNCA surgery patients at teaching hospitals had greater proportion of male patients, radiation history, high acuity procedures and greater comorbidity scores (all p<0.001). Multivariate analyses adjusting for age, sex, income, payer, prior radiation, comorbidity scores, procedural acuity demonstrated that teaching hospitals had a slightly increased LOS (+0.30 days; p=0.009) and odds ratio for wound problems (1.54 [1.22-1.94]) versus non-teaching hospitals. There were no significant differences in return to OR (p=0.271), inpatient mortality (p=0.686), or transfusion rate (p=0.960). **Conclusions:** Despite caring for substantially more complex HNCA surgery patients with greater comorbidities, teaching hospitals demonstrate only a marginally increased LOS and wound complication rate versus non-teaching hospitals, while other quality metrics are similar.

1:31

## **Discharge Destination after Head and Neck Surgery: Predictors of Discharge to Postacute Care**

John D. Cramer, MD, Chicago, IL; Sandeep Samant, MD, Chicago, IL; Urjeet A. Patel, MD, Chicago, IL; Stephanie S. Smith, MD MS, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should understand the rate of discharge

to postacute care for different head and neck operations as well as for different patient characteristics and comorbidities in order to accurately discuss the likelihood of discharge to postacute care with their patients.

**Objectives:** In recent decades there has been a reduction in the length of postoperative hospital stay with a corresponding increase in discharge to postacute care. While discharge to postacute care facilities represents a meaningful, patient centered outcome, little has been published on the rate of discharge to postacute care facilities after head and neck surgery. **Study Design:** We performed a multicenter, cohort study of the American College of Surgeons National Surgical Quality Improvement Program from 2011-2013. **Methods:** We identified 21,963 patients undergoing head and neck surgery and compared the rate of discharge to home versus postacute care facilities and used multivariate logistic regression to identify predictors of discharge to postacute care. **Results:** The overall rate of discharge to postacute care facilities was 15.8% after major head and neck surgery including 17.3% after total laryngectomy, 16.2% after total glossectomy or composite resection and 14.1% after free tissue transfer. The rate of discharge to postacute care facilities was only 1.4% after non-major head and neck surgery. On multivariate analysis, significant preoperative predictors of discharge to postacute care were age, functional status, American Society of Anesthesiology class, major surgical procedures, preoperative ventilator use, wound infection, dyspnea, or disseminated cancer. Postoperative predictors of discharge to postacute care included stroke, myocardial infarction or cardiac arrest, prolonged mechanical ventilation, pneumonia, sepsis and length of stay. **Conclusions:** Use of postacute care facilities after surgery is associated with several preoperative risk factors. The likelihood of discharge to postacute care should be discussed with patients at significant risk.

**1:38                      Readmission following Primary Surgery for Larynx and Oropharynx Cancer in the Elderly**  
Hamad Chaudhary, MD, Baltimore, MD; Kimberly Webster, MA CCC-SLP, Baltimore, MD; Robert J. Herbert, BS, Baltimore, MD; David W. Eisele, MD, Baltimore, MD; Kevin D. Frick, PhD, Baltimore, MD; Christine G. Gourin, MD MPH, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the incidence and risk factors for 30 day hospital readmissions and the effect of unplanned readmissions on survival and costs in elderly patients with larynx and oropharynx cancer.

**Objectives:** To examine 30 day readmission rates and associations with risk factors, survival and costs in elderly patients with laryngeal and oropharyngeal squamous cell cancer (SCCA). **Study Design:** Retrospective cross-sectional analysis of Surveillance, Epidemiology, and End Results (SEER) Medicare data. **Methods:** We evaluated 1,518 patients diagnosed with laryngeal or oropharyngeal SCCA from 2004-2007 who underwent primary surgery using cross-tabulations, multivariate logistic and generalized linear regression modeling, and survival analysis. **Results:** Thirty day readmission occurred in 14.0%, was more likely in patients with postoperative complications during initial hospitalization (24.8% vs. 4.5%,  $P < 0.001$ ), and was associated with an increased 30 day mortality incidence rate (5.1% vs. 0.9%;  $P < 0.001$ ). On multivariate analysis, 30 day readmission was significantly associated with advanced stage (OR=1.81[1.13-2.90]), comorbidity (OR=2.69[1.65-4.39]), divorced/separated marital status (OR=2.00[1.19-3.38]), preoperative tracheostomy (OR=3.39[1.55-7.44]), major surgical procedures (OR=2.58[1.68-3.97]), greater length of initial hospitalization (OR=1.72[1.09-2.71]), pneumonia (OR=2.86[1.28-6.40]), dysphagia (OR=5.97[2.48-15.83]), and cardiovascular events (OR=5.84[1.89-17.96]). Thirty day readmission was significantly associated with 30 day mortality (OR=5.89[2.21-15.70]) and a significantly higher 1 year mortality rate (68% vs. 89%,  $P < 0.001$ ). The mean incremental costs of surgical care were significantly greater for patients with unplanned readmission (\$15,123[\$10,514-\$19,732]), after controlling for all other variables. **Conclusions:** Unplanned readmissions are associated with increased short and long term mortality and costs. Elderly patients with advanced disease, advanced comorbidity, lack of spousal support, pretreatment organ dysfunction, more extensive surgery, postoperative pneumonia, dysphagia, and prolonged hospital stay are at increased risk of 30 day readmissions. These findings suggest a need for targeted interventions before, during, and after hospitalization to reduce morbidity, mortality, and excess costs in this high risk population.

**1:45                      Diagnostic Delay in HPV Related Oropharyngeal Squamous Cell Carcinoma**  
Patrick O. McGarey, MD, Charlottesville, VA; Edwin F. Crandley, MD, Norfolk, VA; David D. Wilson, MD, Charlottesville, VA; Austin J. Sim, BS, Charlottesville, VA; Paul W. Read, MD PhD, Charlottesville, VA; Mark J. Jameson, MD PhD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the differences in presentation and diagnosis between HPV+ and HPV- OPSCC. The participants should be able to discuss underlying factors contributing to delayed diagnosis in HPV+ OPSCC.



comes for cancer patients by minimizing removal of normal functional tissue while also ensuring complete tumor removal. The objective herein is to demonstrate the utility of DOCI in reliably and accurately delineating tumor tissue from surrounding normal tissues. **Study Design:** Patients with OSCC requiring surgery were identified and consented for involvement in this IRB approved study. **Methods:** OSCC specimens and surrounding tissues from the surgical bed were collected; fluorescence decay images were acquired using a wide field DOCI system. Samples (55 patients) were subsequently processed for standard histological assessment by head and neck pathologists. Mean relative fluorescence decay signatures were calculated for tumor, fat, muscle and collagen tissues. Statistical analyses were performed using the Wilcoxon signed rank test. **Results:** Qualitative analysis of DOCI 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 ten of ten wavelength bands analyzed, between tumor and muscle in ten bands, and between fat and tumor in two bands. **Conclusions:** This study demonstrates a novel imaging modality capable of rapidly and significantly distinguishing OSCC from surrounding normal tissue. Such an intraoperative tool would be transformative: allowing for an intraoperative capacity to delineate tumor tissue from non-tumor tissue, thus maximizing the efficacy of tumor resection and minimizing damage to adjacent structures, thus improving patient outcomes.

**2:06** Q&A

**2:10 - 3:00** **Head & Neck Panel: Evaluation of the Head and Neck Mass**

**Moderator:** Dennis H. Kraus, MD FACS, New York, NY  
**Panelists:** Francisco J. Civantos, MD FACS, Miami, FL  
Jonas T. Johnson, MD FACS, Pittsburgh, PA  
Richard V. Smith, MD FACS, Bronx, NY  
Maie A. St. John, MD, Los Angeles, CA

**3:00** Q&A

**3:05 - 3:30** Break with Exhibitors/View Posters

## CONCURRENT SESSION 1B - OTOTOLOGY/NEUROTOLOGY AMERICANA 2

**1:10 - 2:05** **Otology Panel: What They Did Not Teach You about Tinnitus**

**Moderator:** George T. Hashisaki, MD FACS, Charlottesville, VA  
**Panelists:** Carol A. Bauer, MD FACS, Springfield, IL  
Sujana S. Chandrasekhar, MD, New York, NY  
Jay Piccirillo, MD FACS, St. Louis, MO  
Michael J. Ruckenstein, MD FACS, Philadelphia, PA

**2:05** Q&A

**Moderators: Douglas D. Backous, MD FACS, Seattle, WA  
Craig A. Buchman, MD FACS, St. Louis, MO**

**2:10** **Cochlear Implantation in Patients with Syndromic Hearing Loss from Mitochondrial Diseases**

Euna Hwang, MD FRCS, Toronto, ON Canada; George Kurien, MD FRCS, Toronto, ON Canada; Leah Smith, MA CCRA, Toronto, ON Canada; David Y.W. Oh, BSc, Toronto, ON Canada; Joseph M. Chen, MD FRCS, Toronto, ON Canada; Vincent Y.W. Lin, MD FRCS, Toronto, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that sensorineural hearing loss is an important clinical feature of mitochondrial syndromes that can be effectively managed with cochlear implantation.

**Objectives:** To assess the characteristics and outcomes of patients with mitochondrial diseases and associated syndromic hearing loss who underwent cochlear implantation. **Study Design:** Retrospective case series. **Methods:** The patient characteristics and audiologic data of 14 individuals with mitochondrial syndromes who received a cochlear

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implant during the period from 1984 to 2014 were reviewed. Pre- and post-implant speech discrimination test results were compared. **Results:** Five men and nine women with mitochondrial diseases underwent cochlear implantation. The mean age at time of surgery was 49.8 years. Two patients had Kearns-Sayre syndrome; six had mitochondrial encephalopathy, lactic acidosis, and stroke-like episodes (MELAS); and six had another type of mitochondrial myopathy. The mean preoperative pure tone average in the implanted ear was 94.4 dB HL. The mean preoperative speech awareness or reception threshold in the implanted ear was 86.3 dB HL. Nine patients were followed until at least one year of implant use and demonstrated significant postoperative improvements in speech recognition as their mean Hearing in Noise Test (HINT) scores improved from 34.1% to 77.6% ( $p = 0.02$ ). Individually, none of the patients showed a decrease in their HINT score post-implantation. **Conclusions:** This is the largest series of patients receiving a cochlear implant for mitochondrial syndromic hearing loss reported to date. Sensorineural hearing loss is a clinical symptom that is commonly found in mitochondrial disorders. In our experience, patients with bilateral progressive sensorineural hearing loss secondary to a mitochondrial syndrome can be successfully rehabilitated by cochlear implantation.

## 2:17 Restoration of Clinically Absent Vestibular Evoked Myogenic Potentials Using Electrical Stimulation from Cochlear Implants

William J. Parkes, MD, Toronto, ON Canada; Joshua J. Gnanasegaram, BSc, Toronto, ON Canada; Sharon L. Cushing, MD MSc FRCSC, Toronto, ON Canada; Carmen L. McKnight, MSc, Toronto, ON Canada; Blake C. Papsin, MD MSc FRCSC FACS FAAP, Toronto, ON Canada; Karen A. Gordon, PhD, Toronto, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that electrical stimulation through a cochlear implant can bypass a dysfunctional otolith to elicit vestibular responses.

**Objectives:** To demonstrate vestibular responsiveness to cochlear implant stimulation in the presence of otolithic dysfunction. **Study Design:** Prospective, cross-sectional. **Methods:** Thirty-eight participants (mean age 14.6 years) implanted either unilaterally ( $n=4$ ) or bilaterally ( $n=34$ ; 6 simultaneous, 28 sequential) were recruited. Otolithic vestibular reflexes were evoked using a 500 hertz tone burst stimulus and recorded with surface electrodes (ipsilateral sternocleidomastoid muscle for the cervical [c] vestibular evoked myogenic potential [VEMP] and contralateral inferior oblique muscle for the ocular [o] VEMP). Testing was then repeated using an electrical stimulus generated by Custom Sound EP (Cochlear Corporation, Sydney, Australia) software and delivered via a research processor to the participant's cochlear implant at a maximally tolerated level. **Results:** Acoustic stimulation failed to elicit cVEMPs in 35/71 ears (49%) and oVEMPs in 51/71 ears (72%). In these acoustic non-responders, electrical stimulation restored cVEMPs in 11/35 (31%) and oVEMPs in 14/51 (28%). Across all 38 participants, electrically stimulated responses occurred at earlier latencies than acoustically evoked responses cVEMP P1: 11.6 (1.2) vs 13.8(1.4); cVEMP N1: 18.6 (2.0) vs 21.2 (2.1); oVEMP N1: 7.0 (1.9) vs 8.4 (1.5); oVEMP P1: 9.1 (2.4) vs 11.1 (2.1) (ms  $\pm$  standard deviation). In participants with both acoustic and electric VEMPs, the latency differences were statistically significant across all 4 peaks ( $p < 0.01$ , paired t-test). **Conclusions:** Electrical stimulation through a cochlear implant can bypass a dysfunctional otolith to elicit vestibular responses in a proportion of implantees with childhood deafness. The shorter latencies of these electrically driven responses suggest a more direct path of neural stimulation.

## 2:24 Utility of Perioperative Antibiotics in Cochlear Implant Surgery: A Systematic Review

Samantha Anne, MD MS, Cleveland, OH; Stacey Ishman, MD MPH, Cincinnati, OH; Seth Schwartz, MD MPH, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss current literature that is available on the utility of perioperative antibiotics in cochlear implant surgery.

**Objectives:** Perioperative antibiotics are routinely used for cochlear implant surgery to prevent infection and complications. A previous Cochrane review of antibiotic prophylaxis in ear surgery showed no benefit to antibiotic use; however this review did not include any studies of cochlear implant surgery. The objective of the study is to systematically review the literature pertaining to perioperative antibiotics use and its effect on infections and complications in cochlear implant surgery. **Study Design:** Systematic review. **Methods:** PubMed, EMBASE, Medline, CINAHL, and Cochrane library databases were searched from inception to April 2015. Manual searches of references were also completed. Inclusion criteria included English language articles with original human data that described perioperative use of antibiotics in cochlear implant surgery. Two independent evaluators reviewed all abstracts and articles for outcomes related to infection, meningitis, implant extrusion, and adverse antibiotic effects. **Results:** Three studies met criteria for full review. All three were retrospective reviews. Outcome measures were heterogeneous and often lacked specificity. Overall rate of surgical

site infections ranged from 1%-6%. The antibiotic regimens ranged from single dose to 6 weeks. One paper found no effect of antibiotics, one found higher infection rates in patients receiving longer courses of postop antibiotics (5-7 days), and one found lower major infection rates with 6 weeks of clarithromycin. All studies had significant methodologic flaws. **Conclusions:** Rates of surgical site infection and related complications after cochlear implant surgery are low. We found no quality data to show the harm or benefit of perioperative antibiotics in cochlear implant surgery. Further study is needed.

2:31

## **The Impact of Otology Surgery Videos on Resident Training**

Charles B. Poon, MS, Cincinnati, OH; Ravi N. Samy, MD FACS, Cincinnati, OH; Justin S. Golub, MD FACS, New York City, NY; Shawn Stevens, MD, Cincinnati, OH; Myles L. Pensak, MD FACS, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to critically compare produced videos to standard educational resources for surgical training.

**Objectives:** The use of videos as an educational medium is not a novel concept; however, there is a paucity of high quality video resources available to otolaryngology trainees. We hypothesized this group would preferentially utilize standardized, high definition, narrated videos with an overlay of relevant anatomical illustrations. The aim of this study is to improve resident education via optimization of an instructional video format as an educational tool that may be superior to current resources for surgical education. **Study Design:** Prospective study. **Methods:** A video library of otologic procedures was formatted via time stamping to coincide with expert level narration with critical procedural steps, text subtitles, relevant instrumentation, orientation to anatomical structures, and animations facilitating 3 dimensional understanding in a 2 dimensional format. Otolaryngology trainees of postgraduate years (PGY) 1-8 (n=15) watched otologic videos and completed assessment tools focused on: impact on preoperative preparation time, improvement in self-efficacy, and usefulness of the video as a learning tool when compared to current resources. **Results:** Self-reported preparation time was significantly reduced by using the provided resources (P<0.001). Trainees reported increased self-efficacy (P<0.001) and deemed provided videos significantly more useful as a learning tool than current resources (P<0.001). **Conclusions:** The proposed video format may increase learning efficiency and self-efficacy among otolaryngology trainees; on screen delineation of anatomy may eliminate educational uncertainty among novices. Using high end video formatting of this nature should be considered by educators to improve learner confidence and ability. We recognize the small sample size is a limitation of this study. Future research correlating use of developed resources to operating room performance is needed.

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## **Lester A. Brown, MD Resident Research Award**

### **Cost Analysis and Outcomes of a Second Look Tympanoplasty Mastoidectomy Strategy for Cholesteatoma: Expensive Reassurance?**

Matthew G. Crowson, MD, Durham, NC; Vaibhav Ramprasad, BA, Durham, NC; Nikita Chapurin, BA, Durham, NC; Calhoun D. Cunningham, MD, Durham, NC; David M. Kaylie, MD, Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the historical rationale for the second look tympanoplasty mastoidectomy and be able to explain the cost of a second look strategy outweighs the benefit for recurrent cholesteatoma surveillance.

**Objectives:** To analyze cost and compare cholesteatoma recidivism and hearing outcomes with single stage and second look operative strategies. **Study Design:** Retrospective review and cost analysis. **Methods:** Adult and pediatric patients who underwent a tympanoplasty mastoidectomy for cholesteatoma with a single stage or second look operative strategy were identified. Variables included procedure approach, residual or recurrent cholesteatoma, ossicular chain reconstruction frequency, and operative complications. Audiologic outcomes included pre/postoperative air bone gap (ABG) and word recognition score (WRS). Cost analysis included charges for consultation and followup visits, surgical procedures, CT temporal bone scans, and audiology visits. **Results:** 106 patients had a tympanoplasty mastoidectomy for cholesteatoma with 80 canal wall up (CWU) as initial approach. 46 (57.5%) CWU patients had a planned second look. Two (2.5%) had recurrent and 20 (25%) residual cholesteatoma identified at second look. Four (5.0%) single stage CWU strategy patients developed recurrent cholesteatoma. No significant difference in pre/postoperative ABG and WRS between second look and single stage (p>0.05). Compared to second look patients, single stage patients had significantly less postoperative visits (6.32 vs. 10.4; p=0.007), and significantly less overall charges for care (\$23,529 vs. \$41,411; p<0.0001). **Conclusions:** The goal of cholesteatoma surgery is to produce a safe ear, and a second look strategy after CWU has historically been used to evaluate for recurrent or residual disease. The cholesteatoma recurrence rate at a second look after a CWU tympanoplasty mastoidectomy is low. Costs of operative procedures are a significant proportion of healthcare

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resource expenditures. Considering the low rate of cholesteatoma recurrence and relatively high cost of care, implementation of a second look strategy should be individually tailored and not universally performed.

## 2:45 Collagen and $\pm$ -Tubulin Expression of Tympanic Membrane Fibroblasts Treated with Quinolone and Aminoglycoside Antibiotics

Bailey A. Milne-Davies, AA, Gainesville, FL; Patrick J. Antonelli, MD, Gainesville, FL; Nicklas C. Orobello, BS, Gainesville, FL; Carolyn O. Dirain, PhD, Gainesville, FL

**Educational Objective:** At the conclusion of this presentation, the participants will learn the impact of topical antibiotic exposure on TM collagen and tubulin protein synthesis.

**Objectives:** Treatment of tympanic membrane (TM) fibroblasts with ciprofloxacin at levels found in eardrops has been found to dramatically reduce collagen and  $\pm$ -tubulin levels and increase the rate of TM perforations. This study aimed to assess collagen and  $\pm$ -tubulin levels of TM fibroblasts treated with different quinolones and aminoglycoside antibiotics at concentrations found in eardrops. **Study Design:** Controlled, in vitro. **Methods:** Mouse TM fibroblasts were cultured until they were approximately 75% confluent, then treated with phosphate buffered saline (negative control), dilute hydrochloric acid (positive control), 0.3% ciprofloxacin (cipro), 0.3% cipro + 0.1% dexamethasone (cipro-dex), 0.3% ofloxacin, 0.5% gatifloxacin, 0.5% moxifloxacin, 0.3% gentamicin, or 3.5 mg/mL neomycin + polymyxin B sulfate + hydrocortisone (NPH), for 24 or 48 hours. Cells were observed with phase contrast microscope until harvested. Proteins were extracted for Western blotting using antibodies against collagen1A1 and  $\pm$ -tubulin and densitometry to quantify levels. **Results:** Collagen and tubulin levels in fibroblasts treated with ofloxacin, moxifloxacin, gatifloxacin, or gentamicin, for 24 or 48 hours, were not different from the negative control. Fibroblasts treated with NPH, cipro-dex, or cipro for 24 hours had lower collagen ( $p=0.005$ ,  $p=0.01$ , and  $p=0.08$ ) and tubulin ( $p<0.0001$ ) levels than the negative control. After 48 hours, fibroblasts treated with NPH or cipro-dex had lower collagen ( $p=0.006$ ,  $p=0.005$ ) and tubulin ( $p<0.0001$ ) compared to control. Phase contrast images mirrored the collagen and tubulin findings. **Conclusions:** The adverse impact of topical antibiotic exposure on TM collagen and tubulin protein levels is drug specific, not a class effect. This should be considered when selecting otological therapy.

## 2:51 Selective Stimulation of Facial Muscles with a Penetrating Intraneural Multichannel Electrode Array in the Feline Model

Jay M. Bhatt, MD, Orange, CA; Ronald Sahyouni, BA, Irvine, CA; Zachariah Chandy, BA, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA; John C. Middlebrooks, PhD, Irvine, CA; Harrison W. Lin, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the penetrating intraneural multichannel electrode array and its applications in the management of facial nerve paralysis.

**Objectives:** Permanent facial nerve injury is a challenge for patients and physicians, with potential for debilitating functional and cosmetic sequelae. Although current surgical interventions have provided considerable advancements in facial nerve rehabilitation, they often fail to fully address all impairments. We aim to introduce an alternative approach to facial nerve rehabilitation. **Study Design:** Acute experiments in animals with normal facial function. **Methods:** The study included three cats (*felis catus*). Four facial muscles (orbicularis oris, orbicularis oculi, nasalis, intermedius scutulorum) were monitored with a standard electromyographic (EMG) facial nerve monitoring system with needle electrodes. The main trunk of the facial nerve was exposed and a 16 channel penetrating electrode array was placed into the nerve. Electrical current pulses were delivered to each stimulating electrode individually. Elicited EMG voltage outputs were recorded for each muscle. **Results:** Stimulation through individual channels selectively activated restricted nerve populations, resulting in selective contraction of individual muscles. Increasing stimulation current levels resulted in increasing EMG voltage responses. Typically, selective activation of two or more distinct muscles was successfully achieved via a single placement of the multichannel electrode array by selection of appropriate stimulation channels. **Conclusions:** We have established in the animal model the ability of a penetrating electrode array to selectively stimulate restricted fiber populations within the facial nerve and to selectively elicit contractions in specific muscles and regions of the face. These results show promise for the development of a facial nerve implant system.

## 2:58 Q&A

## 3:05 - 3:30 Break with Exhibitors/Poster Viewing

## CONCURRENT SESSION 2A - GENERAL AND SLEEP DISORDERS AMERICANA 1

Moderators: C. Ron Cannon, MD FACS, Jackson, MS  
Willard C. Harrill, MD, Hickory, NC

### 3:30 30 Day Hospital Readmission following Otolaryngology Surgery: An Analysis of 58,231 Hospital Discharges

Evan Michael Graboyes, MD, St. Louis, MO; Dorina Kallogjeri, MD MPH, St. Louis, MO; Mohammed J. Saeed, MBChB, St. Louis, MO; Margaret A. Olsen, PhD MPH, St. Louis, MO; Brian Nussenbaum, MD FACS, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the relative contribution of patient and hospital level risk factors for 30day hospital readmission for patients undergoing inpatient otolaryngology surgery.

**Objectives:** For patients undergoing inpatient otolaryngologic surgery, determine patient and hospital level risk factors associated with 30 day readmission. **Study Design:** Retrospective cohort study. **Methods:** We analyzed the State Inpatient Database (SID) from California for patients who underwent otolaryngologic surgery between 2008 and 2010. Readmission rates, readmission diagnoses, and patient and hospital level risk factors for 30 day readmission were determined. Hierarchical logistic regression modeling was performed to identify procedure, patient, and hospital level risk factors for 30 day readmission. **Results:** The 30 day readmission rate following an inpatient otolaryngology procedure was 8.1%. The most common readmission diagnoses were nutrition, metabolic or electrolyte problems (44% of readmissions) and surgical complications (10% of readmissions). New complications after discharge were the major drivers of readmission. Variables associated with 30 day readmission in hierarchical logistic regression modeling were: type of otolaryngologic procedure, Medicare or Medicaid health insurance, chronic anemia, chronic lung disease, chronic renal failure, index admission via the emergency department, in-hospital complication during the index admission, and discharge destination other than home. **Conclusions:** Approximately one out of twelve patients undergoing otolaryngologic surgery had a 30 day readmission. Readmissions occur across a variety of types of procedures and hospitals. Most of the variability was driven by patient specific factors, not structural hospital characteristics.

### 3:37 Safety Outcomes in Pediatric Airway Surgery: An ACS-NSQIP Analysis

Christopher R. Roxbury, MD, Baltimore, MD; Kris R. Jatana, MD, Columbus, OH; Rahul K. Shah, MD MBA, Washington, DC; Emily F. Boss, MD MPH, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe postoperative sequelae of pediatric airway reconstruction and discuss potential risk factors for postoperative adverse events.

**Objectives:** Prior research has shown that airway reconstructive procedures, while less commonly performed, comprise significant composite morbidity compared to the whole of pediatric otolaryngic cases evaluated in the American College of Surgeon s National Surgery Quality Improvement Program-Pediatric (NSQIP-P) platform. We describe postoperative sequelae of pediatric airway reconstruction and identify predictive factors for adverse events. **Study Design:** Retrospective cohort study of the American College of Surgeon s National Surgery Quality Improvement Program-Pediatric (NSQIP-P) database. **Methods:** CPT codes were used to identify children undergoing airway reconstructive procedures in the 2012-2013 NSQIP-P public use file (PUF). Targeted variables included patient demographics and 30 day postoperative events (reoperation, readmission and complications). Event rates were determined and compared within subgroups (Chi squared). Multivariate logistic regression was performed to identify predictive factors for major adverse events. **Results:** 139 cases in the PUF (0.12%) were airway reconstructive procedures. The most common procedure was laryngoplasty (n=72, 51.8%), followed by cervical tracheoplasty (n=34, 24.5%), tracheal resection (n=17, 12.2%) and cricoid split (n=16, 11.5%). The majority of children were premature (n=86, 61.9%), and 61 (43.9%) had bronchopulmonary dysplasia. There were 28 30-day readmissions (20.1%), 20 complications (14.4%) and 19 reoperations (13.7%). There were no predictive factors for postoperative events by demographic factors (age, race, sex, prematurity, bronchopulmonary dysplasia). On multivariate analysis, cricoid split (OR 12.1, P=0.051) and laryngoplasty (OR 10.9, P=0.032) were independent predictors of readmission. There were no significant predictive factors for complication or reoperation, although there was a trend toward increased complications (OR 4.6, P=0.075) in extremely preterm children (gestational age <29weeks). **Conclusions:** The 30 day adverse event rate in pediatric airway reconstruction is high. Children undergoing

laryngoplasty and cricoid split are at increased risk of readmission, while extreme preterm infants undergoing any airway reconstructive procedure may be at increased risk of complication.

### 3:44 **Platelet Rich Plasma and Platelet Rich Fibrin in Otolaryngology: Current Practices and Literature Review**

Yael E. Bensoussan, MD, Toronto, ON Canada; Vincent Lin, MD FRCSC, Toronto, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand the theory behind the use and preparation of autologous platelet products; 2) discuss the existing literature in otolaryngology on autologous platelet products; and 3) compare the current uses of autologous platelet products in otolaryngology and oral and maxillofacial surgery.

**Objectives:** To review the existing literature and conduct a national survey on current practices in OTOHNS and OMFS in regards to these platelet aggregates. PRP and PRF are autologous platelet concentrates that have been described as a cost effective alternative to the synthetic fibrin glues commonly used for tissue healing, hemostasis, and bone regeneration. Although their use in clinical environment has exponentially increased in oral and maxillofacial surgery (OMFS), plastic surgery and musculoskeletal medicine, their use in otolaryngology is limited at the moment. To review the existing literature and conduct a national survey on current practices in OTOHNS and OMFS in regards to these platelet aggregates. **Study Design:** Web based survey and literature review. **Methods:** A web based anonymous survey was dispersed to the members of the Canadian Society of Otolaryngology and Head and Neck Surgery (CSOHNS) as well as the Canadian Association of Oral and Maxillofacial Surgeons (CAOMS). Results were collected via the Survey Monkey platform. A PubMed, Cochrane and Ovid (Medline) search were performed to capture current articles describing the use of autologous platelet products in otolaryngology. **Results:** Only 7/50 (14%) CSOHNS respondents reported using PRP or PRF in their current practice compared to 25/84 (30%) for the CAOMS members. The uses described by the CSOHNS members were nerve repair, CSF leak repair, bone grafting, rhytidectomy, and packing. The reasons evoked not to use these products were mostly related to lack of information (34.7%) and cost (32.6%) for the CSOHNS members whereas the CAOMS members blamed the lack of evidence in the literature (43.7%) and cost (23.9%). **Conclusions:** There seems to be a greater use and knowledge about autologous platelet products in the OMFS than the otolaryngological community.

### 3:51 **Continuing Medical Education Simulation Program on Airway Management Targeted for Practicing Otolaryngology - Head & Neck Surgeons**

Connor S. Sommerfeld, BSc, Winnipeg, MB Canada; Grace M. Scott, BA MSc, London, ON Canada (Presenter); Kevin Fung, MD FRCSC FACS, London, ON Canada; Lily H.P. Nguyen, MD MSc FRCSC, Montreal, QC Canada; Norbert R. Viallet, MD FRCSC, Winnipeg, MB Canada; Ellen S. Deutsch, MD, Philadelphia, PA; Adrian C.C. Gooi, MD MEd FRCSC, Winnipeg, MB Canada

**Educational Objective:** At the conclusion of this presentation the participant should be able to discuss the impact of high fidelity simulation involving practicing physicians as participants for continuing medical education.

**Objectives:** Simulation provides a safe environment to learn crisis resource management in stressful clinical scenarios, including management of the acute airway. While a number of surgical simulation studies have assessed the impact on trainees, there remains a paucity of data on simulation benefits for practicing physicians. Thus it was the objective of this study to investigate the impact of a simulation program for airway management for practicing otolaryngology-head and neck surgeons. **Study Design:** Mixed methods study design. **Methods:** Questionnaires (5 point Likert and open answer questions) were distributed at a simulation program for airway management held at an annual meeting. Six week followup interviews provided qualitative data. **Results:** The majority of participants had no prior experience in simulation (62.5%). The data suggested that the program provided a strong increase in comfort with the airway management scenarios from a rating of 2.93 to 4.09 ( $p < 0.001$ ). Participants reported the program as relevant (4.68) and useful (4.67), and reported increased confidence about their knowledge of crisis resource management and team training (4.53). Qualitative data suggested great educational value for both the technical skills and communication strategies developed through the program. **Conclusions:** Simulation has been firmly integrated into medical education curricula for learners at all levels. The data in this study have clearly demonstrated the benefit of increased comfort level, collaboration, and communication provided by simulation with practicing physicians as participants. These findings may serve to justify the need for the expansion and continued accessibility of simulation in continuing medical education curricula.

**3:58                    Impact of Surgical Technique on Postoperative Pain in Recovery Unit in Pediatric Patients Undergoing Tonsillectomy**

Chen Lin, BA, Columbus, OH; Kris R. Jatana, MD, Columbus, OH; Jennifer N. Cooper, MS PhD, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH; Arlyne K. Thung, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that there is no difference in postoperative pain scores between two widely used tonsillectomy surgical methods, Coblation and Bovie electrocautery.

**Objectives:** Based on previous studies in the pediatric population, it remains unclear whether there is a difference in postoperative pain between two widely used tonsillectomy methods: Coblation and Bovie electrocautery. We seek to determine whether one of two surgical techniques for tonsillectomy affects postoperative pain scores. **Study Design:** Prospective double blind nonrandomized study. **Methods:** Patients of this study were enrolled in a previous study investigating the use of IV acetaminophen in pediatric patients undergoing tonsillectomy at our hospital between October 2012 to June 2015. All data used in this study comes from the prospectively collected data of the previous study. Coordinators of the previous study were included in the current one. Pain scores were based on a 0 to 10 numerical rating scale (FLACC score) measured in the recovery unit. **Results:** 238 patients were included in the original study. Following exclusion of cases involving both surgical methods or another method, 185 patients qualified. There were 117 Coblation cases and 68 electrocautery cases. The difference between mean pain scores for Coblation and electrocautery at the time of arrival, 5, 15, 30, and 60 minutes in the recovery unit were -0.065 (P=0.393), 0.179 (P=0.485), -0.326 (P=0.447), -0.584 (P=0.236), and -0.426 (P=0.276), respectively. While there was no statistical difference in mean pain scores between the methods, higher pain scores were measured for electrocautery at all time points except 5 minutes in the recovery unit. **Conclusions:** Coblation and electrocautery have similar postoperative pain scores in the recovery unit following pediatric tonsillectomy.

**4:05                    Transoral Robotic Surgery for Obstructive Sleep Apnea: A Systematic Review and Meta-Analysis**

Adrian A. Ong, MD, Charleston, SC; Stephen Miller, BS, Charleston, SC; Shaun A. Nguyen, MD MA, Charleston, SC; M. Boyd Gillespie, MD MSc, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the use of TORS in the treatment of obstructive sleep apnea.

**Objectives:** To determine the effect of transoral robotic surgery (TORS) on sleep related outcomes in patients with obstructive sleep apnea (OSA). **Study Design:** Systematic review and meta-analysis. **Methods:** Literature searches by two independent researchers were conducted using the PubMed-NCBI and Scopus database. Studies on TORS for OSA that included pre and postoperative apnea-hypopnea index (AHI) scores were included. Articles that studied TORS as treatment for diseases other than OSA were excluded. Response was defined as a reduction in AHI >50%, success as a reduction in AHI >50% and postoperative AHI <20, and cure as a postoperative AHI <5. **Results:** A total of 6 articles with 353 patients treated with TORS for OSA met inclusion criteria. Pooled analyses (baseline vs. post-surgery) showed a significant improvement in AHI ( $44.3 \pm 23.4$  to  $17.8 \pm 16.9$ ,  $p < 0.00001$ ), Epworth Sleepiness Scale ( $12.8 \pm 5.4$  to  $5.8 \pm 3.7$ ,  $p < 0.00001$ ), lowest O<sub>2</sub> saturation ( $79.0 \pm 9.5$  to  $84.1 \pm 6.5$ ,  $p < 0.00001$ ), and visual analog scale for snoring ( $9.3 \pm 0.8$  to  $2.4 \pm 2.43$ ,  $p < 0.0001$ ). Surgical response rate was 67.1% (95%CI, 61.7% to 72.4%), success rate was 76.7% (95%CI, 56.1% to 92.2%), and cure rate was 25.6% (95%CI, 15.9% to 36.7%). **Conclusions:** TORS is clinically effective in reducing AHI and symptoms of sleepiness in adult patients with OSA. It is considered successful in a majority of cases, however further studies must be performed to optimize patient selection criteria in order to improve success.

**4:12                    A Multinational Comparative Analysis of the Prevalence and Treatment of Obstructive Sleep Apnea (OSA)**

Kanwar S. Kelley, MD JD, Irvine, CA; Stanley Y. Liu, MD DDS, Redwood City, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss how population demographics effect the prevalence and diagnosis of obstructive sleep apnea (OSA) in countries around the world; 2) comparatively analyze how health care systems and government reimbursement mechanisms influence the diagnosis and treatment of OSA; and 3) discuss what further research needs to be done to determine the true global impact of OSA.

**Objectives:** Access to health care varies widely across the developed world as does the prevalence of obstructive sleep

# Friday

apnea (OSA). This study aims to analyze how health care systems themselves and population demographics influence the diagnosis and treatment of sleep apnea. **Study Design:** PubMed/Medline, Scopus, and Google Scholar databases were systematically searched for articles published from 1993 to 2015 that reported the prevalence of OSA in select countries. **Methods:** A comparative analysis of basic health care systems was utilized to delineate the differences between 5 select countries: the United States, Taiwan, South Korea, Brazil, and the United Kingdom. We then used publicly available national population health data and scholarly publications to determine population based outcomes for the prevalence and diagnosis of OSA. **Results:** Differences in BMI, craniofacial anatomy, gender, ethnicity, and smoking rates all play important factors in the prevalence and severity of sleep apnea. Access to health care plays a significant barrier in the diagnosis of OSA and its associated comorbidities - cardiovascular disease, hypertension, decreased work productivity, and death amongst others - particularly amongst the poor. Prevalence and treatment data for OSA is poorly reported, varies widely, and is mostly extrapolated from other datasets. **Conclusions:** Access to health care itself is a barrier to the diagnosis of OSA. Better prevalence data and analysis is needed to determine how to systematically review the impact of OSA on populations as a whole. The extrapolated data we are using now is insufficient to evaluate the true global impact of OSA.

## 4:25 - 5:10 Sleep Panel: Modern Surgery/Medical Treatment/Evaluation of Obstructive Sleep Apnea

**Moderator:** Kathleen L. Yaremchuk, MD MSA, Detroit, MI

**Panelists:** M. Boyd Gillespie, MD MSc FACS, Charleston, SC  
Andrew R. Scott, MD FACS, Boston, MA  
Erica Robb Thaler, MD FACS, Philadelphia, PA

5:10 Q&A

## CONCURRENT SESSION 2B - PEDIATRIC OTOLARYNGOLOGY AMERICANA 2

### 3:30 - 4:20 Pediatrics Panel: Management of Laryngomalacia

**Moderator:** Sanjay R. Parikh, MD BSc FACS, Seattle, WA

**Panelists:** John P. Bent III, MD, Bronx, NY  
Bruce H. Matt, MD FACS, Indianapolis, IN  
Dana M. Thompson, MD FACS, Chicago, IL

4:20 Q&A

**Moderators:** Julie L. Wei, MD, Orlando, FL  
Gregory J. Wiet, MD FACS, Columbus, OH

### 4:25 Richard J. Bellucci, MD Resident Research Award

#### Ex Vivo Tracheomalacia Model with 3D Printed External Tracheal Splint

Rachel J. Kaye, MD, Bronx, NY; Todd A. Goldstein, MS, Manhasset, NY; Danielle I. Aronowitz, BA, Hempstead, NY; Daniel A. Grande, PhD, Manhasset, NY; Vadim D. Zeltsman, MD, New Hyde Park, NY; Lee P. Smith, MD, New Hyde Park, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss different ex vivo models of tracheomalacia. We will show how these models function in a negative pressure system to simulate the respiratory cycle. Finally, we will demonstrate how the tracheomalacia model performs when fitted with a 3D printed external tracheal splint.

**Objectives:** To design and evaluate an ex vivo model of tracheomalacia with and without a 3D printed external tracheal splint. **Study Design:** Prospective, ex vivo animal trial. **Methods:** Three groups of ex vivo porcine tracheas were used: 1) control (unmanipulated trachea), 2) tracheomalacia (tracheal rings were partially incised and crushed), 3) splinted tracheomalacia (external custom tracheal splint fitted onto group 2 trachea). Each end of an ex vivo trachea was sealed with a custom designed and 3D printed cap, a transducer was placed through one end to measure the pressure inside the trachea. While negative pressure was applied to the tracheal lumen, tracheal wall collapse was measured externally and internally using a bronchoscope. Each group had at least 3 recorded trials. Tracheal diameter was evaluated using ImageJ software and was averaged between two raters. **Results:** Average tracheal occlusion percentage was compared using student's t-tests. The average occlusion was 31% for group 1, 87.4% for group 2, and 20% for group 3. Signifi-

cant differences were found between control and tracheomalacia groups ( $p < 0.01$ ) and tracheomalacia and splinted tracheomalacia groups ( $p < 0.01$ ). There was no significant difference between control and splinted tracheomalacia groups ( $p = 0.1275$ ). Applied pressure was plotted against occlusion and regression line slope differed between tracheomalacia (0.91) and control (0.124) or splinted tracheomalacia (0.39) groups. **Conclusions:** We demonstrate the potential for an ex vivo tracheomalacia model to reproduce airway collapse and show that this collapse can be treated successfully with a 3D printed external splint. These results are promising and justify further studies.

**4:32 Modified Barium Swallow and Fiberoptic Endoscopic Evaluation of Swallowing: A Comparison of Dysphagia Tests**

Renee E. Park, MD MPH, Pittsburgh, PA; Noel Jabbour, MD, Pittsburgh, PA; Sukgi S. Choi, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) describe pediatric dysphagia; and 2) compare the modified barium swallow with the fiberoptic endoscopic evaluation of swallowing.

**Objectives:** Dysphagia in the pediatric patient is common. This study aims to compare the two primary methods of evaluating dysphagia: modified barium swallow (MBS) videofluoroscopy, and fiberoptic endoscopic evaluation of swallowing (FEES). **Study Design:** Patients referred to a tertiary children's hospital between March 2009 and December 2014 with both MBS and FEES within a 6 month interval were selected for matched comparison. **Methods:** McNemar test was used to compare findings and recommendations of MBS and FEES in the same patient. The Kappa statistic was calculated to measure correlation between the two tests. **Results:** Thirty-two paired observations were identified. The most common presenting symptoms included coughing or choking with feeds (75%), dysphagia (67%), and noisy breathing (47%). Comorbid conditions included reflux (88%), identified syndrome (28%) and prematurity (25%). Common anatomic findings included laryngomalacia (50%), laryngeal cleft (28%), and vocal fold immobility (9%). As compared with MBS, FEES was more likely to identify premature spillage ( $p = .001$ ) and recommend the same diet ( $p = .001$ ). MBS was more associated with dietary advancement ( $p = .008$ ) than FEES. There was poor agreement between MBS and FEES when identifying premature spillage, penetration, aspiration, and discoordination of swallow. MBS and FEES did show fair correlation when recommending surgical intervention ( $k = 0.32$ ) or advancing diet ( $k = 0.35$ ), but not with continuing ( $k = 0.14$ ) or restricting diet ( $k = 0.01$ ). **Conclusions:** Pediatric dysphagia is prevalent and frequently evaluated using MBS and FEES. This study suggests that MBS and FEES characterize dysphagia differently and are poorly correlated.

**4:39 Polysomnographic Outcomes following Lingual Tonsillectomy for Persistent OSA in Patients with Down Syndrome**

John D. Prosser, MD, Augusta, GA; Oscar M. Rodriguez, MD, Jackson, MS; Sally R. Shott, MD, Cincinnati, OH; Narong N. Simakajornboon, MD, Cincinnati, OH; Stacey L. Ishman, MD, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe changes in sleep related respiratory outcomes following lingual tonsillectomy in patients with Down syndrome (DS) and persistent obstructive sleep apnea (OSA) following adenotonsillectomy.

**Objectives:** Lingual tonsil hypertrophy is a common cause of persistent airway obstruction in patients with DS after adenotonsillectomy, however little is known about the effect of lingual tonsillectomy on polysomnographic outcomes in these patients. **Study Design:** Retrospective case series. **Methods:** We included all patients with DS who underwent polysomnography before and after lingual tonsillectomy at a tertiary care center from 2003-2013. Non-parametric analysis of variables was carried out. **Results:** Forty patients with DS underwent lingual tonsillectomy and 23 met inclusion criteria. The mean age at surgery was  $9.5 \pm 4.1$  years and 52.2% were female. The median apnea-hypopnea index (AHI) was 8.6 events/hour (range 0.1-43) before surgery and 3.7 (range 0.5 to 24.4) after surgery. The median improvement in overall AHI and the obstructive index were 4.9 events/hour (range: -0.54 to 41) and 4.6 (range -5.2-41] respectively ( $p = 0.0001$ ). The mean oxygen saturation nadir improved from 86% to 91% ( $p = 0.004$ ). The mean time with  $CO_2 > 50$  mmHg, central index, apnea index (OA+MA/time) and percentage of REM sleep were unchanged. After surgery, the AHI was  $< 5$  events/hour in 56% and  $< 1$  in 17% of patients. **Conclusions:** In children with DS, persistent OSA after T&A, and lingual tonsil hypertrophy, lingual tonsillectomy significantly improved AHI, OI and O2 saturation nadir.

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- 4:46**                    **Low Morbidity in Cochlear Implantation for Children Less than 1 Year of Age**  
Ghedak Nather Ansari, BA MSED, Washington, DC; Mauricia T.C. Davidson, BS, Washington, DC;  
Gezzer A. Ortega, MD MPH, Washington, DC; H. Jeffrey Kim, MD, Washington, DC; Adedoyin O.  
Kalejaiye, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss perioperative morbidities in children undergoing cochlear implantation.

**Objectives:** To identify risk factors for perioperative morbidity among a large national cohort of pediatric patients undergoing cochlear implantation. **Study Design:** Retrospective study utilizing the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) Pediatric database (2012-2013). **Methods:** Pediatric cochlear implantation cases were identified using CPT 69930. Patients were categorized by age, and information related to patient demographics, operative characteristics, and 30 day perioperative outcomes were analyzed. **Results:** Our study identified 1,351 cases of pediatric cochlear implantation. The median age was 3.6 years and 73 patients were less than the age of 1 year. There were 18 complication occurrences (0.01%) and the most common complication was superficial incisional surgical site infection (n=13, 72.2%). Thirty-nine patients (2.9%) required readmission. The median operative time was 142 minutes and the mean postoperative length of stay was 0.6 days. When comparing patients less than 1 to those 1 year or older, no significant differences were noted in complication rate, postoperative length of stay, or reoperation rate. Patients less than 1 year of age were more likely to be readmitted (6.9% vs 2.7%, p=0.04), and had longer mean operative times (191.2 minutes vs 160.1 minutes, p=0.0015). **Conclusions:** Despite a slight increase in readmission rates and operative times among patients less than 1 year of age, cochlear implantation appears to be safe in this population with complication rates, reoperation rates, and postoperative lengths of stay similar to children undergoing the procedure at the current FDA approved age of 1 year and older.

- 4:53**                    **Quality of Life Improvement after PE Tube Placement in Down Syndrome Patients: A Prospective Cohort Study**  
Alex Bradley Labby, BA, Portland, OR; Jess C. Mace, MPH, Portland, OR; Carol J. MacArthur, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) compare the quality of life changes in Down syndrome patients vs. controls after PE tube placement; and 2) discuss the differences in quality of life impact of chronic otitis media between Down syndrome patients and controls.

**Objectives:** To evaluate quality of life (QOL) changes after bilateral pressure equalization (PE) tube placement ± adenoidectomy for the treatment of chronic otitis media (OM) with effusion or recurrent acute OM in a pediatric Down syndrome (DS) population compared to controls. **Study Design:** Prospective, cohort study. **Methods:** The OM Outcome Survey (OM-22) was administered to both patients with DS and controls before bilateral PE tube placement ± adenoidectomy and at least 4 months postoperatively. Thirty-one patients with DS and 34 controls were recruited. Both preoperative and postoperative between group and within group score comparisons were conducted for the physical, learning, speech, emotional, and social domains of the OM-22. **Results:** Significant preoperative mean differences were reported between DS and control patients in physical, learning, speech and emotional domain item scores. All four symptom scores in the speech domain, both preoperatively and postoperatively, were significantly worse for DS patients compared to controls (p ≤ 0.008). Patients with DS reported significant postoperative improvement in mean learning domain item scores (p<0.032), while control patients reported significant improvement in physical, learning, speech, and emotional domain item scores (p<0.049). **Conclusions:** Surgical placement of PE tubes results in significant QOL improvements in patients with DS, although the average magnitude is less than that reported by control patients. Problems related to speech and balance are reported at a higher prevalence and persist despite intervention in the DS population. It is possible that longer followup periods and/or more sensitive tools are required to measure improvements in the DS population after PE tube placement ± adenoidectomy.

**5:00 Shirley Baron Resident Research Award**  
**Pediatric Otolaryngologic Conditions: Racial and Socioeconomic Disparities in the United States**  
 Sophie G. Shay, MD, Los Angeles, CA; Nina L. Shapiro, MD, Los Angeles, CA; Neil Bhattacharyya, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate the incidences of common pediatric otolaryngologic presentations, including frequent ear infections (FEI), non-streptococcal sore throat (NSST), streptococcal pharyngitis (SP), hay fever and sinusitis. Participants should also be able to discuss the racial, ethnic, and socioeconomic disparities facing children in the United States with regards to these common otolaryngologic presentations.

**Objectives:** Determine the national incidence and disparities for common pediatric otolaryngologic conditions. **Study Design:** Cross-sectional analysis of nationally representative database. **Methods:** The National Health Interview Survey (2012) was analyzed, extracting children with frequent ear infections (FEI), non-streptococcal sore throat (NSST), streptococcal pharyngitis (SP), hay fever and sinusitis among children. Demographic data including age, sex, race, Hispanic ethnicity, geographic region, poverty level and insurance status were extracted. The annual incidences of these conditions were determined. Disparities in the incidence of each condition were determined according to race and ethnicity, adjusting for other demographic variables. **Results:** Among 57.7 million children (average age, 8.6 years; 51.1% male), the incidences were: FEI (2.4 million cases, 4.1% of children), NSST (11.9 million, 20.6%), SP (8.0 million, 13.8%), hayfever (6.6 million, 9.0%) and sinusitis (4.5 million, 7.9%). Black and Hispanic children were less likely to be diagnosed with FEI than white children (odds ratios [95% confidence interval], 0.503 [0.369-0.686] and 0.661 [0.515-0.848]), adjusting for all other demographic variables. Black and Hispanic children were also less likely to be diagnosed with SP than white children (odds ratios, 0.433 [0.342-0.547] and 0.487 [0.401-0.592], respectively). Similar decreased odds ratios for black and Hispanic children were evident for hayfever (0.704 [0.556-0.890] and 0.708 [0.565-0.888]) and for sinusitis (0.701 [0.543-0.905] and 0.596 [0.459-0.773]). **Conclusions:** Black and Hispanic children are consistently less likely to be identified or diagnosed with FEI, hayfever, SP and sinusitis compared to white children. These data likely highlight a significant healthcare disparity according to race/ethnicity in otolaryngology.

**5:07 Q&A**

## CONCURRENT SESSION 3A - THE GREAT DEBATE (POINT COUNTERPOINT) AMERICANA 1

**Moderator:** Jeffrey M. Bumpous, MD FACS, Louisville, KY

**5:15 - 5:40 Intraoperative Facial Nerve Monitoring during Parotidectomy**  
**Pro**  
 David W. Eisele, MD FACS, Baltimore, MD  
**Con**  
 Eric M. Genden, MD FACS, New York, NY

**5:40 - 6:00 Papillary Thyroid Cancer: Treat it or Just Watch It?**  
**Pro**  
 Ralph P. Tufano, MD MBA FACS, Baltimore, MD  
**Con**  
 David J. Terris, MD FACS, Augusta, GA

**6:00 - 6:10 Q&A**

**6:15 - 7:15 VICE PRESIDENTS WELCOME RECEPTION - Americana Lawn**

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## **CONCURRENT SESSION 3B - WHAT'S THE LATEST AND THE GREATEST? AMERICANA 2**

**Moderator:** Brian Nussenbaum, MD MBA FACS, St. Louis, MO

- 5:15 - 5:30**      **3D Printing in Otolaryngology**  
Glenn E. Green, MD, Ann Arbor, MI
- 5:30 - 5:45**      **Endoscopic Otologic Surgery**  
Brandon Isaacson, MD, Dallas, TX
- 5:45 - 6:00**      **Cine MRI - Evaluation of Residual OSA after T&A**  
Sally R. Shott, MD FACS, Cincinnati, OH
- 6:00 - 6:10**      **Q&A**
- 6:15 - 7:15**      **VICE PRESIDENTS WELCOME RECEPTION - Americana Lawn**

## SATURDAY, JANUARY 23, 2016

7:00 - 7:50      **Business Meetings (Fellows Only)**  
Southern Section - Poinciana 1  
Western Section - Poinciana 2

8:00              **Announcements by Vice Presidents**

### **CONCURRENT SESSION 4A - FACIAL PLASTIC/ RECONSTRUCTIVE SURGERY AMERICANA 1**

**Moderators: Robert M. Kellman, MD FACS, Syracuse, NY**  
**Sherard A. Tatum, MD FACS, Syracuse, NY**

8:05              **Multi-Institutional Analysis of Unplanned Readmission for Head and Neck  
Patients Undergoing Free Flap Reconstruction**  
Eric T. Carniol, MD, Newark, NJ; Emily Marchiano, BA, Newark, NJ; Jacob S.  
Brady, BA, Newark, NJ; Jean A. Eloy, MD, Newark, NJ; Soly Baredes, MD, Newark, NJ;  
Richard C. Park, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the perioperative variables associated with 30 day unplanned readmission following free flap reconstruction of the head and neck.

**Objectives:** To analyze associations between perioperative factors and 30 day unplanned readmissions for head and neck patients that have undergone microvascular free flap reconstruction. **Study Design:** Retrospective study of cases from the American College of Surgeons National Surgical Quality Improvement Program database. Patients who underwent concurrent head and neck procedures with microvascular free flap reconstruction of the head and neck from 2011 to 2013 were identified. **Methods:** Patient demographics, preoperative comorbidities and laboratory values, and postoperative complications were analyzed. Univariate and multivariate analyses of unplanned readmission based on patient, laboratory, and hospital course characteristics were conducted. **Results:** In total, 813 patients were included in the analysis. Overall 30 day readmission rate for patients undergoing free flap reconstruction of the head and neck was 10.2% (n=83). On univariate analysis, factors associated with unplanned readmission were significant recent weight loss, disseminated cancer (regional and distant), open wound, hyponatremia, lower hematocrit levels, medical complications, and surgical complications (P<0.05). A multivariate analysis of preoperative variables revealed that open wound infections was associated with increased readmission (odds ratio 1.944 (1.078 - 3.505), P = 0.027). A similar analysis with postoperative variables showed that surgical complications were associated with increased readmission (odds ratio 4.215 (2.436 - 7.293), P<0.001). In addition, free flap failures only constituted 1.6% of the cohort and this was not associated with an increase in unplanned readmission. **Conclusions:** Unplanned readmission of patients undergoing free flap surgery of the head and neck is 10.2%. Overall, open preoperative wounds and postoperative surgical complications were most associated with unplanned readmission.

8:12              **Enlargement of the Nasal Airway after Internal Nasal Valve Surgery: Radiologic  
Outcomes**  
John P. Naughton, MD, Bronx, NY; Howard D. Stupak, MD, Bronx, NY

**Educational Objective:** At the conclusion of this presentation, participants should be able to recognize that surgery at the internal nasal valve can cause downstream effects at secondary points of the nasal airway and lead to objective increases in surface area and volume of the airway.

**Objectives:** To use objective radiologic data to calculate changes in total nasal airway volume and cross-sectional surface area to quantify secondary changes in nasal airway size after isolated internal nasal valve surgery. **Study Design:** A patient that had undergone pre and postoperative high resolution maxillofacial CT

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scanning was identified. An open source DICOM viewer with advanced image processing software was used to assess cross-sectional areas and total volume of the nasal airway. **Methods:** A closed polygon region of interest was drawn around the nasal airway in cross-sectional images such that the paranasal sinuses would be excluded from calculation. Next, automated calculation was performed by setting parameters such that the model would select pixels with a maximum value of -315 Hounsfield units. This automated area calculation thus represents the nasal airway, and this protocol was repeated at each cross-sectional image followed by automated calculation of volume. **Results:** The operated upon site of the internal nasal valve showed a 25.4% increase in cross-sectional area postoperatively. Downstream, non-operated sites in the nasal cavity revealed increases in area ranging from 33.1% to 50.6%, with a mean of 41.7% increase for all measured sites. This size increase was not present when measured at the nasopharynx (2.8% increase) or anterior to the operated site at the external nasal valve (1.7% increase). Total nasal airway volume was increased by 32.2%. **Conclusions:** This study used radiologic data to demonstrate objective enlargement of downstream, non-operated sites in the nasal airway and increased total nasal airway volume after isolated surgery to address the internal nasal valve.

**8:19 Henry Williams, MD Resident Research Award**  
**A Bioengineered Peptide Amphiphile Nanofiber Neurograft for Facial Nerve Repair: A Comparison to Autografting using Evoked Electromyography (EMG)**  
Jacqueline J. Greene, MD, Chicago, IL; Mark T. McClendon, PhD, Chicago, IL; Nicholas Stephanopoulos, PhD, Chicago, IL; Samuel I. Stupp, PhD, Chicago, IL; Claus P. Richter, MD PhD, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the electrophysiological performance of the peptide amphiphile nanofiber neurograft to autografting as measured via EMG, as well as discuss the clinical utility and limitations of evoked EMG.

**Objectives:** Facial nerve injury can cause severe physical and psychological morbidity. A bioengineered peptide amphiphile (PA) nanofiber neurograft may provide the nanostructure necessary to guide organized neural regeneration with comparable or better return of function, less donor site morbidity, shorter surgical time, and potentially fewer reconstructive procedures than the current clinical gold standard (autografting) when end-to-end repair is not possible. **Study Design:** Prospective, randomized controlled animal study. **Methods:** The buccal branch of the rat facial nerve was 1) either left intact; or subjected to 2) a 4mm resection, 3) resection then autografting repair with the resected neural segment, or 4) resection followed by repair with the PA nanofiber neurograft. After 8 weeks, the proximal buccal branch of groups 1-4 was surgically reexposed and stimulated with 0.1-1.4 mA of current and the evoked compound muscle action potentials of the orbicularis oris muscle were recorded. **Results:** The resected nerves had a significantly slower evoked EMG latency than the intact nerves,  $9.03 \pm 0.53$  msec (N=4) and  $7.76 \pm 0.32$  msec (N=5) respectively (two tailed p value 0.008). There was no significant difference between the latency of the autograft ( $8.01 \pm 1.24$  msec, N=4) and neurograft ( $8.22 \pm 0.87$  msec, N=5), nor did they differ significantly from the intact nerve. **Conclusions:** The latency was similar among the intact, autograft and neurograft groups, indicating some degree of regeneration; however, the variability in EMG methodology remains a limitation. A more precise methodology such as direct neural stimulation is needed to elucidate the complete electrophysiological profile of the regenerating facial nerve.

**8:26 Causal Network Analysis of Head and Neck Keloid Tissue Identifies Potential Master Regulators**  
Lamont R. Jones, MD, Detroit, MI; Laura R. Garcia-Rodriguez, MD, Detroit, MI (Presenter); Kang M. Chan, MD, Detroit, MI; Indrani D. Datta, MS, Detroit, MI; George W. Divine, PhD, Detroit, MI; Maria J. Worsham, PhD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the role of master regulators and causal network analysis in the possible role of keloid development.

**Objectives:** To generate novel insights and hypotheses in keloid development from potential master regulators. **Study Design:** Prospective cohort study of six fresh keloid and six normal skin samples from twelve anonymous donors (IRB approved). **Methods:** Genome wide profiling was previously done on the cohort using the Infinium Human Methylation450BeadChip®. The 190 statistically significant CpGs between keloid and normal tissue mapped to 152 genes (p < 0.05). The top 10 statistically significant genes (VAMP5, ACTR3C, GALNT3, KCNAB2, LRRC61, SCML4, SYNGR1, TNS1, PLEKHG5, PPP1R13-aFDR<0.015), were uploaded into the Ingenuity Pathway Analysis (IPA) software s Causal Network Analysis (CNA). To reflect expected gene expression direction in the context of methylation changes, the inverse of the methylation ratio from keloid versus normal tissue was used for the analysis. CNA identified disease specific

master regulator molecules based on downstream differentially expressed keloid specific genes and expected directionality of expression (hypermethylated vs hypomethylated). **Results:** CNA software identified 4 hierarchical networks which included 4 master regulatory molecules, Pyroxamide, Tributyrin, PRKG2 and PENK and 19 intermediate regulators (HDAC1, HDAC3, HDAC4, PPARG, TP53, RUNX2, RB1, P38 MAPK, CDK4, Pkc(s), PPARG, MYOD1, PSEN1, TNS, FOXO1, ERK, Akt, GSK3B, Vegf). **Conclusions:** CNA of differentiated methylated gene data of keloid versus normal skin demonstrated 4 causal networks with 4 master regulator molecules. These hierarchical networks suggest potential drivers of the keloid phenotype likely triggered due to perturbation/injury to normal tissue.

8:33

### **Panfacial Trauma: Classification and Correlation with Force of Injury**

Garrett G. Casale, BS, Charlottesville, VA; Brian A. Fishero, MD, Charlottesville, VA; Stephen S. Park, MD, Charlottesville, VA; John J. Christophel, MD MPH, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the facial trauma grading system described, to compare this grading system to previously described systems, and to discuss this novel system's effectiveness in scoring facial trauma created in an artificial setting.

**Objectives:** Communicating the fractures in a panfacial trauma can be difficult and is often inconsistent. We propose to create a facial trauma scale that incorporates reducible fractures, is reliably communicated, and correlates to the severity of injury as measured by force of trauma sustained. **Study Design:** Cadaveric tissue study. **Methods:** A system for grading facial trauma was developed based only on clinically relevant (reducible) fractures. Ten cadaveric heads were subjected to various degrees of facial trauma by dropping a fixed mass from predetermined heights onto each head. The heads were then imaged with a fine cut CT scan. Traumatized heads were then scored using this novel system and using three existing scoring systems. Regression analysis was used to determine correlation between energy imparted on the cadaveric heads and trauma severity as rated by the scoring systems selected. **Results:** Inter-rater reliability of the novel grading system was similar to the three other tested trauma scales. Facial trauma scores correlated with depth of penetration of the weight ( $p=0.008$ ). Facial trauma scores on any scale did not correlate with total kinetic energy applied to the cadaver heads when controlling for presence of dentition and age. **Conclusions:** The novel facial trauma severity score is clinically relevant and has high fidelity in communicating the fractures sustained. The scale correlated with depth of penetration of the missile, however not with total kinetic energy sustained. The trauma sustained by the cadaver heads was more severe than usual survivable clinical scenarios, likely testing the ceiling effect of the scale.

8:40

### **Survey of Current Practice Patterns in the Management of Frontal Sinus Fractures**

Kevin J. Choi, MD MS, Durham, NC; Bora Chang, BS, Durham, NC; Charles R. Woodard, MD, Durham, NC; Jeffrey Marcus, MD, Durham, NC; David B. Powers, MD DMD, Durham, NC; Liana Puscas, MD, Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the current trends in the surgical management of frontal sinus fractures.

**Objectives:** The treatment of frontal sinus fractures has evolved as injuries to the frontal sinus outflow tract (FSOT) can now effectively be managed with endoscopic sinus surgery (ESS). This study aims to assess the practice patterns for frontal sinus fracture management across multiple surgical disciplines. **Study Design:** Cross-sectional survey. **Methods:** All members of American Academy of Facial Plastics and Reconstructive Surgery, Society of University Otolaryngologists, American Society of Maxillofacial Surgeons and AO-Craniomaxillofacial were selected for participation. An email containing the study description and a link to the questionnaire was provided. Only completed studies were included. **Results:** 298 surveys were completed. 33.5% were facial plastic surgeons trained in otolaryngology, 25.8% general otolaryngologists, 25.5% plastic surgeons, and 15.1% oral and maxillofacial surgeons. 74.8% of respondents practiced in an academic setting with 87.9% having access to a rhinologist. 61.7% felt advances in ESS changed the management of FSOT fractures. 91.1% of respondents favored observation for non-displaced fractures to the FSOT. ESS was favored by 35.9% and frontal sinus obliteration or cranialization by 16.8% of respondents when an isolated displaced fracture to the FSOT was present. 4.0% favored ESS and 27.5% favored frontal sinus obliteration or cranialization when a displaced fracture to the FSOT was present in addition to an anterior table fracture requiring repair. **Conclusions:** ESS can effectively treat obstruction to the FSOT. Its utility in managing FSOT fractures appears to be recognized by multiple surgical disciplines throughout the country. A multi-institutional review is warranted to provide objective data to support our survey findings.

# Saturday

## 8:47 **Choosing the Correct Plate: A Novel Computer Assisted Method for Preparing Plates for Mandibular Fixation after Trauma**

Christopher J. Rizzi, MD, Baltimore, MD; Timothy E. Ortlip, MD, Baltimore, MD; Kavita T. Vakharia, MD, Hershey, PA; Kalpesh T. Vakharia, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the concept of using a computer program to virtually choose mandibular plate fixation size, shape and orientation. The feasibility of this novel concept will be demonstrated and the details explained such that attendees may apply this to their clinical practice.

**Objectives:** To prove the feasibility of determining the size, shape and contour of mandibular fracture fixation plates with the use of a newly developed computer algorithm. **Study Design:** This is a retrospective study involving a survey of 15 respondents regarding 10 open reduction, internal fixation mandibular fracture repairs. Real postoperative and recreated postoperative images were compared by respondents for similarity. **Methods:** A novel computer algorithm was developed and used to determine fixation plate size, shape and position for 10 different displaced mandibular fractures retrospectively. This algorithm involves fusion of a 3D reconstructive imaging program output and Adobe Photoshop© to determine the optimal plate type, contour and location. Individuals were then asked to compare real postoperative CT imaging with the imaging developed with use of the novel technique to assess accuracy and feasibility of this computer algorithm. **Results:** A total of 10 mandible fracture cases were included in the study. One true postoperative CT image and one created CT image, from the computer algorithm, from each case were presented to 10 different respondents. There was strong concordance between the appearance of the true postoperative imaging and the image created with use of the computer based software. **Conclusions:** This technique may be used to determine adequate mandibular fixation plate size, shape and position. Images created with use of the program are highly similar to true postoperative images.

## 8:54 **Does a Standalone Cancer Center Improve Microsurgical Outcomes?**

Matthew L. Tamplen, MD, San Francisco, CA; Santo Ricceri, BS, San Francisco, CA; Shirin Hemmat, BS, San Francisco, CA; Rahul Seth, MD, San Francisco, CA; William R. Ryan, MD, San Francisco, CA; Philip D. Knott, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the role hospital setting may have on free tissue transfer (FTT) outcomes for head and neck reconstruction.

**Objectives:** To evaluate the role hospital setting, standalone cancer center versus large multidisciplinary hospital, may have on free tissue transfer (FTT) outcomes for head and neck reconstruction. **Study Design:** Retrospective chart review. **Methods:** Medical records were reviewed of 180 consecutive patients undergoing FTT for head and neck reconstruction between March 2012 and June 2014. Patients who underwent surgery at a standalone subspecialty cancer center within a tertiary hospital network (n = 101) were compared to patients who underwent surgery at the same hospital network's primary large medical center (n = 79) by the same two reconstructive surgeons. **Results:** The cancer center group had higher mean age (65.2 years vs 60.0 years; p = 0.009), and a shorter mean operative time (12.3 hours vs 13.2 hours; p=0.034). Postoperatively, the cancer center group had a significantly shorter average ICU stay (3.45 days vs 4.41 days; p<0.001). There were no significant differences in medical or surgical complications between the groups. Having surgery at the cancer center was the only significant independent predictor of a reduced ICU stay on multivariate analysis (Coef 0.73; p<0.020). Subgroup analysis, including only patients with cancer of the aerodigestive tract, demonstrated further reduction in ICU stay for the cancer center group (3.85 days vs 5.1 days p<0.001). **Conclusions:** Standalone subspecialty cancer centers are appropriate settings for FTT. We found both reduced operative time and ICU length of stay, contributing to lower overall costs. These findings stand contrary to the notion that FTT requires a large multidisciplinary hospital.

## 9:01 **Q&A**

## 9:05 - 9:55 **Plastic & Reconstructive Surgery Panel: Moh's Reconstructive Cases**

**Moderator:** Stephen S. Park, MD, Charlottesville, VA

**Panelists:** Ted A. Cook, MD FACS, Portland, OR  
Lisa E. Ishii, MD MHS, Baltimore, MD  
Travis T. Tollefson, MD MPH FACS, Sacramento, CA  
Brian J.F. Wong, MD PhD, Irvine, CA

9:55 Q&A

10:00 - 10:30 Break with Exhibitors/Poster Viewing - Americana 3 & 4

## CONCURRENT SESSION 4B - GENERAL AND SLEEP MEDICINE AMERICANA 2

8:05 - 9:00 Panel: Electronic Healthcare Records: Tricks on How to Make Your Day Easier

**Moderator:** David E. Eibling, MD FACS, Pittsburgh, PA

**Panelists:** Keat-Jin Lee, MD FACS, Guilford, CT  
Michael D. Seidman, MD FACS, Detroit, MI  
Robert J. Stachler, MD FACS, Detroit, MI  
Adam M. Zanation, MD, Chapel Hill, NC

9:00 Q&A

**Moderators:** Donald T. Donovan, MD FACS, Houston, TX  
Ronald B. Kuppersmith, MD FACS, College Station, TX

9:05 Isolated Chronic Nasopharyngitis: Clinical Presentation, Treatment, and Outcomes

Alla Y. Solyar, MD, St. Petersburg, FL; Adam C. Rourke, DO, Sterling Heights, MI; Donald C. Lanza, MD, St. Petersburg, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that a separate entity, chronic nasopharyngitis, rather than chronic rhinosinusitis or recurrent acute sinusitis exists and may be causing similar symptoms.

**Objectives:** Isolated chronic nasopharyngitis (CNP), ICD-9 code 472.2, is a seldom reported condition that is mistaken as chronic rhinosinusitis (CRS) or recurring acute rhinosinusitis (RARS). The objective of this study is to determine symptoms and clinical exam findings that differentiate CNP from CRS and RARS as well as to identify possible treatment strategies for this type of nasopharyngitis. **Study Design:** Retrospective case series report of patients diagnosed with CNP from 2012-2014. **Methods:** Patient demographic information, presenting symptoms, exam findings and treatments are described. Criteria for exclusion included failure to followup and symptoms primarily related to documented rhinosinusitis. **Results:** Twenty-six patients with CNP were identified, 12 had isolated nasopharyngeal inflammation. The most common presenting symptom was postnasal drip (12/12), often involving small amounts of intermittent purulent debris or crusts. Additional symptoms included nasal congestion (10/12), cough (7/12), auricular fullness (7/12), and throat clearing (5/12). Eight patients had purulence in the nasopharynx (without adenoidal tissue) and 11 had erythema. *S. aureus* was the most common organism cultured. While overt acid reflux symptoms were present in 5/12 patients, all were treated with proton pump inhibitors. Additionally, 9/12 patients were managed with antimicrobial therapy. One patient underwent nasopharyngeal cautery. Overall improvement was seen in 11/12 patients. **Conclusions:** Isolated CNP is a clinical entity that resembles CRS & RARS, has been overlooked, and demands additional research. It may be multifactorial in its etiology including: inhalant allergy, extraesophageal reflux and bacterial biofilms. Clinical suspicion and endoscopy of the sinonasal passages, nasopharynx and larynx are paramount in proper identification and subsequent management of this disorder.

9:12 Trends in Otolaryngology Fellowship Training 2004-2014

Joshua E. Romero, MD, Syracuse, NY; Amar C. Suryadevara, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss trends in otolaryngology fellowship training over the past decade.

**Objectives:** Examine the rate of fellowship training versus general practice for graduating otolaryngology residents, correlating variables of their programs, and trends in fellowship choice. **Study Design:** Retrospective survey. **Methods:** 99 civilian otolaryngology residency programs were contacted and their websites checked for career choices of graduates from the years 2004-2014. If only alumni lists were available, each physician was searched for utilizing Google. The resulting trends were analyzed with linear regression analysis and compared against multiple program variables with Fischer's

# Saturday

exact test. **Results:** From 2004-2014 data on 1488 graduating residents from 59 different programs was available. The rate of fellowship has risen 39% to 58%  $p=0.0002$ . 25/59 programs received NIH research grants in 2014. This was not a statistically significant variable in all years. 31/59 programs had at least three residents in each class. Larger programs have had a significantly higher rate of fellowship in 3 of the past 4 years. 16/59 programs were in the northeast and mid-Atlantic, 13/59 midwest and great plains, 20/59 south and southwest, and 10/59 in the west. 7/59 have dedicated research years. 10/59 were ranked in the top 20 otolaryngology departments by US News in 2014. These variables were previously significant but have lost significance over time. Rhinology has become statistically more popular, while facial plastics has declined percentage-wise. **Conclusions:** In otolaryngology the norm has shifted over the past decade from fellowship as a minority to a majority choice. The impact of this change and the factors driving it should be the focus of further research.

**9:19**                      **Commercial versus In-House 3D Printing in Otolaryngology**  
Alex T. Legocki, BA, Boston, MA; Andrew Duffey-Peter, Boston, MA; Andrew R. Scott, MD FACS, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare clinical applications and limitations of in-house, entry level 3D printing versus high end vendor modeling as they pertain to an otolaryngologic practice.

**Objectives:** To describe the clinical applications and limitations of retail, entry level additive manufacturing technology (three dimensional (3D) printing) within an otolaryngologic practice, including a comparison with available vendor services. **Study Design:** Quantitative cost comparison and descriptive side by side comparison of entry level, in-house 3D model production versus high end vendor modeling, with review of literature. A comparison of anatomic model fidelity and clinical versatility between entry level 3D printing as compared to high end models provided by third party vendors. **Methods:** Each model was produced using computed tomography (CT) imaging data and in-house models were printed in polylactic acid (PLA) plastic using a Makerbot® Replicator. Methods of production were assessed for the following: macroscopic surface anatomy, sterilizability, resilience to manipulation and plate bending, cost of production, speed of production, and alveolar nerve canal and tooth root visualization in mandibles. **Results:** Entry level, in-house production was comparable to high end vendor modeling with regard to surface anatomy and physical resilience, superior with regard to cost and speed of production, variable with regard to nerve canal visualization, and inferior with regard to sterilizability, virtual surgical planning options, and tooth root visualization. **Conclusions:** Within this report we introduce practical applications and limitations of retail, entry level 3D printers to general otolaryngologic practice. While high end production, especially with vendor services, allows for sterilizable materials and additional planning options such as distraction vectors and osteotomy placement, there is a significant cost reduction with in-house modeling without sacrificing key uses including preoperative plate bending and study of morphology.

**9:26**                      **Education in Flexible Transnasal Laryngoscopy: Benefits and Limitations of Targeted Training**  
Kimberly A. Russell, MD, Boston, MA; Christopher D. Brook, MD, Boston, MA; Michael Platt, MD MS, Boston, MA; Avner Aliphass, MD, Boston, MA; Gregory Grillone, MD, Boston, MA; J. Pieter Noordzij, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the need for robust training by physicians performing flexible fiberoptic laryngoscopy.

**Objectives:** To determine the value of targeted laryngoscopy education in de novo learners. **Study Design:** Prospective study of fiberoptic laryngoscopy interpretations. **Methods:** Ten PGY-1 interns from emergency medicine and otolaryngology and three board certified otolaryngologists viewed 25 selected and digitally recorded fiberoptic laryngoscopies. Participants were asked to rate 13 items relating to abnormalities in the pharynx, hypopharynx, larynx, subglottis, the level of concern, and confidence with the diagnosis. A laryngoscopy teaching video was then administered to the interns prior to rating a second set of 25 videos. Improvement in diagnosis and intraclass correlations (ICC) were calculated for each question and compared between the first and second administration. **Results:** ICC values for all questions were generally low for the intern group, and higher for the attending group. For vocal cord mobility there was improvement from a pre-intervention ICC of 0.249 (CI 0.162-0.367) to 0.471 (CI 0.364-0.594). Attending ICCs for vocal cord mobility were higher than the pre- (0.888, CI 0.826-0.931) and post-intervention group (0.891, CI 0.829-0.934). There was minimal improvement in intern scores for base of tongue abnormalities, subglottic stenosis, vocal cord abnormalities, level of comfort, level of concern, pharyngeal abnormalities, or larynx, pharyngeal and hypopharyngeal masses. **Conclusions:** Learning of flexible laryngoscopy can be improved with the use of a teaching video, however, additional interventions

are needed to attain competence in accurately diagnosing upper airway lesions. Clinicians who seek to perform flexible laryngoscopy require robust training.

**9:33 Self-Directed Learning in Otolaryngology Residents' Preparation for Surgical Cases: A Survey Examining Study Habits and Use of Available Resources**

Jad R. Jabbour, MD MPH, Milwaukee, WI; Thomas C. Robey, MD, Milwaukee, WI; Anna E. Bakeman, BS, Milwaukee, WI; Noel N. Jabbour, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the current use of educational resources among otolaryngology residents in preparing for surgical cases, discuss residents' perceived effectiveness and efficiency of their preparation, and identify potential targets for new resource development to improve case preparation.

**Objectives:** To characterize the nature of surgical preparation among otolaryngology residents nationwide, to determine the self-rated effectiveness and efficiency of current case preparation practices, and to identify potential targets for development of new surgical education resources. **Study Design:** Cross-sectional survey. **Methods:** A survey examining the 3 study objectives was developed and distributed to otolaryngology residents nationwide via program directors. After 2 weeks of survey collection, data were submitted to descriptive analysis and comparative analyses between junior (PGY 1-3) and senior (PGY 4-5) residents. **Results:** Among the 108 resident respondents, the most commonly used resources included textbooks (86.1%), surgical education websites (74.1%), and surgical atlases (66.7%). Time was the primary limitation to case preparation (cited by 84.3%), and convenience was the predominant factor influencing resource selection (92.5%). On a 5 point Likert scale, mean scores regarding effectiveness and efficiency of case preparation were  $3.53 \pm 0.68$  and  $3.19 \pm 0.88$ , respectively. Senior residents compared to junior residents were more likely to rate their preparation as effective ( $3.75 \pm 0.54$  vs  $3.40 \pm 0.72$ ,  $p = 0.008$ ) and efficient ( $3.45 \pm 0.85$  vs  $3.03 \pm 0.86$ ,  $p = 0.02$ ). Of 6 proposed new resources, 3 were endorsed by 82.6% of respondents, with the most popular being a tool for finding top rated sources for various procedures. **Conclusions:** Despite the array of educational resources available, otolaryngology residents do not consistently rate their case preparation as effective or efficient. While there appears to be progress in self-directed learning throughout residency, there remains room for improvement, with potential avenues for such improvement explored here.

**9:40 Racial Disparities in Preventable Risk Factors for Head and Neck Cancer**

Sunshine M. Dwojak, MD MPH, Nashville, TN; Neil Bhattacharyya, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that there are racial differences in preventable risk factors for head and neck cancer.

**Objectives:** To demonstrate racial differences in preventable risk behaviors/practices that contribute to head and neck cancer (HNCA). **Study Design:** Cross-sectional analysis of large national risk factor survey. **Methods:** The Behavioral Risk Factor Surveillance System for 2013 was analyzed. Demographic data were extracted including age, sex and race. Social habits considered risk factors for HNCA were also extracted including alcohol consumption, smoking and HPV vaccination status. Statistical comparisons were conducted according to race for each risk factor and additional comparisons were conducted within the American Indian population subgroup for risk factors according to sex. **Results:** 73.4 million Americans were surveyed. American Indians reported higher rates of binge drinking (19.0%) than whites (17.3%), blacks (12.4%), and Asian Americans (13.1%;  $p < 0.001$ ). This rate was significantly higher for American Indian males (23.5%) versus females (13.7%;  $p < 0.001$ ). Mean total drinks per month was higher for whites and American Indians (13.5 and 13.5) as compared to blacks (9.2) and Asians (8.1;  $p < 0.001$ ). American Indians reported the highest rates of current smoking (28.1%), followed by blacks (20.1%), whites (18.3%), and Asians (10.2%;  $p < 0.001$ ). American Indians also reported the highest rates of every day smoking (18.2%), versus whites (13.3%), blacks (13.1%), and Asians (6.1%;  $p < 0.001$ ). Rates of HPV vaccination were lowest for American Indians (11.7%), compared to whites (14.6%), blacks (13.6%), and Asians (12%;  $p = 0.616$ ). **Conclusions:** There are striking racial disparities in the prevalence of preventable risk factors for HNCA. These data highlight the need for targeted education and prevention programs.

# Saturday

**9:47**                    **4D Computer Tomography Utility in Parathyroidectomy for Primary Hyperparathyroidism with Parathyroid Hormone Levels of Less than 100 pg/mL**  
Anais Rameau, MD MPhil, Stanford, CA; Michael Friduss, MD, Santa Clara, CA (Presenter)

**Educational Objective:** At the end of the presentation, attendees may consider 4D CT scan over sestamibi scan for preoperative parathyroid localization, in case of low baseline PTH in primary hyperparathyroidism.

**Objectives:** The prevalence of multi-gland parathyroid disease (MGD) has been reported to be higher in patients with primary hyperparathyroidism and low baseline PTH levels (<100 pg/mL). Low baseline PTH is associated with lower localization rate and positive predictive value with both preoperative sestamibi and ultrasound. This study sought to evaluate our experience with 4 dimensional computer tomography (4-D CT) for the localization of abnormal parathyroid glands, including MGD, in patients with low baseline PTH. **Study Design:** Case series. **Methods:** A cases series of patients with primary hyperparathyroidism with low baseline PTH or an inconclusive sestamibi, who underwent surgery with a single surgeon from April 2012 to June 2015 following 4D CT to help with abnormal gland localization. **Results:** We identified 14 patients who underwent a 4D CT in the setting of primary hyperparathyroidism and low baseline PTH. A sestamibi scan had been ordered in 71% and was inconclusive in all cases. No ultrasound was performed. In all patients, 4D CT was 90% sensitive in localizing abnormal glands, yielding a positive predictive value of 69.2%. 42.9% of patients had evidence of MGD and 4D CT detected 50% of MGD cases. A focused unilateral exploration was performed in 28.6% of cases, and a four glands exploration was performed in all remaining patients. **Conclusions:** In patients with low baseline PTH, with higher likelihood of MGD and of inconclusive results on sestamibi, 4D CT may be a superior modality for localizing smaller or multiple adenomas. This may allow for improved interpretation of intraoperative PTH results, and in a minority of cases, a focused parathyroid exploration.

**9:54**                    **Q&A**

**10:00 - 10:30**        **Break with Exhibitors/Poster Viewing - Americana 3 & 4**

## **CONCURRENT SESSION 5A - RHINOLOGY AMERICANA 1**

**10:30 - 11:25**        **Panel: Chronic Rhinosinusitis: Real Cases and Treatment Options**

**Moderator:** Timothy L. Smith, MD MPH FACS, Portland, OR

**Panelists:** Roy R. Casiano, MD FACS, Miami, FL  
Subinoy Das, MD FACS, Dublin, OH  
Robert C. Kern, MD FACS, Chicago, IL  
Brent A. Senior, MD FACS, Chapel Hill, NC

**11:25**                    **Q&A**

**Moderators: Alexander G. Chiu, MD, Tucson, AZ  
Abtin Tabaei, MD, New York, NY**

**11:30**                    **Disparities in Antibiotic Prescription for Uncomplicated Acute Rhinosinusitis by Emergency Departments versus Primary Care Providers**

Regan W. Bergmark, MD, Boston, MA; Ahmad R. Sedaghat, MD PhD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should understand antibiotic utilization for acute rhinosinusitis for pediatric and adult patients presenting to primary care providers and emergency departments in the United States.

**Objectives:** We have previously identified patient characteristics associated with emergency department (ED), rather than primary care provider (PCP), presentation for uncomplicated acute rhinosinusitis (ARS). Here we investigate potential disparities in prescription of antibiotics for patients presenting to a PCP versus ED for uncomplicated ARS. **Study Design:** Cross-sectional study of 37,975,715 patient presentations for uncomplicated ARS to PCPs and EDs from the 2005-2010 National Ambulatory Medical Care Surveys and National Hospital Ambulatory Medical Care Surveys. **Methods:** The primary outcome measure was prescription of an oral antibiotic, which was tested for association with clinical

setting (PCP versus ED), and clinical, demographic and socioeconomic patient characteristics. **Results:** Amongst adult ARS presentations, 57.0% received an antibiotic prescription from a PCP versus 59.1% in the ED. Pediatric patients also were commonly prescribed antibiotics by PCPs (52.9%) and EDs (51.4%). Compared to PCPs, EDs were not associated with antibiotic prescription for adults (OR=1.09, 95%CI: 0.79-1.50, P=0.613) or children (OR=0.94, 95%CI: 0.51-1.72, P=0.840). Among PCP visits, antibiotic prescription was more likely in the northeast (OR=2.90, 95%CI: 1.31-6.38, P=0.009). No other demographic, clinical or socioeconomic characteristics including insurance status were associated with antibiotic prescription by PCPs or EDs. **Conclusions:** More than half of ARS patients presenting to PCPs and EDs are prescribed antibiotics. There was no differential antibiotic prescription for ED versus PCP presentation. ARS patients in the northeast were more likely to receive antibiotics from PCPs while no such variation was seen for EDs. Interventions targeting PCPs especially in the northeast may reduce excessive antibiotic utilization.

## 11:37 **Cost Utility Analysis of Endoscopic Sinus Surgery for Chronic Rhinosinusitis with and without Nasal Polyposis**

George A. Scangas, MD, Boston, MA; Aaron K. Remenschneider, MD, Boston, MA; Mark G. Shrimme, MD, Boston, MA; Ralph B. Metson, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to both understand how a cost utility analysis is performed and discuss the cost effectiveness of endoscopic sinus surgery for chronic rhinosinusitis patients with and without nasal polyps.

**Objectives:** To evaluate cost effectiveness of endoscopic sinus surgery (ESS) compared to medical therapy for chronic rhinosinusitis (CRS) patients with and without nasal polyps. **Study Design:** Cohort style Markov decision tree economic model with a 31 year time horizon. **Methods:** A surgical cohort of CRS patients without polyps (n=270) and with polyps (n=229) who underwent ESS were compared with a cohort of CRS patients (n=499) from the national Medical Expenditures Survey Panel (MEPS) database who underwent medical management. Health utility scores were calculated from responses to the EQ-5D outcomes instrument in both cohorts. Decision tree analysis and a ten way Markov model utilized published event probabilities and primary data to calculate long term costs and utility. The primary outcome measure was incremental cost per quality adjusted life year (QALY). Multiple sensitivity analyses were performed. **Results:** The reference case for CRS patients without nasal polyps yielded an incremental cost effectiveness ratio (ICER) for ESS versus medical therapy alone of \$7056.72 per QALY. The reference case for CRS patients with polyps yielded an ICER for ESS versus medical therapy alone of \$10,910.50 per QALY. These results were robust to one way analysis and probabilistic sensitivity analysis. **Conclusions:** This study demonstrates the value of ESS as a cost effective intervention compared to medical therapy alone for the management of CRS patients both with and without nasal polyps.

## 11:44 **Outcomes of HPV Related Nasal Squamous Cell Carcinoma**

Naweed I. Chowdhury, MD, Kansas City, KS; Sameer A. Alvi, MD, Kansas City, KS; Spencer W. Kerley, MD, Kansas City, KS; Kyle Kimura, MS, Kansas City, KS; Ann Robinson, MD, Kansas City, KS; Larry A. Hoover, MD, Kansas City, KS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of HPV in outcomes of patients diagnosed with squamous cell carcinoma of the nasal cavity and sinuses.

**Objectives:** HPV infection has been shown to play an integral role in the development and prognosis of various head and neck cancers. Generational changes in sexual behavior may have led to an increased incidence of positivity in recent years. HPV positivity in both benign and malignant lesions of the sinonasal cavities has been shown in previous studies (estimates range from 20-50% for malignancy). We intend to investigate if HPV positivity affected survival outcomes in our patient cohort. **Study Design:** 27 patients diagnosed pathologically for nasal SCC with available archived biopsy specimens were retrospectively analyzed to obtain HPV status using a real time, multiplex PCR assay that detects and quantifies 15 known high risk HPV types. **Methods:** Demographic information was collected and survival analyses were performed using the Kaplan-Meier estimation. **Results:** 18 of 27 (67%) SCC tumors in the patient cohort were positive for HPV DNA. HPV types 16 and 18 were the most common (n = 8 and 2 respectively), although a wide range of HPV types across the 15 tested were positive. Survival analyses showed a statistically significant survival advantage (median survival of 12 vs. 54 months) when accounting for HPV positivity using log rank testing (p < 0.005). **Conclusions:** HPV positivity appears to be present in a significant proportion of nasal SCCa. In our patient population there does appear to be a survival advantage to HPV positivity. Further prospective, multi-institutional trials with standardized treatment protocols are needed to elucidate the true impact of HPV positivity in this subset of head and neck cancers.

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**11:51 Evaluation of the Impact of IgE Levels on Outcomes in Patients with Chronic Rhinosinusitis in the Setting of Maximal Medical Therapy: A Prospective Cohort Study**

Ana M. Lemos-Rodriguez, MD, Chapel Hill, NC; Zainab Farzal, BS, Chapel Hill, NC (Presenter); Satyan B. Sreenath, MD, Chapel Hill, NC; Brian D. Thorp, MD, Chapel Hill, NC; Brent A. Senior, MD, Chapel Hill, NC; Adam M. Zanation, MD, Chapel Hill, NC; Charles S. Ebert Jr., MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the relation between IgE levels and the outcomes in patients with chronic rhinosinusitis after maximal medical therapy.

**Objectives:** To evaluate the impact of IgE levels on outcomes in patients with chronic rhinosinusitis (CRS) following maximal medical therapy. **Study Design:** Prospective cohort study. **Methods:** 39 patients who underwent maximal medical therapy for CRS were assigned to three different cohorts based on their IgE levels: normal (<25 IU), moderate (>25 d 75 IU), and high (>75 IU). The primary outcome evaluated was maximal medical therapy failure with surgical recommendation within each cohort. Secondary outcomes included changes in pre- and post-maximal medical therapy scores for the Rhinosinusitis Disability Index (RSDI), Chronic Sinusitis Survey (CSS), and CT based Lund-Mackay (LM) evaluation. Cohorts were sub-stratified based on presence of nasal polyps. **Results:** No significant difference was found when failure of MMT was compared between cohorts. Only pretreatment CSS scores between normal and high IgE levels ( $p=0.02$ ) were significantly different. When the moderate IgE and normal groups were combined and compared with high IgE cohort, there was still no significant difference in primary outcome and quality of life. Patients without polyps did demonstrate a significant difference in maximal medical therapy failure ( $p=0.03$ ) when moderate IgE vs high IgE cohorts were compared. In the high IgE cohort, both polyps and non-polyps subgroups failed maximal medical therapy. **Conclusions:** Overall, IgE levels do not appear to have significant effect on outcomes of maximal medical therapy or pretreatment CRS quality of life. However, in the setting of high IgE levels, the outcomes of maximal medical therapy are uniformly poor and all patients proceed to endoscopic sinus surgery. Interestingly, this was true in both, presence and absence of nasal polyps.

**11:58 Sinonasal Symptoms and Clinical Findings in Patients with Gastroesophageal Reflux versus Chronic Rhinosinusitis**

Camilo A. Reyes, MD, Augusta, GA; Joshua C. Yelverton, MD, Augusta, GA; Madison E. Pumphrey, BS, Augusta, GA; Stilianos E. Kountakis, MD PhD, Augusta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the symptoms and clinical findings at initial presentation of gastroesophageal reflux disease as compared to chronic rhinosinusitis. In addition, participants should understand symptoms that may help clarify the appropriate diagnosis.

**Objectives:** Compare sinonasal symptoms of patients referred for possible rhinosinusitis but eventually diagnosed as having gastroesophageal reflux disease (GERD) to chronic rhinosinusitis (CRS) at initial presentation. **Study Design:** Retrospective review. **Methods:** GERD patients were identified from a prospectively collected database at a tertiary referral institution. Primary complaints were compiled via chart review. Symptom scores from initial visits were obtained using a visual analog scale. Sinonasal Outcome Test scores were obtained for each patient. The control group is randomly selected CRS patients. **Results:** One hundred seventy-two patients were identified with GERD and 172 randomly selected patients with CRS served as control. GERD patients presented with higher rated symptoms. Average SNOT-22 scores were 37.9 and 29.2 for GERD and CRS, respectively ( $p<0.01$ ). When comparing GERD patients with sinonasal pathology on exam to those with GERD without sinonasal pathology, the symptom scores were similar ( $p>0.05$  for all symptoms). Cough, postnasal drip, and thick discharge were rated more severe in GERD patients versus CRS ( $p<0.05$ ). The most common chief complaints of GERD patients were post-nasal drip, cough, and nasal congestion (50.5%, 39.5%, 19.2%, respectively). The most common chief complaints in CRS patients were nasal congestion, facial pain/pressure, and smell/taste dysfunction (48.8%, 24.4%, 23.8%, respectively). Post-nasal drip and cough were significantly worse in GERD ( $p<0.05$ ), when looking at symptom scores in all patients who presented with nasal congestion. **Conclusions:** Patients with GERD report more severe symptoms than those with CRS. Cough and post-nasal drip are symptoms that may suggest the presence of GERD with or without sinonasal pathology.

**12:05 Complete Surgical Resection Improves Short Term Survival in Acute Invasive Fungal Rhinosinusitis**

Christopher R. Roxbury, MD, Baltimore, MD; David F. Smith, MD PhD, Cincinnati, OH; Stella Lee, MD, Pittsburgh, PA; Masaru Ishii, MD PhD, Baltimore, MD; Andrew P. Lane, MD, Baltimore, MD; Douglas D. Reh, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss risk factors for and presenting signs and symptoms for acute invasive fungal rhinosinusitis. They should be able to discuss management options including surgery, and compare outcomes in patients with early versus late disease using a simple staging system.

**Objectives:** To assess treatment modalities impacting short term survival in acute invasive fungal rhinosinusitis and to develop a staging system to predict probability of complete surgical resection. **Study Design:** Retrospective chart review. **Methods:** 53 histopathologically diagnosed cases of AIFR meeting inclusion criteria were identified between 1984-2014. Patient characteristics, extent of disease at diagnosis, treatment modality, and short term survival data were collected. Univariate logistic regression analysis was performed to assess for factors associated with short term survival and increased odds of complete surgical resection. Multivariate logistic regression was performed to control for confounding. **Results:** All patients had comorbidities predisposing to AIFR. Survival to inpatient discharge was achieved in 36 patients (67.9%). Univariate and multivariate analysis showed significantly improved short term survival in patients with successful surgical resection as defined by negative surgical margins or normal postoperative nasal endoscopy (OR 52.5,  $p=0.003$ ) (OR 58.2,  $p=0.006$ ). Other factors such as treatment with antifungals and G-CSF did not have a significant impact on survival. A surgical staging system was proposed, with stage 1 disease limited to the nasal cavity, stage 2 extending extranasally without intracranial extension, and stage 3 with intracranial extension. Chi square analyses showed significant trends toward decreased surgical clearance (83.0% vs 44.8% vs 0%,  $p=0.014$ ) and short term survival (100% vs 62.9% vs 25%,  $p=0.006$ ) with increasing disease stage. **Conclusions:** While further studies are needed to define specific AIFR treatment protocols, these data add to a growing body of literature suggesting that complete surgical resection may provide the best survival outcomes, regardless of other factors such as ability to reverse immunocompromise. Our staging system represents the first attempt to predict surgical success and prognosis in patients with AIFR.

**12:12 Safety, Feasibility and Symptomatic Assessments of Silicone Stent Lacrimal Diversion as a Novel Therapeutic Platform for Chronic Rhinosinusitis**

Daniel M. Beswick, MD, Stanford, CA; Guillermo S. Casillas, MD, San Lucas, DF Mexico; Andrew Thamboo, MD, Stanford, CA; Jayakar V. Nayak, MD PhD, Stanford, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand lacrimal diversion using a silicone stent for patients with symptoms of chronic sinusitis.

**Objectives:** Lacrimal diversion is an established treatment modality for dacryocystitis and epiphora that remains unexplored as a therapeutic avenue for sinusitis. Through placement of a silicone stent from the medial canthus into the ethmoid complex, delivery of topical irrigants may be achieved. **Study Design:** Two silicone lacrimal diversion stent designs were evaluated in patients with symptoms of chronic rhinosinusitis (CRS) at a single institution. **Methods:** Bilateral stents were placed from a medial canthus to sinus trajectory under sedation, after which topical saline and steroid-antibiotic drops were administered. Surgical details, complications, and SNOT-20 scores were assessed pre- and post-treatment. **Results:** Six patients/12 sides had design 1 (D1) 15.5 mm stents placed uneventfully. All D1 patients experienced complications related to conjunctival irritation and discomfort, with one cerebrospinal fluid leak noted. Upon stent reengineering to the design two (D2) 18.5 mm length, 15 patients/30 sides received lacrimal diversion. Six D2 patients (40%) experienced local complications, including preseptal cellulitis, epiphora, and foreign body sensation, each of which fully resolved. Mean pre-procedure vs. post-procedure SNOT-20 scores decreased at day seven (63.1 vs. 34.5,  $p=0.001$ ) and day 30 (63.1 vs. 22.8,  $p=0.002$ ) in D2 patients. **Conclusions:** Silicone stent lacrimal diversion appears to be a feasible modality for treating symptoms of CRS, with the potential for topical irrigant administration to the sinuses, and yielding improvements in SNOT-20 scores. With further optimization in device design to limit local complications, this technology may be an advantageous minimally invasive option for treating patients with sinusitis.

**12:19 Bovie Turbinate Reduction Revisited: Can Precise Volumetric Heating Be Achieved without Feedback Control?**

Rijul S. Kshirsagar, 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 compare and discuss

# Saturday

Bovie electrosurgery and temperature controlled radiofrequency tissue ablation techniques for inferior turbinate reduction.

**Objectives:** Temperature controlled radiofrequency inferior turbinate ablation uses a feedback system to achieve volume reduction, but requires costly single use consumables. By adjusting the power settings on traditional monopolar Bovie electrosurgery devices with low cost needle tips, volumetric tissue heating may also be achieved for a fraction of the cost of more expensive technologies with the same end result. This preclinical study describes the parameter optimization for this approach. **Study Design:** Controlled laboratory study using albumin gel and chicken breast. **Methods:** A Bovie system (cut mode, 4-32 W, 5-120 s) and a temperature controlled radiofrequency ablation system were used to coagulate egg white and chicken breast. The temperature controlled system was set to the standard clinical parameters for treating inferior turbinate hypertrophy. Lesion volume was approximated as prolate spheroid geometry. Denaturation volume was calculated and compared between the two devices. **Results:** No significant difference in volume was found between the temperature controlled system and the Bovie system at 8W for 30s, 8W for 60s, 16W for 30s, 32W for 5s, and 32W for 15s. Time to achieve adequate lesion size was significantly less in the Bovie system when compared to the temperature controlled system ( $p < 0.05$ ). **Conclusions:** Bovie electrosurgery may be a more affordable alternative to temperature controlled systems with similar lesion volume effect. The low cost Bovie handpieces, when used properly, may achieve similar if not identical effects as the expensive feedback controlled, single use handpieces. Costs of Bovie handpieces are an order of magnitude less than proprietary devices and can be performed in the office as well.

12:26

Q&A

## CONCURRENT SESSION 5B - LARYNGOLOGY AMERICANA 2

Moderators: C. Gaelyn Garrett, MD, Nashville, TN  
Karen M. Kost, MD, Montreal, QC

10:30

### Office Photodynamic Therapy for Treatment (PDT) of Premalignant Laryngeal Lesion after Failed KTP Laser

Peter C. Baxter, MD, New York, NY; Tova F. Isseroff, MD, New York, NY; Peak Woo, MD, New York, NY

**Educational Objective:** Understand the option of office PDT treatment for laryngeal masses and learn a novel application for its use in patients with laryngeal dysplasia.

**Objectives:** To evaluate a novel application technique of aminolevulinic acid photodynamic therapy (ALA-PDT) in patients who have failed office KTP laser treatment. **Study Design:** Retrospective chart study. **Methods:** During a three year period, nine patients who had failed office KTP laser treatments for persistent dysplastic and keratotic lesions underwent treatment with office ALA-PDT treatment. ALA was placed directly on the vocal folds by topical application. Three hours later, the ALA was activated with the KTP laser. Each patient was followed in the office for a minimum of nine months. **Results:** Seven of the nine subjects had fair to good results with stable or minimal disease following treatment. Two patients failed ALA treatment and required further surgical intervention. Regression was noted in the area of prior failure such as the subglottis, the anterior commissure and the vocal process. **Conclusions:** Photodynamic therapy with ALA and KTP laser is a safe and effective treatment alternative that can be performed on non-sedated patients in the office setting. The direct application of ALA to the lesion appears to enhance treatment in areas that are inaccessible by KTP laser alone. This procedure is particularly well suited to patients who have failed prior office intervention and have infra-glottic persistence of disease.

10:37

### External Laryngeal Trauma: An Inpatient Analysis

Emily Marchiano, BA, Newark, NJ; Daniel M. Oh, BS, Newark, NJ; Milap D. Raikundalia, BS, Newark, NJ; Soly Baredes, MD, Newark, NJ; Jean A. Eloy, MD FACS, Newark, NJ; Richard C. Park, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand inpatient outcomes in patients admitted with external laryngeal trauma (ELT).

**Objectives:** To analyze the largest database cohort of patients admitted with ELT to date. **Study Design:** Retrospec-

tive study of cases from the Nationwide Inpatient Sample (NIS) database. **Methods:** We identified patients admitted with ELT from 2002-2010 using the NIS database. Patient demographics, length of stay, hospital charges, hospital level characteristics, procedures, and concomitant diagnoses were analyzed. **Results:** A total of 2,179 patients admitted with a diagnosis of ELT were identified. The average age was 39.6 years old and 78.6% were male. In-hospital mortality was 4.4%. Overall, 67.4% of patients underwent surgical management with 35.4% requiring a tracheostomy. Late tracheostomy patients required 11.3 days longer hospitalization and incurred higher hospital charges (\$224,489 vs. \$118,499) than those who had an early tracheostomy ( $P < 0.001$ ). Esophageal injury was significantly associated with early tracheostomy (14.6% vs. 8.1%). Late tracheostomy patients had significantly higher odds of having a concomitant diagnosis of pulmonary edema or failure (2.601), renal failure (21.860), and urinary tract infections (2.642). **Conclusions:** External laryngeal trauma (ELT) patients were commonly admitted with additional injuries. In-hospital mortality was 4.4% and did not differ based upon tracheostomy status or timing. Having a tracheostomy placed and delay of that procedure were both associated with significantly increased length of stay and hospital charges. Late tracheostomy placement was associated with increased odds of associated pulmonary edema and failure, renal failure, and urinary tract infections.

10:44

### Laryngeal Pemphigoid: A Series of 4 Cases and Review of the Literature

Ann W. Plum, MD, Syracuse, NY; Richard T. Kelley, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the diversity of the clinical manifestations of mucous membrane pemphigoid (MMP) involving the larynx and discuss the utility of systemic antibody titers in MMP.

**Objectives:** 1) To describe the diversity of the manifestations and management of laryngeal MMP; and 2) to discuss diagnostic tools for MMP and need for suspicion. **Study Design:** Retrospective case series and literature review. **Methods:** This is a retrospective case series conducted at an academic medical center from 2008 through 2015 on patients with laryngeal MMP. Their medical records, stroboscopic examinations, and operative findings were reviewed to describe their presentation and course. A PubMed literature search was conducted for laryngeal MMP. **Results:** Four patients were identified with MMP, referred for hoarseness. The first had vocal fold and oral lesions, which were managed medically. The second presented with oral lesions and severe supraglottic stenosis, managed by tracheostomy, dilation and immunosuppressants, and later decannulation. Recurring stenosis was managed with KTP laser. The third had supraglottic and subglottic webs, managed with laser and dilation then immunosuppressants. The last presented with an epiglottic lesion. All diagnoses were through biopsy and immunofluorescent (IF) staining. Upon literature review, IF staining of the basement membrane remains the best diagnostic tool. Michel's fixative is required. Serologic testing for anti-BP180 has also been investigated, however, 7.5% of patients without clinical pemphigoid test positive for anti-BP180. **Conclusions:** Laryngeal MMP ranges from mucosal inflammation and hoarseness to laryngeal stenosis and airway compromise. Treatment requires both surgical airway management and immunosuppression to control active disease. The role of serologic antibody testing is still to be determined. Suspicion is needed so that proper fixative is used for IF to provide definitive diagnosis.

10:51

### Type 1 Medialization Thyroplasty vs. Office Based Injection Vocal Fold Augmentation for Unilateral Vocal Fold Paralysis: A Cost Minimization Analysis

Samantha H. Tam, MD, London, ON Canada; Hongmei Sun, MSc, London, ON Canada; Sisira Sarma, PhD, London, ON Canada; Jennifer Siu, BHSc, Kingston, ON Canada; Kevin Fung, MD, London, ON Canada; Leigh J. Sowerby, MD MHM, London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the differences in cost of medialization thyroplasty and office based injection laryngoplasty in patients with unilateral vocal fold paralysis.

**Objectives:** Medialization thyroplasty (MT) and injection laryngoplasty (IL) are widely accepted treatment options for unilateral vocal fold paralysis (UVFP). Although similar outcomes are reported for both procedures, MT requires operating room resources while IL is performed in an outpatient clinic. IL has a temporary effect while MT generally offers a permanent solution. Because of similar clinical outcomes, the purpose of this study is to quantify the cost differences in adult patients with UVFP undergoing MT versus IL. **Study Design:** Cost minimization analysis conducted using a decision tree model. **Methods:** Probabilities were obtained from a retrospective cohort from the home institution. Costs were derived from published literature and institution data on actual costs. All costs were reported in Canadian dollars. The time horizon was 5 years. The study was conducted from the institutional perspective. Various sensitivity analyses were conducted to assess incremental costs due to differences in costs and probabilities of key events. **Results:** One hundred four subjects were eligible for inclusion. Sixty-three subjects underwent MT and 41 underwent IL. The cost of initial treatment with MT

# Saturday

was C\$1601 per subject whereas those treated with injection laryngoplasty was C\$841. Preliminary results showed that the incremental cost saving with IL was C\$760. Scenario and sensitivity analyses all favored IL, with incremental costs ranging from C\$192 to C\$1732. **Conclusions:** Initial treatment of UVFP with IL results in the average cost savings of \$760 per subject. In selected patients with UVFP, treatment with office based IL is less costly compared to MT.

10:58

## Recovery from Unilateral Vocal Fold Paralysis in a Tertiary Care Setting

Neel K. Bhatt, MD, St. Louis, MO; David J. Grindler, MD, Denver, CO; Emily A. Spataro, MD, St. Louis, MO; Randal C. Paniello, MD PhD, St. Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should have a better understanding of the likelihood of symptomatic recovery and vocal fold motion recovery following vocal fold paralysis based on the specific etiology of paralysis and the anatomical site of recurrent laryngeal nerve injury.

**Objectives:** Following injury to the recurrent laryngeal nerve (RLN) and UVFP, patients can experience spontaneous symptomatic recovery secondary to sufficient axonal regeneration. Symptomatic recovery can occur even without regaining vocal fold movement as reinnervation can provide bulk and tone to the laryngeal musculature. We present an assessment of symptomatic recovery and vocal fold motion recovery following UVFP. **Study Design:** Case series with chart review. **Methods:** All patients with UVFP that presented between 2002 and 2012 were included to determine the rate of recovery. **Results:** 939 patients met inclusion criteria. 115 were lost to followup with an unknown rate of recovery. Among the remaining patients, 431 patients (52.31%) experienced symptomatic improvement in voice and swallow avoiding further intervention while 393 patients (47.69%) did not. In terms of vocal fold movement, 199 patients (24.15%) had some degree of movement recovery while 625 patients (75.85%) had no recovery of motion. Proximal RLN injury tended to recover at a lower rate compared to distal nerve injuries. Specifically, thoracic etiologies of RLN injury experienced the worst rate of symptomatic recovery (44.44%,  $p < 0.05$ ) while paralysis after intubation represented the best recovery (67.39%,  $p < 0.05$ ). **Conclusions:** Symptomatic recovery occurs at a rate approximately twice that of regaining any vocal fold movement. Recovery appears to be related to the proximal to distal location of the RLN injury. This study helps to quantify the patient population that would benefit from future regenerative approaches in the setting of UVFP.

11:05

## Effectiveness of Nuedexta as a Novel Therapy for Mixed Voice Disorder: A Survey of Patient Experience

Vaibhav H. Ramprasad, BA, Durham, NC; Mirabelle Sajisevi, MD, Durham, NC; Gina Vess, CCC-SLP, Durham, NC; David L. Witsell, MD MHS, Durham, NC

**Educational Objective:** At the end of this presentation, participants should be able to describe the effectiveness of Nuedexta as a novel pharmacologic therapy for mixed voice disorders as assessed by patient perception of symptoms before and after administration of therapy.

**Objectives:** To evaluate the effectiveness of Nuedexta as a novel therapy for the management of symptoms as a result of mixed voice disorders from a patient perspective. **Study Design:** Patient survey. **Methods:** A retrospective review was performed of patients diagnosed with mixed voice disorders and treated with Nuedexta at an academic tertiary care center in 2014. Patients treated with Nuedexta were contacted and surveyed over the telephone. The responses from two patients are presented. **Results:** Four patients were treated with Nuedexta for symptom relief after failure of other treatments including Botox. Two patients completed the survey. One of the two respondents reported improvement in voice symptoms. Specifically, speech fluency improved and a lower incidence of vocal spasms was reported with Nuedexta. There was noted improvement in voice related functions such as speech perception in settings with ambient noise and speech perception over the telephone. The other respondent reported no improvement in all measures. In both patients, Nuedexta was considered tolerable with minimal side effects. **Conclusions:** Nuedexta has been used in certain neurologic disorders. We report the novel use of Nuedexta in the treatment of mixed voice disorders. In one patient, treatment with Nuedexta led to moderate symptom relief. It was overall tolerable with minimal side effects in 2 patients surveyed. Further investigation is warranted to evaluate the efficacy of Nuedexta in treating voice disorders.

11:12

## Review of Videolaryngoscopy Pharyngeal Wall Injuries

Devon W. Greer, MD, Tacoma, WA; Kathryn E. Marshall, PhD, Tacoma, WA; Scott E. Bevans, MD, Tacoma, WA; Aurora G. Standlee, MD, Tacoma, WA; Patricia S. McAdams, MD, Tacoma, WA; Wayne J. Harsha, MD FACS, Tacoma, WA

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

quency of injury to the pharynx with use of videolaryngoscopy in the course of intubation, likely injury patterns, and basic guidelines for management of these injuries.

**Objectives:** This manuscript collects all literature available on the incidence and causes of pharyngeal injuries associated with videolaryngoscopy assisted intubations. We then evaluated patient characteristics described in the injuries and combined with cases at our institutions to find risk factors for injuries and propose a grading scale for injuries. This grading scale can then be used to guide indications for repair of the injuries. **Study Design:** Case series with literature review. **Methods:** We recently observed four oropharyngeal injuries associated with videolaryngoscope intubations, and we reviewed the currently available literature to determine commonalities between cases that may highlight patient or surgical risk factors predisposing to injury. At the time of this writing, there are 23 published cases available for review found through OVID and PubMed searches; which we reviewed for patient characteristics, (e.g. BMI, age and sex, Mallampati grade), type of videolaryngoscope, location of injury, and type of repair (if any) required. **Results:** Our data review indicated women were more commonly injured than men with videolaryngoscope associated intubation. The right tonsillar pillars and soft palate were the most frequently injured, with through and through perforation of the soft tissues being the most common type of injury. The stylet choice was not consistently reported, but injuries occurred with multiple stylet styles. The most common repair of injuries required simple closures and long term harm was very rare. **Conclusions:** We propose a standardized method of reporting risk factors for injury, type of injury and details of management, and a 5 grade description of oropharyngeal trauma which will improve and standardize use of videolaryngoscopy for intubation and also guide management of injuries secondary to videolaryngoscopy.

**11:19                      Quantitative Evaluation of the Vocal Fold Medial Surface Contour upon Selective Activation of Intrinsic Laryngeal Muscles**

Andrew M. Vahabzadeh-Hagh, MD, Los Angeles, CA; Zhaoyan Zhang, PhD, Los Angeles, CA;  
Dinesh K. Chhetri, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the changes to the medial surface of the vocal fold with selective activation of the intrinsic laryngeal muscles and discuss the possible advances in medialization laryngoplasty relative to the traditional implant formations of convergent, divergent and rectangular.

**Objectives:** Glottal insufficiency is a common clinical problem in otolaryngology and medialization laryngoplasty (ML) remains the primary treatment modality. The goal of ML is to restore a physiologic glottal posture and achieve optimal phonation. However, although the shape of the medial glottal channel is considered a critical variable, this area is not readily appreciable during phonation from a superior endoscopic view of the larynx. Thus, in this study we investigate the medial surface contour changes of the vocal fold with selective activation of the intrinsic laryngeal muscles (ILMs) (thyroarytenoid, lateral cricoarytenoid, posterior cricoarytenoid). **Study Design:** Basic science study using an in vivo canine hemilarynx model. **Methods:** An in vivo canine hemilarynx model was utilized. India ink was used to mark flesh points in a grid like fashion along the medial surface of the vocal fold. A glass prism provided two distinct views of the medial surface. Selective ILM activation was performed and motion was captured using a high speed digital camera. The image processing package DaVis (LaVision Inc.) was used for time series cross correlation analysis for 3D deformation calculations of the medial surface. **Results:** The ILMs were activated at various grades of activation using neuromuscular stimulation. Activation of each intrinsic laryngeal muscle yielded a unique medial surface contour change. **Conclusions:** A quantitative analysis of in vivo canine vocal fold medial surface upon activation of selective ILMs is provided. This may guide our therapeutic efforts during medialization laryngoplasty, as well as computational modeling of laryngeal physiology.

**11:26                      Q&A**

**11:30 - 12:25            Laryngology Panel: Late Surgical Rehabilitation for Airway, Voice, and Swallowing after Prior Radiation and Surgery**

**Moderator:** Peak Woo, MD FACS, New York, NY  
**Panelists:** Seth H. Dailey, MD, Madison, WI  
Edward J. Damrose, MD FACS, Stanford, CA  
Michael M. Johns III, MD, Los Angeles, CA  
Lucian Sulica, MD, New York, NY

**12:25                      Q&A**

# Saturday

**12:30**                    **Adjourn Sessions**

**AFTERNOON**           **Activities or Free afternoon**

**12:45 - 2:30**           **TRIOLOGICAL THESIS SEMINAR (pre-registration required) - Americana 2**

**12:45 - 2:30**           **RESIDENT BOWL (pre-registration required) - Poinciana 3 & 4**

**12:45 - 2:45**           **PHYSICIAN/SCIENTIST MEETING (by invitation) - Americana 3 & 4**

**12:45 - 5:30**           **GOLF OUTING (pre-registration required)**

**1:00 - 5:00**           **ASGO SCIENTIFIC SESSION (registration required) - Americana 1**

**6:30**                    **MEET THE AUTHORS POSTER RECEPTION AND PARTY (all attendees) - Americana 3 & 4**

## SUNDAY, JANUARY 24, 2016

- 7:00 - 7:50      **Business Meetings (Fellows Only)**  
**Eastern Section - Poinciana 1**  
**Middle Section - Poinciana 2**
- AMERICANA 1 & 2**
- 7:55              **Announcements by Vice Presidents**  
  
**Introduction of Vice Presidents-Elect by Section Vice Presidents**
- 8:05 - 8:55      **Controversies in Otolaryngology: Reflux - Is It as Important as We Think?**  
**Moderator:**     Albert L. Merati, MD FACS, Seattle, WA  
**Panelists:**       David O. Francis, MD, Nashville, TN  
                         Jacob Pieter Noordzij, MD, Boston, MA  
                         Robert T. Sataloff, MD DMA FACS, Philadelphia, PA
- 8:55 - 9:45      **Masters of Otolaryngology: Scary Cases, My Worst Cases, Career Changing Events**  
**Moderator:**     Roger L. Crumley, MD MBA FACS, Irvine, CA  
**Panelists:**       Robin T. Cotton, MD FACS, Cincinnati, OH  
                         Patrick J. Gullane, MD FACS, Toronto, ON  
                         Mark K. Wax, MD FACS, Portland, OR  
                         Gayle E. Woodson, MD FACS, Merritt Island, FL
- 9:45 - 10:10     **Break with Exhibitors/Poster Viewing - Americana 3 & 4**
- 10:10 - 11:05    **Value Based Medicine: The Future, But What's It All About?**  
**Moderator:**     Randal S. Weber, MD FACS, Houston, TX  
**Panelists:**       **What is Value Based Medicine from the Health System Perspective?**  
                         Douglas A. Girod, MD FACS, Kansas City, KS  
                         **The Multispecialty Academic Practice: How Do We Deliver Value Based Care?**  
                         Myles L. Pensak, MD FACS, Cincinnati, OH  
                         **Value Based Cancer Care and an Alternative Payment Methodology**  
                         Randal S. Weber, MD FACS, Houston, TX  
                         **Not Just Little Adults: Measures, Outcomes and Value Based Initiatives in Pediatric Surgical Care**  
                         Emily F. Boss, MD, Baltimore, MD
- 11:05 - 12:00    **Health Reform, Ethics, Changes for the Future: The Compromised Surgeon**  
**Moderator:**     Gerald B. Healy, MD FACS, Boston, MA  
**Panelists:**       Michael S. Benninger, MD FACS, Cleveland, OH  
                         Carol R. Bradford, MD FACS, Ann Arbor, MI  
                         Kenneth M. Grundfast, MD FACS, Boston, MA  
                         Michael G. Stewart, MD MPH FACS, New York, NY
- 12:00              **Adjourn**



## Allergy/Rhinology

### 1. Factors Influencing Surgical Intervention in Adult Cystic Fibrosis Patients

Christopher D. Brook, MD, Boston, MA; Alice S. Maxfield, MD, Boston, MA; Ahmad R. Sedaghat, MD PhD, Boston, MA; Stacey T. Gray, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify factors that lead to surgical intervention in adult cystic fibrosis patients.

**Objectives:** To identify characteristics of adult cystic fibrosis patients that predict surgical intervention. **Study Design:** Retrospective case series. **Methods:** Patients were identified in a tertiary sinus center by ICD-9 code 277.00-277.03. Charts were reviewed for cystic fibrosis gene mutation, Lund-Mackay Score (LMS), SNOT22 score, previous surgery, number of previous surgeries, and need for surgical intervention after presentation. A t test was used to compare those who needed further surgery and those who did not, and analysis of variance was used to compare mean LMS and need for further surgery by mutation. **Results:** 100 patients met the inclusion criteria for the study. 43/100 of patients had undergone previous surgery, 29/100 underwent subsequent surgery after initial presentation to the sinus center (of those 11 had not undergone surgery previously), and 46/100 never underwent surgery. Patients that had undergone previous surgery were more likely than patients that had not to require a surgery after presentation ( $p=0.02$ ), even though LMS was not significantly different between the groups of previous surgery and no previous surgery (9.6 and 11.3,  $p=0.11$ ). Status of the F508 deletion did not impact Lund-Mackay Score for homozygotes, heterozygotes and other mutations (10.8, 9.6, 8.7 respectively,  $p=0.45$ ). F508 deletion status did predict the need for surgery after presentation, with 25% of homozygotes, 3% of heterozygotes and 20% of other mutations requiring surgery ( $p=0.04$ ). **Conclusions:** Surgical intervention in adult cystic fibrosis patients is predicted by previous surgical intervention, and homozygous F508 deletion, but not LMS.

### 2. Breast Adenocarcinoma Seeding following Endoscopic Endonasal Resection of Pituitary Mass

Erynne A. Faucett, MD, Tucson, AZ; Joshua B. Calton, BS, Tucson, AZ; Alexander G. Chiu, MD, Tucson, AZ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the findings of metastatic breast adenocarcinoma within the pituitary. In addition, participants should recognize the possibility of surgical seeding following endonasal endoscopic approach to tumor resection.

**Objectives:** 1) Discuss findings of metastatic breast adenocarcinoma within the pituitary; and 2) recognize the potential of surgical seeding following endonasal endoscopic approach of pituitary tumor. **Study Design:** Case report and review of the literature. **Methods:** Patient chart analysis and literature review. **Results:** A 72 year old female with history of breast adenocarcinoma treated with radiation and hormone therapies presented in 2011 with symptoms suspicious for pituitary macroadenoma. Complete resection of the mass was performed via endoscopic endonasal approach with pathology revealing metastatic breast adenocarcinoma. The patient was treated with localized radiotherapy to the sellar and suprasellar regions. In 2014, surveillance MRI showed a mass in the inferior aspect of the sphenoid sinus, posterior nasal septum, and anterior skull base along the previous surgical tract. Endoscopic endonasal resection of the mass was performed with pathology revealing adenocarcinoma. Since complete resection there has been no evidence of recurrence. **Conclusions:** There have been few reported cases of surgical seeding with non-endoscopic resection of tumors such as chordomas and craniopharyngioma. However, there are no cases of surgical seeding following tumor resection using an endoscopic endonasal approach. More specifically, there are no cases of seeding to the surgical tract following resection of already rare, metastatic breast adenocarcinoma within the pituitary. We present a patient with recurrent metastatic breast adenocarcinoma as a result of surgical pathway seeding. To our knowledge, this is the first reported case of breast cancer seeding to the surgical tract following endoscopic endonasal approach for resection of metastatic breast cancer to the pituitary gland.

# Posters

## 3. Sinusitis in Patients Concurrently on Tumor Necrosis Factor Alpha Inhibitors

Adam L. Honeybrook, MD, Durham, NC; Cynthia S. Wang, BS, Durham, NC; Nikita A. Chapurin, BA, Durham, NC; David W. Jang, MD, Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize that patients on TNF $\alpha$  can develop chronic sinusitis which often does not necessitate the need to cease therapy.

**Objectives:** Tumor necrosis factor alpha (TNF- $\alpha$ ) inhibitors have revolutionized treatment of many impairing inflammatory diseases. While sinusitis after initiation of TNF- $\alpha$  inhibitors has been observed, it is not well described in the literature. We aim to characterize the features of sinusitis in patients concurrently on anti-TNF- $\alpha$  therapy and their treatment course. **Study Design:** A retrospective chart review of 28 patients diagnosed with sinusitis by an otolaryngologist while on a TNF- $\alpha$  inhibitor. **Methods:** Patient demographics, medical comorbidities, sinusitis characteristics and treatment course were reviewed. Descriptive statistics and bivariate analysis were performed with SPSS (Version 22, Chicago, IL). Phi correlation coefficients greater than  $r = \pm 0.3$  and  $p \leq 0.05$  were considered significant. **Results:** Of the 28 patients studied, 12 (42.9%) had a history of sinusitis prior to initiation of anti-TNF- $\alpha$  therapy and 16 (57.1%) had no prior history. 71.4% (n=20) of patients were diagnosed with chronic rhinosinusitis without polyps and 17.9% (n=5) had recurrent acute sinusitis. In the group with no prior history of sinusitis, the median time from drug initiation to diagnosis of sinusitis was 22.5 months (IQR: 2.25-112.75). Overall, 14.3% (n = 4) of the cohort stopped, changed, or held doses of the drug due to sinusitis. 35.7% (n=10) of patients required a surgery or procedure, which included FESS (25%, n=7) and balloon dilatation (10.7%, n=3). **Conclusions:** Anti-TNF- $\alpha$  therapy can be associated with development of sinusitis, especially chronic sinusitis. While surgery was sometimes necessary, discontinuation of anti-TNF- $\alpha$  therapy was not necessary in most cases.

## 4. The Sinonasal Microbiome in Chronic Rhinosinusitis

Mark A. Merkley, MD PhD, Rochester, NY; Tristan C. Bice, MD, Rochester, NY; Steven R. Gill, PhD, Rochester, NY; Li-xing Man, MSc MD MPA, Rochester, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify trends in the science, highlight best practices, and discuss future avenues for research.

**Objectives:** Review published studies involving the bacterial 16S and fungal 18S ribosomal subunits in chronic rhinosinusitis. New genomic sequencing technologies allow for the identification of all the members of the bacterial community, including many not routinely found on standard culture assays. Studies using these technologies were reviewed to identify trends in the science, highlight best practices, and discuss future avenues for research. **Study Design:** Literature review. **Methods:** PubMed was searched for papers utilizing molecular techniques to assay the microbiome in chronic rhinosinusitis. **Results:** 17 studies were identified. Study characteristics, including study design, sampling technique, sample source, and molecular methodology were compared and contrasted. Significant differences in both the presence and relative abundance of microbial taxa were observed between chronic rhinosinusitis patients and healthy patients. Studies also demonstrated a significantly more complex community of bacteria and fungi than common culture techniques. There was a chronological trend in the number of taxa identified per study. Pitfalls noted in studies include problems with experimental design, data analysis, exclusion criteria, and contamination. **Conclusions:** Published studies illustrate significant microbial differences between chronic rhinosinusitis and healthy patients and also highlight the superiority of molecular testing over culture techniques. As the sequencing technique is becoming more refined, it will be of importance to discuss best practices for the chronic rhinosinusitis microbiome field. Future studies can build on the current literature by addressing experimental questions that will be more likely to expose host-pathogen-commensal relationships and will allow for mechanistic experimentation.

## 5. Sinonasal Phosphaturic Mesenchymal Tumor with Intracranial Extension

Julianna E. Pesce, MD, Los Angeles, CA; Scott D. Nelson, MD, Los Angeles, CA; Marilene B. Wang, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate understanding of tumor induced osteomalacia as it relates to phosphaturic mesenchymal tumor. Participants can discuss the unique pathologic diagnosis of phosphaturic mesenchymal tumors, explain their presentation in the head and neck, and compare treatment options.

**Objectives:** Phosphaturic mesenchymal tumors are rare neoplasms that are known to cause renal phosphate wasting resulting in systemic bone demineralization and osteomalacia. These tumors are often discovered during the search for the cause of osteomalacia and diagnosis is often delayed. Only 17 previously published tumors were localized to the sinonasal area with even fewer reported to be locally destructive with intracranial destruction. Through a case report and literature review we discuss the clinical presentation, radiographic and histologic features, and treatment options for this rare tumor. **Study Design:** Case report and literature review. **Methods:** We describe a case of a man with a phosphaturic mesenchymal tumor originating in the sinuses and presenting with a long history of osteomalacia and local tumor destruction. A literature review was conducted to include all cases of sinonasal phosphaturic mesenchymal tumor with intracranial extension. **Results:** A 29 year old male was transferred to our hospital due to the presence of an extensive sinonasal mass found on recent imaging. The patient had a 9 year history of unexplained osteomalacia that left him wheelchair bound secondary to severe lower extremity weakness. He presented with a 1 month history of double vision and right sided proptosis. Imaging demonstrated a large heterogeneous mass centered in the right nasal cavity, right maxillary sinus, right orbit, and right frontal sinus with destruction of the posterior wall of the frontal sinus and intracranial extension. The patient underwent anterior craniofacial resection of the tumor followed by adjuvant radiation therapy to 54 Gy. Definitive histopathological diagnosis was consistent with phosphaturic mesenchymal tumor. Only 17 previous cases have been published with tumors originating in the sinonasal region and intracranial extension is extremely rare. **Conclusions:** Phosphaturic mesenchymal tumor is a rare neoplasm in the sinonasal region that causes tumor induced osteomalacia. Early recognition is of utmost importance in order to minimize the debilitating consequences of long term osteomalacia as well as local tumor invasion. Although intracranial extension is rare, treatment with surgery followed by radiation may be warranted in order to maximize disease free survival.

## 6. Clinical Outcome in Patients with Eosinophilic and Non-Eosinophilic Chronic Rhinosinusitis: The Importance of Tissue Eosinophilia

Camilo A. Reyes, MD, Augusta, GA; Joshua C. Yelverton, MD, Augusta, GA; Thomas Holmes, BS, Augusta, GA; Stilianos E. Kountakis, MD PhD, Augusta, GA

**Educational Objective:** At the conclusion of this presentation, participants should be able to understand the difference in clinical course following surgery in patients with eosinophilic and non-eosinophilic chronic rhinosinusitis.

**Objectives:** To compare the response to surgery in patients with eosinophilic (eCRS) and non-eosinophilic (neCRS) with regard to subjective symptom scoring and endoscopic examination. **Study Design:** Retrospective review. **Methods:** Patients were identified from a database compiled at a tertiary referral institution in an academic rhinology practice. Sino-Nasal Outcome Test (SNOT-20) and Lund-Kennedy endoscopy scores were compared from eCRS and neCRS patients before surgery, one week after surgery and at long term followup. **Results:** Fifty eCRS and fourteen neCRS patients were identified that met inclusion criteria. Preoperative SNOT-20 scores in eCRS were significantly lower compared to neCRS (29 and 38.93 respectively,  $p < 0.05$ ). Both groups showed significant one week improvement after surgery (eCRS = - 37.08%, neCRS = - 37.25%). There was no significant difference between the two groups at the one week and long term followups. The symptom improvement realized at the one week followup was unchanged at long term followup. At long term followup, endoscopy score remained higher in eCRS versus neCRS (4.32 and 0.33, respectively,  $p < 0.01$ ). There was a significant correlation between SNOT-20 score and endoscopy score before surgery and at long term followup (before = 0.6045  $p < 0.001$  and long term = 0.3482  $p < 0.0221$ ). The average long term followup was 17.26 months. **Conclusions:** Patients with neCRS have higher SNOT and endoscopy score prior to surgical treatment, but experience a faster recovery when compared to eCRS patients. In both populations, there is sustained improvement at long term followup. However, patients with eCRS have more objective evidence of long term disease and require longer followup due to the more chronic nature of the disease.

## 7. Isolated Sphenoid Fungus Ball Leads to Hemorrhagic Stroke

Nicholas R. Rowan, MD, Pittsburgh, PA; Berrylin J. Ferguson, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the risks associated with endoscopic removal of an isolated sphenoid fungus ball in the setting of incidental bony dehiscence of the sphenoid.

**Objectives:** To describe a rare case involving fungal invasion of the cavernous carotid following endoscopic removal of an isolated sphenoid fungus ball. **Study Design:** Case report and literature review. **Methods:** Review of a case history including the patient's clinical course, surgery, radiographic images, histopathology and autopsy slides. A pertinent

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literature review is also presented. **Results:** The patient is a 68 year old man with a history of inhaled and low dose oral steroid dependent asthma who presented with acute sinusitis. Following culture directed antibiotic therapy, vertex headaches persisted, and a CT revealed an opacified sphenoid with a dehiscent right lateral wall, the latter of which occurs in up to 30% of sphenoids. He underwent uneventful awake endoscopic sphenoid sinus debridement with a perioperative increase in systemic steroids. Histopathology demonstrated a fungus ball, cultures were negative. 3 days postoperatively he developed a new onset pupil sparing right third nerve palsy. An MRI showed minimal enhancement of posterior clinoids and CT showed an unremarkable sphenoid. 2 weeks postoperatively he suffered a hemorrhagic stroke and died. Postmortem evaluation revealed an edematous right third cranial nerve and invasion of the intima of the cavernous internal carotid artery with hyphae, consistent with aspergillus, adjacent to bony dehiscence. **Conclusions:** Steroid use and a defect in the bony barrier of the sphenoid adjacent to the carotid artery may have predisposed this patient to carotid fungal invasion. Histopathology is critical in confirming diagnosis and antifungal therapy may inhibit fungal growth. Since this case, immunocompromised patients at our institution with a suspected fungus ball receive perioperative antifungals.

## 8. IgE Levels to Aeroallergens in Turbinate Tissue from Pediatric Patients with Chronic Rhinitis

Cameron Sheehan, BS, Columbus, OH; Elizabeth Erwin, MD, Columbus, OH; Kris R. Jatana, MD, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate increased understanding of pediatric allergic rhinitis, turbinate hypertrophy and the possible role of local IgE in turbinate tissue.

**Objectives:** The objectives of this project were to correlate serum IgE to aeroallergens to tissue IgE levels taken from the turbinates of pediatric patients undergoing turbinate reduction. **Study Design:** Non-randomized prospective study. **Methods:** We recruited 20 children with chronic rhinitis at the time of turbinate reduction surgery. Symptoms were assessed using the Sinonasal Outcome Test (SNOT-22), and ImmunoCAP testing was performed to measure levels of IgE antibodies to a panel of aeroallergens both in the serum and in turbinate samples homogenized in phosphate buffered saline. **Results:** Patients ranged in age from 2 to 15 years (median 9), and the majority were male (74%). The prevalence of asthma was high at 35%. The most commonly rated severe symptoms were nasal congestion and runny nose. Serum analysis revealed IgE antibody levels  $>0.10$  IU/ml to at least one aeroallergen in 67%. Testing for IgE antibodies in turbinate samples (n=18) also revealed positive results ( $>0.10$  IU/ml). Nearly every sample had detectable IgE antibodies to *Alternaria* (18/18), oak (15/18), and ragweed (17/18). Ten patients had IgE antibodies to other allergens, and in this group 6 concurrently had serum positives consistent with systemic sensitization and 4 did not. **Conclusions:** The finding of low levels of IgE antibodies in patients without evidence of systemic sensitization could be consistent with the concept of local allergy or entopy; however, the low levels of IgE antibodies in nasal tissue from all patients make the results difficult to interpret.

## 9. Single Layer Repair of Massive Anterior Skull Base Defects without Nasoseptal Flap

Frederick Yoo, MD, Los Angeles, CA; Marilene B. Wang, MD, Los Angeles, CA; Marvin Bergsneider, MD, Los Angeles, CA; Jeffrey D. Suh, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the utility of a single layer repair of large anterior skull base defects and discuss the advantages and disadvantages of using different materials for the repair.

**Objectives:** Endoscopic techniques for resection of anterior skull base (ASB) tumors have advanced in recent years, allowing for complete excision of larger tumors via endoscopic endonasal approach. Bilateral skull base defects are most commonly repaired using a multi layered reconstruction followed by unilateral or bilateral nasoseptal flaps. Use of a single layer closure of large ASB defects with an acellular dermal allograft (AlloDerm) has been described previously in literature with a high success rate, but this technique has yet to gain widespread use. We report our experience in a series of four patients with esthesioneuroblastomas who underwent reconstruction of large, bilateral ASB defects using a single layer intradural graft, without nasoseptal flaps. We also compared the results of AlloDerm or collagen matrix xenograft (DuraMatrix) use as the graft biomaterial. **Study Design:** Retrospective case series. **Methods:** The medical records of four patients with single layer closure of large, bilateral ASB defects treated at a tertiary academic medical center were reviewed. **Results:** Two patients were reconstructed with AlloDerm and two with DuraMatrix, with successful single layer closure and postoperative XRT. The patients with AlloDerm graft both had prolonged postoperative crusting for over 12 months, with symptomatic infections requiring multiple courses of antibiotics. Of the DuraMatrix patients, both patients had complete resolution of crusting 3 months after surgery, without signs of infection. **Conclusions:** Single layer repair

without nasoseptal flap is a viable method of skull base repair for large ASB defects. In this small series, repair with DuraMatrix was superior with less graft crusting and infection, requiring substantially fewer debridements than patients reconstructed with AlloDerm.

## Facial Plastic & Reconstructive

10. **Ultrasonic Aspirator for Rib Graft Shaping and Harvest in Facial Plastic Surgery**  
Amir Allak, MD MBA, Charlottesville, VA; Catherine Meller, MBBS, Charlottesville, VA; J. J. Christophel, MD MPH, Charlottesville, VA; Stephen S. Park, MD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the novel application of ultrasonic aspirators in the shaping and harvest of rib bone and cartilage.

**Objectives:** Traditionally, harvest and carving of rib grafts was performed solely with cold instrumentation and high speed drills. The ultrasonic aspirator utilizes high frequency vibration of the instrument tip, which can be optimized to specifically denature and emulsify bone and cartilage. The resulting emulsified tissue is removed by continuous irrigation and suction. Various instrument tips allow for fine, delicate carving and even in situ shaping. The ultrasonic aspirator has proven useful in various disciplines within otolaryngology-head and neck surgery, but there are few published studies in facial plastic surgery. This study describes its use in harvesting and shaping rib cartilage for grafting in rhinoplasty and auricular reconstruction. **Study Design:** Case series. **Methods:** Patients undergoing rhinoplasty or auricular reconstruction using autologous rib grafts that were shaped with the ultrasonic aspirator. Cosmetic and functional outcomes were recorded. **Results:** Harvest and shaping of grafts was successful and had equivalent outcomes to those performed previously with conventional methods. **Conclusions:** Ultrasonic aspirator assisted harvest and shaping of rib cartilage for rhinoplasty and auricular reconstruction is efficient and effective. Cosmetic and functional outcomes are comparable with traditional methods.

11. **Isolated Single Wall Orbit Fractures and Concomitant Globe Injury: Identifying High Risk Patients**  
Brian T. Andrews, MD, Kansas City, KS; Todd Thurston, MD, Kansas City, KS; Anee S. Jackson, MD, Kansas City, KS; Naiman Nazir, MD MPH, Kansas City, KS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to assess the risk of concomitant eye injury associated with isolated single wall orbit fractures.

**Objectives:** Ophthalmologic evaluation prior to surgical repair of isolated orbit fractures is important to rule out globe injury and possible vision loss. Unfortunately this is not always possible at all institutions. We hypothesize that the anatomic location of a single wall orbit isolated orbit fracture can help predict the likelihood of ocular injury and thus identify high risk patients who mandate ophthalmologic evaluation prior to surgical repair. **Study Design:** A retrospective chart review was performed at a tertiary academic medical center using the institutional trauma registry for maxillofacial trauma. **Methods:** All subjects with an isolated single wall orbit fracture were included in this study. Statistical analysis was performed using a Fisher exact test. **Results:** 279 subjects with orbit fractures were identified for inclusion in this study. Forty-one of the 279 (14.7%) subjects had isolated single wall orbit fractures. Isolated single wall fractures included: orbit floor= 19 of 41 (46.3%), medial wall= 15 of 41 (36.6%), lateral wall= 4 of 41 (9.8%), and orbit roof= 3 of 41 (7.3%). Concomitant ocular injury (13 of 41, 31.8%) was associated with isolated orbit wall fractures as follows: orbit floor= 4 of 19 (21.1%), medial wall= 6 of 15 (40%), lateral wall= 2 of 4 (50%), and orbit roof= 1 of 3 (33.3%). A Fisher exact test demonstrated that there was no statistically significant association between individual isolated wall fractures and ocular injury ( $p=0.5000$ ). **Conclusions:** Isolated orbit wall fractures are common in maxillofacial trauma and often require surgical repair. Concomitant ocular injury is common (31.8%) with this highest incidence occurring with lateral wall fractures (50%), however, statistical analysis did not demonstrate a significant relationship between the anatomic location of an isolated single wall fracture and eye injuries.

12. **Nasal Implant Extrusion: Case Report and Review of the Literature**  
Jason E. Gilde, MD, Oakland, CA; Chris G. Tang, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the presentation and treatment of nasal implant extrusion.

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**Objectives:** Describe a case of nasal implant extrusion and review the presentation and treatment of this problem. A review of the literature is included. **Study Design:** A case report of a patient presenting with nasal implant extrusion and literature review. **Methods:** The medical record of a patient with nasal implant extrusion treated at a tertiary care academic facility was reviewed. A PubMed/Medline search was performed for the key words "nasal implant extrusion". **Results:** A 26 year old Chinese woman presents with a gortex dorsal augmentation nasal implant partially extruding from the right nares. Patient had a rhinoplasty performed in China 2 years ago with placement of a gortex dorsal augmentation implant. Two weeks prior to presentation, the implant eroded through the right nasal mucosa. The patient was taken to the operating room for implant removal and nasal reconstruction. Cultures were obtained, and patient was treated with oral clindamycin and ketoconazole. At 2 weeks postoperative, she demonstrated improved cosmesis of the nose and resolution of the infection. **Conclusions:** Although nasal implant extrusion is a known complication of implantation of foreign material for dorsal augmentation, the procedure continues to be performed, primarily in Asian countries. Surgical techniques exist to improve outcomes. Treatment involves implant removal and nasal reconstruction.

## 13. Evaluating Nasal Tip Support Using a Multicomponent Nasal Model

Eric J. Gray, BS, Irvine, CA; Jason J. Chen, BS, Irvine, CA; Marlon M. Maducdoc, 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 discuss the methods available to quantitatively examine nasal tip support and benefits provided by a customizable 3D model.

**Objectives:** Stability of the nasal tip is essential for maintaining proper form and function of the nasal airway, particularly following rhinoplasty. Palpation is the standard method for accessing nasal tip support. A new method to quantitatively measure tip support was sought as current measurement techniques have had limited utility. **Study Design:** Nasal tip support mechanisms were evaluated by performing mechanical analysis on a CT derived 3D printed multicomponent model to gauge how tip palpation alters tip displacement and reaction force. **Methods:** A digital nasal model was created using a CT scan and CAD software. The facial skeleton was 3D printed in ABS plastic. 3D printing was used to create molds to cast the nasal cartilages in polyurethane of appropriate stiffness (septum - 13.3 MPa, upper and lower lateral cartilages - 10.4 MPa). The five individual nasal cartilages were embedded within the negative mold of the nasal skin envelope. Then polyurethane representing the skin envelope was poured into the mold (0.167 MPa). Mechanical analysis was performed on the model and the integrated response to tip depression was recorded. **Results:** The multicomponent model had a reaction force of 0.261 N and 0.783 N at 0.5 mm and 1 mm tip displacement respectively. **Conclusions:** This study demonstrates a novel way to create a customizable multicomponent nasal model. 3D printing ensures a constant form factor, while the casting process allows for manipulation of the mechanical parameters of the individual cartilage structures and skin envelope. This process demonstrates a novel way for surgeons to create an advanced model to improve their surgical planning.

## 14. Intraoperative Fluctuations in Blood Pressure and Its Impact on Fluid Administration during Head and Neck Free Tissue Transfer

Jason I. Kass, MD PhD, New York, NY; Samuel D. Maria, MD, New York, NY; Anmol A. Gupta, MD, New York, NY; Matthew A. Levin, MD, New York, NY; Brett A. Miles, DDS MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate that wide swings in intraoperative blood pressure (IOBP) will lead to higher fluid administration. High fluid administration reduces outcomes in free flap surgery and control of these swings may improve outcomes in free tissue transfer.

**Objectives:** Recent evidence in cardiac and liver surgery has shown increased morbidity and mortality with poorly controlled intraoperative blood pressure (IOPB). Poorly controlled IOPB leads to elevated fluid administration. As intraoperative crystalloid volume is a risk factor for free tissue transfer outcomes we tested whether poorly controlled IOPB correlates with higher volume administration in free tissue transfer. **Study Design:** Retrospective cohort. **Methods:** Continuous intraoperative hemodynamics from 303 cases of free tissue transfer were analyzed. All patients had arterial lines placed at the start of the case. Elevated IOPB variability was defined as the fractional change in mean arterial pressure (FCM MAP) >25% for a 1 minute period. Total volume administration including blood products, colloid and crystalloid were available as part of the electronic anesthetic record. **Results:** 8.9% of the study population received greater than 5L of fluid intraoperatively. The study group was demographically diverse, 68% male, with a median age of 55 years. Intraoperative MAP <40mm Hg (OR 1.207; 95% CI 1.072, 1.360; p=0.04) and MAP FCM >25% (OR 1.037; 95% CI 1.007,

1.067;  $p=0.001$ ) were found to be associated with higher fluid totals. Neither pressor administration of any kind nor patient comorbidities were significantly associated with this outcome. **Conclusions:** Intraoperative blood pressure variability correlates with increased fluid administration during free tissue transfer. Minimizing these fluctuations may help reduce high volume administration, which is a known risk factor for poor outcomes in free tissue transfer.

## 15. An Innovative Photographic Database for Cutaneous Defects

Matthew Q. Miller, MD, Charlottesville, VA; Shefali R. Rikhi, BS, Charlottesville, VA; Jared J. Christophel, MD MPH, Charlottesville, VA; Stephen S. Park, MD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants will understand how to design an IRB approved photo database and see the wide educational opportunities.

**Objectives:** To construct an easy to use server based database that stores photos of patients undergoing reconstructive surgery for cutaneous facial defects and organizes them in a manner best suited for rapid search and education.

**Study Design:** An IRB approved, user modifiable database was designed using OnBase software (Hyland Software Inc., Westlake, Ohio) to store both the photos of patients undergoing reconstructive surgery and the pertinent clinical data.

**Methods:** We designed a database using the OnBase software system to catalog patient data and photographs (pre, intra, and postoperative) and allow searches based on key data points. Data entry was based on patients undergoing facial reconstruction of Mohs defects. Data included defect description, flap nomenclature, flap design, outcomes, and complications. Almost all data values are entered via dropdown menus to eliminate the errors of free text entry. **Results:** The database allows easy and rapid searches of case examples based on a number of criteria. It allows the user to view multiple examples of different patients with a given defect, defined by location, depth, and size. It provides a way to review personal outcomes and exercise continued practice based learning. **Conclusions:** Server based database systems such as OnBase provide platforms which can be used to create user friendly photo and data collection systems. Access to this database could potentially be opened widely and provide physicians around the globe an online database of case examples of facial reconstruction.

## 16. Patient Compliance following Mandibular Fracture Repair

Jeffrey P. Radabaugh, MD, Lexington, KY; Adam J. Van Horn, MD, Lexington, KY; Jared M. Shelton, DMD MD, Lexington, KY; Stephen A. Chan, BS, Lexington, KY; Thomas J. Gal, MD MPH, Lexington, KY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss how patient travel and specific surgical approach affect postoperative compliance in patients with isolated mandibular fractures.

**Objectives:** Compliance with postoperative care in the maxillofacial trauma population is uniformly considered to be poor. The axiom to treat and street is not a function of lack of access to postoperative care but rather its anticipated lack of utilization. The goal of this study is to identify factors associated with increased compliance with postoperative management of mandible fractures. **Study Design:** A retrospective cohort study from a tertiary care institution. **Methods:** Using CPT codes to identify maxillofacial injuries requiring operative repair, a subset of isolated mandibular fractures was identified. Age, gender, race, insurance type, travel distance to our site of repair, type of fracture, surgical approach, and complications were used as variables in multivariate analysis to examine factors associated with compliance to postoperative care. **Results:** Between 2010 and 2013, 340 isolated mandible fractures were identified. Mean age was 36 and 79% were male. Demographic data did not appear to be associated with compliance. Type of fracture was not associated with compliance. No association between complications and postoperative compliance was observed. Trends toward improved compliance with external incisions, particularly those with removable sutures and drains as well as temporary fixation hardware were observed. Relative distance from our institution was significantly associated with followup. **Conclusions:** Postoperative compliance after surgical repair is poor relative to that which one would expect after standard operative intervention. It would appear that a need to followup, such as for drains, temporary fixation hardware placement, and sutures, may improve compliance, while difficulties returning to the site of surgery may impede it.

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## 17. Image Guided Placement of Osseointegrated Implants for Challenging Auricular, Orbital and Rhinectomy Defects

Mirabelle B. Sajisevi, MD, Durham, NC; Kevin J. Choi, MD, Durham, NC; Jay McClennen, CCA, Durham, NC; David M. Kaylie, MD, Durham, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the use of an image guided technique for placement of osseointegrated implants for reconstruction in patients who have undergone resection for cancer of the head and neck.

**Objectives:** Surgery for head and neck squamous cell carcinoma (HNSCC) can result in significant defects. Flap reconstruction provides closure of the wound but often a prosthesis is needed to restore preoperative appearance. The objective of this study is to describe the use of an image guided technique for placement of osseointegrated implants for reconstruction. **Study Design:** Review of three consecutive patients with defects from surgical resection of HNSCC treated with osseointegrated implants for prosthesis (OIP) using image guidance. **Methods:** All three patients were evaluated preoperatively by our anaplastologist for prosthesis planning. CT scan was then performed and the sites and trajectory of implant placement were selected based on adequacy of bone stock. Image guidance was used intraoperatively to guide precise placement. **Results:** Case 1: 55 year old male who required total auriculectomy for SCC. Case 2: 64 year old male who underwent radical resection of facial SCC including removal of the orbit and auricle. Case 3: 74 year old male who required total rhinectomy for SCC. Case 1 and 3 received adjuvant radiation prior to implantation. Case 2 underwent simultaneous implant of OIP and an osseointegrated hearing implant (OHI). Complications included tissue overgrowth and poor wound healing after flap debulking requiring surgical revision. **Conclusions:** Defects after surgery for HNSCC can be complex and restoration is hard to achieve with native tissue alone. OIP offers an excellent means for reconstruction. However, this patient population is challenging due to limited bone stock and landmarks from resection. We describe our unique approach using image guidance for placement of OIPs and OHIs.

## 18. Full Thickness Scalp Defects Reconstructed with Outer Table Calvarial Decortication and Grafting: A 13 Year Review

Jordan P. Sand, MD, Saint Louis, MO; Jason A. Diaz, MD, Saint Louis, MO; Brian Nussenbaum, MD, Saint Louis, MO; Jason T. Rich, MD, Saint Louis, MO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss an alternative way of reconstructing full thickness scalp defects with outer table calvarial decortication and grafting.

**Objectives:** To identify outcomes for patients with full thickness scalp defects reconstructed with outer table calvarial decortication and grafting. **Study Design:** Retrospective cohort review. **Methods:** A clinical investigation data exploratory repository database from a single academic institution was utilized to identify patients treated in the past 13 years by three staff surgeons with this reconstructive technique. Medical records and outcomes were reviewed. **Results:** Twenty-four patients (18 male, 6 female) were identified to have undergone 25 separate full thickness scalp reconstructions as described above. Average age was 73 years (range 49-86) with an average followup of 423 days (range 27-994). Average defect size was 42 cm<sup>2</sup> (range 1.8-145) with the most common location being the scalp vertex (n=14). Acellular dermis was the most commonly used graft (n=22), followed by split thickness skin graft (n=2) and full thickness skin graft (n=1). 84% (21/25) of the reconstructions had a successful reconstruction with an average healing time of 107 days (range 27-233). All four patients with reconstruction failures had a prior history of scalp radiotherapy. **Conclusions:** For select patients (i.e., anticipated high surgical morbidity, tight scalp location, significant comorbidities, uncertain margin status, or aggressive pathology) reconstruction of full thickness scalp defects can be successfully performed with outer table calvarial decortication and grafting. However, prolonged wound care is required. Prior scalp radiotherapy predicts failure for using this technique.

## 19. A Novel System to Evaluate Aesthetic Results following Orbitofacial Reconstruction

Patrick T. Tassone, MD, Philadelphia, PA; Lucas M. Bryant, MD, Philadelphia, PA; Joseph M. Curry, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to use a rating system to evaluate aesthetic results in patients who have undergone orbitofacial resections and reconstructions.

**Objectives:** Extirpation of orbital and periorbital malignancies can have devastating aesthetic and functional conse-

quences. Restoration of form and function of these areas remains a challenge for the reconstructive surgeon. No validated system exists to evaluate aesthetic results following orbitofacial reconstructions. We created a novel system to characterize postoperative aesthetic outcomes in orbitofacial patients, then assessed our system for inter- and intra-evaluator reliability. **Study Design:** Review of orbitofacial aesthetic results by evaluators and comparison between evaluators. **Methods:** A question based, anatomically organized survey was created to evaluate facial deformity following orbitofacial reconstruction. Evaluators answered questions using postoperative photographs from 20 patients. Responses were assessed for inter- and intra-evaluator by Kendall's coefficient of correlation. **Results:** Five evaluators completed the survey at least once, and three completed it twice. 85% of questions showed at least substantial inter-evaluator reliability, including evaluation of overall deformity. The survey also showed good intra-observer reliability when evaluators repeated the survey after 2-3 weeks. **Conclusions:** We present a reliable and novel system to evaluate aesthetic outcomes following reconstruction for complex orbitofacial defects.

## 20. Donor Site Morbidity of the Rectus Abdominis Free Flap in Head and Neck Reconstruction

Scott H. Troob, MD, Portland, OR; Jordan Allensworth, MD, Portland, OR; Eben L. Rosenthal, MD, Stanford, CA; Mark K. Wax, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss complication rates of rectus abdominous free flaps in head and neck reconstruction and compare relative rates of hernia formation with and without reinforcement of the donor site.

**Objectives:** Donor site morbidity of the rectus abdominous free flap has not been well described in head and neck reconstruction. We discuss our experience, evaluate donor site morbidity, and evaluate the role of abdominal wall reinforcement in reducing postoperative complications. **Study Design:** Retrospective review of 179 patients who underwent rectus free tissue transfer between January 1999 and July 2015 separated into those receiving reinforcement and those that did not. **Methods:** Complication rates of 89 patients receiving reinforcement of their abdominal defect were compared to the 90 that did not. **Results:** Male to female ratios (3:1) and mean age (60 years) were similar in both groups. Reinforcement consisted of acellular dermis (n=34) or mesh (n=65). In the reinforcement group, 6 patients (6.7%) had acute complications, (within 14 days of surgery), and 8 patients (9%) had a long term complication (greater than 14 days postoperative). In those without reinforcement, 7 patients (7.8%) had acute complications and 11 patients (12.2%) had long term complications. There were no statistical differences in the overall donor site complication rate between the groups. Rates of hernia (3.4 vs 8.8%) and abdominal wall dehiscence (1.1 vs 0) were similar for reinforcement vs. none. **Conclusions:** Donor site complications of the rectus abdominis free flap are uncommon. The use of reinforcement for tension free closure of the rectus abdominis donor site does significantly reduce the rate of hernia formation.

## 21. Recurrent Intraoperative Free Flap Thrombosis Despite Systemic and Directed Anticoagulation

Jennifer A. Villwock, MD, Syracuse, NY; Lindsay B. Sobin, MD, Boston, MA; Sherard A. Tatum, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize recurrent intraoperative thrombosis despite anticoagulation as a complicating factor and potential contraindication to free flap reconstruction.

**Objectives:** Perioperative free flap anastomosis thrombosis is a known complication. Recurrent intraoperative thrombosis is a rare complication. We report the first case, to our knowledge, of recurrent intraoperative thrombosis of multiple attempted free flaps and anastomotic revisions in a patient without underlying coagulopathy. **Study Design:** Case report and literature review. **Methods:** A case of recurrent intraoperative free flap thrombosis in a 35 year old male is described and the recent literature reviewed. **Results:** The patient is a 35 year old male with a history of meningioma, radiation, and failed bone flap. Resultant glabellar and frontal defect, with exposed bone and communication of exposed dura with nasopharynx, necessitated free flap closure. Over the course of six days he underwent a rectus abdominis free flap, an anastomosis revision, and, after subsequent rectus flap definitive failure, a latissimus dorsi free flap. Each case was complicated by intraoperative thrombosis of the arterial and venous anastomoses despite vessel irrigation with heparinized lactated ringers after harvest, systemic heparinization, clot clearance with a Fogarty catheter, and catheter directed tissue plasminogen activator (t-PA) to the anastomoses. The latissimus dorsi flap was deemed unsalvageable intraoperatively due to intractable thrombosis and left as a biologic dressing. Hematology service conducted coagulopathy workup, which was completely unremarkable. **Conclusions:** Recurrent intraoperative thrombosis in the absence of coagulopathy has been anecdotally noted by our senior surgeons, but never formally reported previously. In this perplexing scenario, pro-

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ceeding with additional free flaps may not be advisable.

## General/Clinical Fundamentals

### 22. Does Resident Participation Influence Otolaryngology-Head and Neck Surgery Morbidity and Mortality? An Examination of 27,018 Operations

Nicholas B. Abt, BS, Baltimore, MD; Douglas D. Reh, MD, Baltimore, MD; David W. Eisele, MD, Baltimore, MD; Howard W. Francis, MD, Baltimore, MD; Christine G. Gourin, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss resident's impact on postoperative outcomes for otolaryngology-head and neck surgery and explain these data to their patients.

**Objectives:** Patients may perceive resident procedural participation as detrimental to their postsurgical outcome. Our objective is to investigate whether otolaryngology-head and neck surgery (OHNS) house staff participation is associated with surgical morbidity and mortality. **Study Design:** Case control study of prospectively collected data. **Methods:** OHNS patients were analyzed from the American College of Surgeons National Surgical Quality Improvement Program 2006-2013 databases. We compared the incidence of 30 day postoperative morbidity, mortality, readmissions, and reoperations in patients operated on by resident surgeons with attending supervision (AR) with patients operated on by an attending surgeon alone (AO) using cross tabulations and multivariable regression. **Results:** There were 27,018 cases with primary surgeon data available, with 9,511 AR cases and 17,507 AO cases. Overall, 3.62% of patients experienced at least one postoperative complication. The AR cohort had a higher complication rate of 5.73% than the AO cohort at 2.48% ( $p < 0.001$ ). After controlling for all other variables, there was no significant difference in morbidity (OR=1.05 [0.89-1.24]), mortality (OR=0.91 [0.49-1.70]), readmission (OR=1.29 [0.92-1.81]) or reoperation (OR=1.28 [0.91-1.80]) for AR compared to AO cases. There was no difference between PGY levels for adjusted 30 day morbidity or mortality. **Conclusions:** There is an increased incidence of morbidity, mortality, readmission, and reoperation in OHNS surgical cases with resident participation, which appears related to increased comorbidity in the AR cohort. After controlling for all other variables, resident participation was not associated with an increase in 30 day morbidity, mortality, readmission, or reoperation odds. These data suggest that OHNS resident participation in surgical cases is not associated with poorer short term outcomes.

### 23. Vagal Nerve Stimulator Malfunction with Resulting Thermal Injuries: A Case Report and Review of the Literature

Jacqueline A. Anderson, MD, Tacoma, WA; Aurora G. Standlee, MD, Tacoma, WA; Brian J. Mitchell, DO, Spokane, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the risks associated with vagal nerve stimulator implantation including the previously unreported risk of thermal injury.

**Objectives:** Vagal nerve stimulators are implantable devices FDA approved for the treatment of refractory epilepsy and depression. They are generally considered safe and effective, with the few complications being primarily infection and vocal cord dysfunction. We present a case of severe thermal injury resulting from vagal nerve stimulator malfunction years after placement. Our goal is to raise awareness about this rare but potentially serious device malfunction and to discuss our approach for workup, surgical resection, and reconstruction. **Study Design:** Case report and literature review. **Methods:** PubMed and Ovid literature searches. **Results:** Our patient presented with an asymptomatic neck mass over 10 years after implantation of a Cyberonics vagal nerve stimulator for refractory epilepsy. Workup led to the discovery of extensive necrosis and microabscess formation surrounding a charred lead wire. He ultimately required multiple debridements, sacrifice of the ipsilateral vagus nerve, and regional flap reconstruction. No previous reports of thermal injury secondary to vagal nerve stimulator device malfunctions were identified in the literature. Literature regarding other implantable devices also failed to identify possible lead shortage and thermal injury as a risk. **Conclusions:** We present a case of severe thermal injury resulting from vagal nerve stimulator malfunction years after placement, our workup and surgical treatment. We highlight this previously unreported complication and potential future patient safety issues related to implantable devices.

**24. Mammary Analogue Secretory Carcinoma in a Woman with a Prolactinoma: A Case Report and Review of Literature**

Ghedak Nather Ansari, BA MSEd, Washington, DC; Laquanda T. Knowlin, MD, Washington, DC; Daniel Bostock, MD, Washington, DC; Babak Shokrani, MD, Washington, DC; Adedoyin O. Kalejaiye, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss pathological findings in the diagnosis of mammary analogue secretory carcinoma.

**Objectives:** To describe a case of mammary analogue secretory carcinoma (MASC) presenting in a woman with a prolactinoma. To examine the potential link between elevated prolactin levels and salivary gland tumors. **Study Design:** Case study and literature review. **Methods:** A 23 year old woman with a history of pituitary prolactinoma presented with a slowly enlarging right parotid mass. Fine needle aspiration (FNA) of the mass revealed a monotonous population of cells with abundant eosinophilic cytoplasm and frequent cytoplasmic vacuoles. Cytology and immunohistochemistry were consistent with MASC. We reviewed the literature to examine potential links between elevated prolactin levels and salivary gland tumors. **Results:** MASC is a recently described salivary gland malignancy that is morphologically and genetically similar to secretory carcinoma of the breast. In the past, MASC was erroneously classified as acinic cell carcinoma and other adenocarcinomas due to similar histopathological features, but MASC should be differentiated from these tumors given that it displays a specific t(12;15)(p13;q25) translocation. Breast and salivary glands have similar embryonic origin and both contain prolactin receptors. Multiple studies have suggested that circulating prolactin level is related to breast cancer risk, but no links have been made between prolactin levels and salivary neoplasms. **Conclusions:** MASC is a recently described clinical entity. The diagnosis may be made on FNA and with confirmatory testing for the t(12;15)(p13;q25) translocation. To our knowledge, this is the first reported case of MASC in a patient with a prolactinoma. Further studies are needed identify a link, if any, between elevated prolactin and salivary tumors such as MASC.

**25. Vice President's Resident Research Award  
Functional Impact of Tinnitus on the Prevalence of Anxiety and Depression**

Jay M. Bhatt, MD, Irvine, CA; Neil Bhattacharyya, MD FACS, Boston, MA; Harrison W. Lin, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the relationships between tinnitus, anxiety and depression among adults.

**Objectives:** Quantify the relationships between tinnitus, anxiety and depression among adults. **Study Design:** Cross-sectional analysis of a national health survey. **Methods:** Adult respondents in the 2007 Integrated Health Interview Series tinnitus module were analyzed. Data for tinnitus symptoms and severity and reported anxiety and depression symptoms were extracted. Associations between tinnitus problems and anxiety, depression, lost workdays, days of alcohol consumption, and mean hours of sleep were assessed. **Results:** Among 21.4 ± 0.69 million adult tinnitus sufferers, 26.1% reported problems with anxiety in the preceding 12 months, while only 9.2% of those without tinnitus reported an anxiety problem (p<0.001). Similarly, 25.6% of respondents with tinnitus reported problems with depression, while only 9.1% of those without tinnitus reported depression symptoms (p<0.001). Those reporting tinnitus symptoms as big or very big problem were more likely to concurrently report anxiety (odds ratio 5.7; CI: 4.0-8.1; p<0.001) and depression (OR 4.8; CI: 3.5-6.7; p<0.001) symptoms. Tinnitus sufferers reported significantly fewer mean hours of sleep per night (7.00 vs 7.21; p<0.001) and greater mean days of work missed (64.4 vs 61.6, p<0.001) compared to those who did not report tinnitus. Mean days of alcohol consumption between the two groups were not significantly different. **Conclusions:** Tinnitus symptoms are closely associated with anxiety, depression, shorter sleep duration, and greater workdays missed. These comorbidities and sequelae should be recognized and addressed to optimally manage patients with chronic and bothersome tinnitus.

**26. Trends in Medical School Otolaryngology Curriculum: Do They Correlate with Residency Application Rates?**

Elizabeth F. Boscoe, BA, Aurora, CO; Cristina E. Cabrera-Mffly, MD, Denver, CO

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe trends in the otolaryngology medical school curriculum at allopathic US medical schools and discuss whether the amount and type of exposure affects application rates to otolaryngology residency.

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**Objectives:** To identify trends in medical school otolaryngology curriculum requirements. To determine whether the otolaryngology curriculum correlates with application rates to otolaryngology residency. **Study Design:** Survey of United States allopathic medical schools. **Methods:** Allopathic medical schools were surveyed to determine the amount of otolaryngology exposure students receive during their undergraduate medical education. Public databases and an existing otolaryngology resident database were used to determine application rates to otolaryngology residency from 2011 to 2013. **Results:** 60% of the schools surveyed responded. Average class size was 149 students. 68% of surveyed schools noted that 75-100% of their students received preclinical exposure to otolaryngology, with 59% reporting a mandatory preclinical otolaryngology module for all students. 80% of schools required a mandatory otolaryngology clinical rotation, which in a majority of cases was less than 2 weeks long. 89% of schools offered otolaryngology as a clinical elective, with a mean of 12 students participating in the elective yearly. Only 7% of schools required a mandatory otolaryngology clinical rotation. Neither schools with mandatory preclinical otolaryngology modules or mandatory clinical rotations had a higher rate of otolaryngology residency applications. Medical schools with larger class size ( $p < 0.0001$ ) or an affiliated otolaryngology residency program had a higher rate of resident applicants ( $p < 0.0001$ ). **Conclusions:** While increased exposure to otolaryngology curriculum does not increase residency applications, our data suggests that medical students do not receive significant exposure to otolaryngology during medical school. Increased requirements for otolaryngology curriculum may be beneficial to all medical students regardless of their specialty choice.

**27. Otitis Media with Facial Nerve Paralysis and Subperiosteal Abscess of the Orbit--A Rare Initial Presentation of Wegener's Granulomatosis: Case Report and Literature Review**

Anthony L. Chin-Quee, MD, Detroit, MI; Laura R. Garcia-Rodriguez, MD, Detroit, MI; Lamont R. Jones, MD, Detroit, MI; Robert J. Stachler, MD, Detroit, MI; Syed F. Ahsan, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize an uncommon presentation of Wegener's granulomatosis.

**Objectives:** A previously healthy 18 year old female presented initially with left otitis media which was refractory to several antibiotic regimens. She then presented one month later to the ED with left sided nasal congestion, facial pain, and proptosis. Evaluation revealed extensive left pansinusitis and subperiosteal abscess of the orbit. This was treated conservatively. The patient was sent home, and subsequently presented to clinic for myringotomy with tympanostomy tube placement, revealing purulent fluid and granulation tissue in the middle ear space. One day later, she developed complete facial nerve paralysis (House-Brackmann VI). Proptosis worsened and the patient was brought to the OR for emergent FESS with left orbitotomy. Symptoms recurred one week later and a revision procedure was completed. Biopsies of periorbita revealed Wegener's granulomatosis. **Study Design:** Case report and literature review. **Methods:** N/A. **Results:** N/A. **Conclusions:** Wegener's granulomatosis has known nasal and otologic manifestations. This case aims to present a very rare instance of otitis media with facial nerve paralysis and subperiosteal abscess of the orbit as an initial presentation of Wegener's granulomatosis.

**28. Improving Standardization of Antibiotic Prophylaxis for Major Pediatric Otolaryngologic Procedures Using Quality Improvement Methods**

Alessandro deAlarcon, MD MPH, Cincinnati, OH; Michael A. Demarcantonio, MD, Cincinnati, OH; Janet N. Germann, RN, Cincinnati, OH; Carolyn Bell, RN, Cincinnati, OH; Jonette A. Ward, BA, Cincinnati, OH; Meredith Tabangin, BS MPH, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the employment of quality improvement techniques to achieve high adherence to perioperative guidelines.

**Objectives:** Introduction: Evidence based utilization of antibiotics has been shown to reduce perioperative infections in major surgical procedures. Adherence to guidelines is variable, and standardization of surgical practice has been difficult to achieve. Adherence to established guidelines will be a key component to achieving further reductions in surgical site and perioperative infections. Quality improvement methodology can be used to achieve significant improvements in guideline adherence. Objective: To standardize the surgical antibiotic prophylaxis for major pediatric otolaryngologic procedures using quality improvement methodology. **Study Design:** Prospective cohort of children undergoing major pediatric otolaryngologic procedures at a tertiary pediatric children's medical center. **Methods:** The intervention model used a rapid cycle, Plan-Do-Study-Act (PDSA), framework for improvement research. All children undergoing major pediatric otolaryngologic procedures were included between June 1, 2014 and February 13, 2015. **Results:** 423 major procedures were performed during the study period. A literature review was first performed to establish antibiotic prophylaxis guide-

lines (APG). A 3 month preintervention baseline of 98/157 (62%) adherence to APG was established. Seven interventions were performed: 1) daily pre-briefs; 2) case pre-briefs; 3) modification of email surgical request forms; 4) distribution of antibiotic prophylaxis indication cards; 5) electronic medical record (EMR) case based antibiotic indications; 6) EMR antibiotic prophylaxis order sets; and 7) weekly surgeon adherence notification emails. Adherence improved to 109/112 (97%) after all interventions were implemented ( $p < .001$ ). **Conclusions:** Standardized evidence based antibiotic prophylaxis is achievable in a large pediatric otolaryngology practice. Quality improvement methodology can be successfully employed to achieve high adherence and should be used as a strategy to achieve standardization.

## 29. IgG4 Related Disease Mimicking Sjogren's Syndrome: A Case Report

Erynne A. Faucett, MD, Tucson, AZ; Hilary C. McCrary, MPH, Tucson, AZ; Audrey B. Erman, MD, Tucson, AZ; Margaret M. Miller, MD, Tucson, AZ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a case of IgG4 related disease mimicking other autoimmune disease, and its presentation, workup, and management.

**Objectives:** To define IgG4 related disease (IgG4-RD) as a fibro-inflammatory condition. To describe clinical features of IgG4-RD. To understand treatment options for patients with IgG4-RD. **Study Design:** Case report and review of the literature. **Methods:** A case of IgG4-RD mimicking Sjogren's disease is described and the recent literature is reviewed. **Results:** An 80 year old male presented to a rheumatology clinic after being diagnosed with Sjogren's syndrome by parotid biopsy. The patient's antibody testing was inconsistent with Sjogren's syndrome and further workup was initiated. A repeat parotid gland biopsy was obtained in the head and neck clinic, which confirmed diagnosis of IgG4-RD by special stains for IgG4 which were reviewed at the Mayo Clinic. Additional features of his illness included increased serum levels of IgG4, right lacrimal gland swelling, chronic rhinosinusitis, and diffuse lymphadenopathy of the chest and abdominal cavities. In most cases, the disease is systemic involving multiple organs including the pancreas, aorta, kidneys, and biliary tract; however, this was not the case for our patient. Oral prednisone therapy was prescribed which improved his laboratory abnormalities and the salivary gland swelling. **Conclusions:** We describe a rare case diagnosed with IgG4-RD involving the salivary glands, initially misdiagnosed as Sjogren's syndrome. Clinical features of IgG4-RD mimic those of autoimmune disorders, including Sjogren's syndrome. It is therefore important for otolaryngologists and rheumatologists to have IgG4-RD on their differential when evaluating patients with diffuse salivary gland swelling.

## 30. The Impact of Different Otolaryngology Rotations on Resident Quality of Life and Sleepiness

Laura R. Garcia-Rodriguez, MD, Detroit, MI; Dominique L. Sanchez, BA/BS, Southfield, MI; Alvin B. Ko, MD, Detroit, MI; Kathleen L. Yaremchuk, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to be more vigilant of resident mental health during certain rotations and based on graduate level of training.

**Objectives:** To determine if certain residency rotations within the specialty of otolaryngology impact resident quality of life and sleepiness more than others. This was tested with a nationwide survey at two points during the academic year analyzing the impact of specific rotations on resident quality of life (QOL) and sleepiness. **Study Design:** Survey study. **Methods:** A survey to collect demographics, specialty rotation (head/neck oncology, laryngology, general, pediatrics, neurotology, other), Physician Well-Being Index (PWBI), and Epworth Sleepiness Scale (ESS) was sent out nationally to otolaryngology residents via SurveyMonkey in October 2014 and May 2015. **Results:** The 105 respondents from October 2014 had a mean age of 29.9 and worked an average of 70.1 hours/week. Mean PWBI was 3.38 out of 7 while mean ESS was 11.7. Higher PWBI was correlated with higher ESS for all otolaryngology residents regardless of rotation (Pearson coefficient of 0.36;  $p=0.001$ ). PWBI scores were higher for head/neck oncology, 4.0 (SD 1.6). PWBI score was higher for PGY2-3; ESS was highest for PGY2. PWBI showed a significant positive correlation with hours worked (correlation coefficient 0.23;  $p=0.018$ ) as well as a significant negative correlation with exercise time (correlation coefficient -0.03;  $p=0.040$ ). **Conclusions:** Otolaryngology residents show higher levels of distress and sleepiness consistently on the head/neck oncology rotation and for the PGY2-3. The pediatric service also resulted in increased sleepiness. Focused interventions during these rotations may reduce distress, improve quality of life and enhance learning.

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## 31. Discrepancies in Ear Drop Prices

Yaser Ghavami, MD, Irvine, CA; Jay M. Bhatt, MD, Irvine, CA (Presenter); Omid Moshtaghi, BS, Irvine, CA; Afsheen Moshtaghi, BS, Irvine, CA; Melissa E. Huang, BS, Irvine, CA; Jeffery T. Gu, BS, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify and address the wide variability and discrepancies among the most commonly prescribed ear drops.

**Objectives:** This study was conducted to evaluate the variability and discrepancies among the most commonly prescribed ear drops in pharmacies in southern California. **Study Design:** Prospective study which evaluated point of sale prices of common otic drops. **Methods:** Prices of ten commonly used otic drops were determined by randomly selecting drug stores in 3 major regions in southern California: Orange County, San Diego County, and Los Angeles County. Mean, range, minimum and maximum prices for each drug were calculated and analyzed. **Results:** Data was collected from 111 pharmacies. The mean prices, standard deviation, maximum price, minimum price are noted respectively in parenthesis for each individual drug as follows: Domeboro (22.81, 21.06, 94.6, 10); Sulfacetamide (39.41, 20.93, 100, 4); Cortisporin (42.01, 19.74, 105, 25); Floxin (94.25, 53.65, 174, 15); VoSoL 10 ml (114.49, 64.92, 226.60, 34.99); VoSoL 15 ml (118.47, 89.80, 274, 11.99); Tobradex (163.93, 54.54, 338, 44); Ciprodex (197.41, 47.51, 467, 29); VoSoL HC (199.09, 48.86, 300.48, 25) and Cipro HC (230.63, 42.16, 299.99, 29.70). **Conclusions:** There is a significant variability among the prices of the ear drops across different pharmacies in southern California. Patients are best served by a thorough pricing inquiry if required to pay out of pocket for their ear drops. A searchable, state mandated reporting of drug prices for the general population may help reduce costs of drugs by creating competition among pharmacies.

## 32. Opinions and Practices of Otolaryngologists Regarding Informed Consent to Surgical Interventions with Resident Involvement

Benjamin N. Hunter, BUS, Salt Lake City, UT; Ragheed F. Al-Dulaimi, MD MPH Msc, Salt Lake City, UT; Jeffrey R. Botkin, MD MPH Msc, Salt Lake City, UT; Andrew G. Shuman, MD, Ann Arbor, MI; Richard R. Orlandi, MD, Salt Lake City, UT; P. Daniel Ward, MD MS, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better understand the ethical issues surrounding informed consent to surgical interventions where resident physicians are involved. The participants will have cause to evaluate their own habits as they come to better appreciate the various thought processes and habits of their colleagues regarding this regularly encountered issue.

**Objectives:** The training of surgical resident physicians presents an interesting dilemma relating to informed consent (IC), as patients are often unaware of the extent to which residents are involved in their surgical care. This study evaluated the opinions and practices of academic otolaryngologists regarding IC to surgical interventions with trainee involvement. **Study Design:** A survey was sent to department chairs and division chiefs of surgical specialties at the top 50 NIH funded institutions in the United States along with an invitation to distribute the survey to their faculty. **Methods:** We compared responses between otolaryngologists and surgeons of other specialties with descriptive statistics and regression analysis. **Results:** 25 otolaryngologists and 224 surgeons from other specialties completed the survey. Compared to other surgical specialties, otolaryngologists were more likely to allow residents to perform portions of procedures after having given explicit instructions about what is to be done, while not being in the operating room ( $p=0.034$ ). Otolaryngologists were more likely to allow residents to perform portions of surgeries without direct supervision and without having given explicit instructions about what is to be done in the procedure ( $p=0.003$ ). 64% of otolaryngologists felt it is beneficial to inform patients of the role of residents in their surgical care, and 48% of otolaryngologists routinely inform patients of this role. **Conclusions:** Otolaryngologists may offer more autonomy to residents in the surgical setting than surgeons in other specialties. There is a divide over the opinions and practices of explicitly informing patients of the level of resident involvement in the surgical care of patients.

## 33. Pull-Through Sialodochoplasty for Stensen's Megaduct

Jessica A. Kandl, MD, Charleston, SC; Adrian A. Ong, MD, Charleston, SC (Presenter); M. Boyd Gillespie, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) describe which patients may benefit from a pull-through sialodochoplasty; and 2) know the basic steps to performing a pull-through sialodochoplasty.

**Objectives:** Describe the technique and determine outcomes of a novel surgical procedure for the management of distal Stensen's duct stenosis with megaduct. **Study Design:** Retrospective case series. **Methods:** Patients treated for salivary obstruction at a single tertiary academic salivary referral center were identified using ICD-9 codes for salivary duct obstruction (529.8). A subset of patients with obstruction of Stensen's duct with associated megaduct was identified. The surgical management of these patients with the pull-through sialodochoplasty technique is described in detail. The patients were contacted by telephone interview to determine the outcome of the procedure. **Results:** A total of 1 male and 4 female patients were treated with the pull-through sialodochoplasty technique for distal Stensen's duct stenosis with associated megaduct. The mean patient age was 64 years (range, 53 to 70 years). Three (60%) had undergone a previously unsuccessful treatment with salivary endoscopy alone. At a mean followup of 8 months (range, 1 to 16 months), three (60%) patients reported minimal glandular swelling without discomfort; one (20%) patient reported occasional glandular pain with no swelling; and one (20%) reported no pain or swelling. No patient required additional treatment during the followup period. All 5 (100%) confirmed the procedure improved their symptoms and quality of life and would agree to undergo the procedure again. **Conclusions:** The pull-through sialodochoplasty effectively manages distal Stensen's duct stenosis with associated megaduct and may have a lower likelihood of recurrence compared to salivary endoscopy. Mild persistent obstructive symptoms following the procedure may be due to reduced excretory capacity of the remodeled ductal system.

**34. Clinical and Economic Burden of Facial Trauma in the Incarcerated Population**  
Lindsey K. Koester, BA, Syracuse, NY; Jennifer A. Villwock, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the clinical and economic burden of facial trauma in prisoners.

**Objectives:** Incarcerated patients represent a special subset of facial trauma patients. Our institution is distinctive as a level I trauma center and provider of specialized services to the incarcerated. We previously established that 16.6% of prisoners presenting to our emergency department (ED) with facial trauma in the 2013 calendar year, accounting for 11.8% of all prisoner visits. We analyzed all otolaryngology consults for facial trauma in incarcerated patients presenting to the ED in 2013 to characterize patient visits and identify potential areas for cost and resource savings. **Study Design:** Retrospective review of ED visits during 2013 calendar year. **Methods:** Billing data identified patients seen for facial trauma and receiving otolaryngology consults. Information about transfer from outside facility, nature of trauma, timeline from injury to repair, and followup was recorded. Costs were determined using average nationwide Emergency Department data. **Results:** The 28 presenting complaints to our service included: facial fracture (26), complex laceration repair (1), and nerve injury (1). Ten patients were transferred from an outside facility. 11 patients underwent surgical intervention with 9 repaired within 14 days of injury. No patients required emergent surgery. Costs for the entire cohort were estimated at \$740,818. **Conclusions:** Facial trauma is a significant cause of morbidity and economic burden in the incarcerated population. In our series, no trauma warranted immediate intervention. Identifying surgical candidates remotely could result in significant cost and resource savings.

**35. Does Resident Involvement in Thyroid Surgery Lead to Increased Postoperative Complications?**  
Rijul S. Kshirsagar, BS, Irvine, CA; Zachariah K. Chandy, BA, Irvine, CA; Hossein Mahboubi, MD MPH, Irvine, CA; Sunil P. Verma, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the association between resident involvement in thyroid surgery and 30 day postoperative outcomes.

**Objectives:** To evaluate the impact of resident involvement during thyroid surgery on 30 day postoperative complications. **Study Design:** Retrospective analysis of the 2011 American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) dataset. **Methods:** All patients who underwent thyroid surgery in 2011 were identified from the ACS-NSQIP database. Patient demographics, perioperative details, resident involvement in surgery and 30 day postoperative complications were extracted. Propensity score analysis was used to match resident and non-resident cases. Univariate and multivariate analysis were performed to determine the relationship between resident involvement in surgery and postoperative outcomes. **Results:** Data from 10990 patients who underwent thyroid surgery were analyzed. 1747 patients with and 1747 without resident involvement were case matched. There was no significant difference ( $p = 0.19$ ) in 30 day complication rates for surgery with and without resident involvement, which were 1.4% and 2%, respectively. Operative time was longer with residents ( $119 \pm 67$  minutes vs.  $102 \pm 55$  minutes,  $p < 0.001$ ). Cases with resident involvement had an unplanned reoperation rate of 0.9%, which was significantly lower than the rate without residents of 2% ( $p =$

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0.001). Multivariate analysis revealed no significant association between resident involvement and overall complications (odds ratio = 0.70; 95% confidence interval: 0.42-1.18; p = 0.18). **Conclusions:** Resident participation during thyroid surgery was associated with no significant change in 30 day postoperative complications, decreased unplanned reoperation rates and increased operative times. These findings may aid in preoperative counseling regarding resident involvement in thyroid surgery.

## 36. Effects of Substance Abuse on Mandible Fracture Healing

Jordan A. Malenke, BS, Philadelphia, PA; Chetan Y. Safi, BS, Philadelphia, PA; Allen F. Fielding, DMD MD, Philadelphia, PA; Joseph P. Mulligan, DMD, Philadelphia, PA; Jeffrey C. Liu, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better understand the impact of tobacco, alcohol, and other drug use on mandible fracture surgical outcomes.

**Objectives:** To determine the impact of substance use on mandible fracture surgical outcomes. **Study Design:** Retrospective cohort study. **Methods:** Records of patients presenting with isolated mandible fractures from 2013 to 2014 with at least 6 month followup were examined. Measure outcomes included major complications defined as infected/exposed hardware, nonunion, and minor complications such as chronic pain, trismus, and paresthesia. Appropriate statistical testing was used for data analysis. **Results:** 152 patients met criteria during the study period. 45 (29.6%) patients reported no substance use, 47 (31%) reported only tobacco use, and 60 (39%) reported drug use with or without tobacco use. Cohorts were similar in average age, gender ratio, number and severity of fractures, and method of fracture fixation. The rate of major complications was elevated in the drug use cohort compared to tobacco users and non-users (27% vs. 9% and 7% respectively). Infection rates were also elevated for drug users (20% vs. 6% and 7%). Further statistical analysis of these three cohorts is ongoing. **Conclusions:** Substance abuse, with or without tobacco use, is associated with poorer outcomes following surgical repair for mandible fractures. Efforts should be made to identify modifiable presurgical risk factors that could improve overall outcome in this high risk population.

## 37. Traumatic Transpalatal Perforation as a Complication of Intubation with Videolaryngoscopy

Matthew R. Naunheim, MD MBA, Boston, MA; Dunia E. Abdul-Aziz, MD, Boston, MA; Jean M. Bruch, DMD MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the common patterns of intubation trauma and blind spots during videolaryngoscopy and explain airway management in a patient with a traped endotracheal tube.

**Objectives:** To characterize the risk of trauma during videolaryngoscopy and describe airway management required after this complication. **Study Design:** Retrospective case report and review of the otolaryngology and anesthesia literature. **Methods:** We report a photo documented case of traumatic palatal perforation in a patient with a history of uvulopalatopharyngoplasty who underwent endotracheal intubation assisted by videolaryngoscopy. **Results:** A 67 year old male with a history of uvulopalatopharyngoplasty was scheduled to undergo a routine outpatient eye surgery. After a reportedly easy intubation, substantial bleeding was observed from the patient's mouth, which saturated the drapes. On examination, the endotracheal tube was noted to have pierced the right soft palate and caused substantial bleeding, trapping the tube within a band of soft tissue. The endotracheal tube could not be removed due to concern for the airway, and so a releasing incision was made, hemostasis was achieved, and the soft palate was repaired. **Conclusions:** Videolaryngoscopy is an indispensable tool for anesthesiologists, but otolaryngologists must be aware of the risks inherent to this technique, including oropharyngeal trauma, especially in patients with previous oropharyngeal surgery. Management of these complications may require surgical intervention and careful consideration of extubation plan in patients at risk of airway compromise.

## 38. Development and Implementation of Standardized, Evidence Based Consent Forms for High Volume Otolaryngologic Procedures

Enrique R. Perez, MD, New York, NY; Alfred M. Iloreta, MD, New York, NY; Benjamin D. Malkin, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to implement a system of standardized informed consent forms for common otolaryngologic procedures and understand how it can improve the

consistency and completeness of the informed consent process.

**Objectives:** We developed standardized consent forms for use in a tertiary academic otolaryngology program and assessed how they compared to those being used previously. **Study Design:** Quality improvement project with retrospective chart review. **Methods:** We implemented pre-typed, plain language, evidence based consent forms for 6 of our most common otolaryngologic procedures. Risks were categorized based on frequency: moderate (>5% of cases), low (1-5%) and very low (<1%). The consents for all the adenotonsillectomies performed 6 months before and after implementation were reviewed. **Results:** A total of 36 and 35 cases before and after implementation were identified, respectively. On average, pre-intervention handwritten consents listed 1 moderate, 1 low and 2 very low risk complications (ranges 0-3, 1-1 and 1-5, respectively); this was compared to 4 moderate, 1 low and 5 very low risk complications on the standardized consents. Pre-intervention forms also averaged 1 benefit, 1 alternative and 1 risk of withholding surgery (ranges 0-3, 0-1 and 0-3, respectively); the standardized forms listed 4 benefits, 1 alternative and 3 risks of withholding surgery. Overall there was an 80% utilization rate of the standardized consents. Almost 75% of the consents were obtained by a junior resident or a physician assistant in both the pre- and post-implementation groups. **Conclusions:** Obtaining informed consent requires a thorough conversation of the relevant risks, benefits and alternatives of a procedure. Pre-typed standardized consent forms can assist the surgeon in having a consistent, complete discussion with his/her patient and be tools to improve the consent process.

### 39. Levamisole Induced Auricular Autoimmune-Like Vasculitis

Zain H. Rizvi, MD, Los Angeles, CA; Julianna E. Pesce, MD, Los Angeles, CA; Eddie A. Ramirez, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify head and neck manifestations of levamisole induced vasculitis. The participants should be able to discuss the clinical presentation, explain the required workup and treatment, and compare this vasculitis to other autoimmune conditions.

**Objectives:** Discuss the clinical presentation, explain the required workup and treatment for head and neck manifestations of levamisole induced vasculitis which may be seen in cocaine drug users. **Study Design:** Case report including a detailed analysis of the clinical workup and treatment as well as review of the literature. **Methods:** This is a description of a case report from a tertiary care university affiliated hospital. Clinical and assessment and laboratory workup are reviewed. A literature review of the background, incidence, disease course, workup and treatment options are presented. **Results:** This case discusses a patient with previous history of hepatitis B who presented with bilateral painful swelling of his auricles with associated helical purpura and eschars. Further questioning revealed a history of cocaine use the night preceding the onset of symptoms. Workup for autoimmune, rheumatologic, and vasculitic diseases revealed increased antityeloperoxidase and anticardiolipin antibodies, suggestive of levamisole vasculitis. Following initial empiric treatment with antipseudomonal antibiotics, the patient was managed expectantly as levamisole vasculitis is generally self-limiting following cessation of use. **Conclusions:** Levamisole, an anthelmintic no longer for human use, is found in up to 70% of cocaine confiscated in the US. Levamisole induced vasculitis is an increasingly recognized phenomenon with a propensity for the head and neck region that may pose a diagnostic challenge for the otolaryngologist. Recognition of this clinical entity is essential for accurate diagnosis and management.

### 40. St. Blaise, Patron Saint of Throat Ailments

Joshua E. Romero, MD, Syracuse, NY; Richard T. Kelley, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the historical importance of St. Blaise and the impact of his veneration on many of our patients' interaction with illness.

**Objectives:** To familiarize otolaryngologists with Saint Blaise, patron saint of diseases of the throat. **Study Design:** Historical review. **Methods:** The medical context, legend, and resulting veneration of St. Blaise are reviewed. **Results:** Over 65 million Americans are Catholic (22% of the population). Patron saints are thought to be intercessors, in heaven, capable of praying to God on our behalf, for specific needs. By the middle ages, saints were adopted for occupations, illness, and even geography. Medical care and scientific understanding of disease was limited. Patients therefore frequently turned to religious rites. Prayer that involves repetition, such as the rosary, is akin to mediation. Such activities have been demonstrated, in some studies, to alter disease outcome. St. Blaise was a physician, bishop, and martyr in fourth century Armenia. A hagiographic tale of him healing a boy with an airway foreign body became widespread, and by the sixth century Christians in the eastern Mediterranean were invoking his intercession for throat ailments. By the

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medieval period his cult as one of the Fourteen Holy Helpers against illness was noted throughout western Europe. The tradition of blessing candles shaped as a cross on his feast day (February 3) and praying for his protection against throat diseases continues to this day throughout the world. **Conclusions:** Many patients gain comfort by meditation and prayer when faced with throat illness. Knowledge of St. Blaise, a major figure in many patients' religious background, may aid physicians in caring for these patients.

## 41. Understanding the Differences of Otolaryngologic Airways, Otolaryngology Residents as the Teacher

Nicholas R. Rowan, MD, Pittsburgh, PA; Carl H. Snyderman, MD MBA, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the need for education of other specialties about otolaryngologic airways.

**Objectives:** Increase emergency practitioner awareness and understanding of otolaryngologic airways and their associated emergencies to improve patient care in an emergency setting. Assess the perceived effectiveness of otolaryngology resident teaching to non-otolaryngology residents. **Study Design:** Prospective quality improvement initiative. **Methods:** Quality improvement (QI) review board approval was obtained. An interactive, case based seminar regarding otolaryngologic airways and their management was delivered to an emergency medicine department at a tertiary care institution. Pre- and post-seminar surveys were completed to evaluate audience demographics, assess the effectiveness at improving understanding of otolaryngologic airways and to measure the perceived gain from this seminar. **Results:** 17 resident physicians and 2 attending physicians completed both surveys in their entirety. All respondents were trained in advanced life support and had previously orotracheally intubated a human. 63% of respondents were aware that laryngectomy patients could have a tracheostomy tube in their stoma compared to 100% following the seminar. At completion of the seminar, 100% of respondents knew that tracheostomy patients could potentially be orotracheally intubated and 95% knew that this was not anatomically possible in a laryngectomy patient. Respondents reported an increase of comfort with this topic by 33% at the end of the seminar, while 100% indicated that the seminar was beneficial and 100% reported further interest in other otolaryngology directed educational session. **Conclusions:** Emergency personnel may not be familiar with basic management of surgical airways in life threatening emergencies. Otolaryngology resident teaching of a resident based audience may be an effective and well received means to increase understanding of otolaryngologic emergencies to emergency personnel and nonsurgical physicians.

## 42. Massive Pharyngeal Perforation after Tire Explosion Barotrauma

Ronald J. Schroeder, MD, Syracuse, NY; Tristan B. Klosterman, MD, Syracuse, NY; Anthony J. Mortelliti, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the clinical presentation of pharyngeal tears and be able to discuss medical and surgical management of large pharyngeal tears.

**Objectives:** 1) Recognize the clinical presentation of pharyngeal tears; and 2) discuss medical and surgical management of large pharyngeal tears. **Study Design:** Case report. **Methods:** Patient chart analysis and literature review. **Results:** 26 year old male with hemoptysis, odynophagia, neck pain, and hoarseness after a truck tire exploded while being filled with air. Nasopharyngolaryngoscopy showed a right pharyngeal laceration with active bleeding. Computed tomography of the neck and Gastrografin swallow study showed a large perforation of the right pharyngeal wall with air dissecting through the deep neck to the superior mediastinum. The patient was taken to the operating room for repair of pharyngeal perforation, exploration of the neck, and placement of a neck drain. The drain was removed after 3 days, and the pharyngeal perforation was fully healed after 2 weeks without any complications. **Conclusions:** Barotrauma is capable of causing significant damage to the pharynx, and thorough evaluation is necessary in severe cases to determine if surgical repair is indicated.

## 43. Health Related Internet Access in Midwest Otolaryngology Patients

Nathan M. Schularick, MD, Iowa City, IA; Lucy H. Karnell, PhD, Iowa City, IA; Henry R. Diggelmann, MD, Mason City, IA; Phil R. Lee, MD, Mason City, IA; Nitin A. Pagedar, MD MPH, Iowa City, IA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand how specific demographic groups of otolaryngology patients use the internet in very different ways; 2) discuss how online com-

munication with patients is not always superior to written letters; 3) identify those patients who are more and less likely to use the internet for health related purposes; and 4) demonstrate which internet tools are more likely to reach new patients.

**Objectives:** No current studies of Internet use in United States ENT patients exist. Our study evaluated use of health related Internet resources by otolaryngology patients to provide guidance for otolaryngology physicians to more effectively communicate with current and prospective patients. **Study Design:** Voluntary survey of patients at two outpatient otolaryngology clinics in our state. **Methods:** A paper survey was provided to patients at otolaryngology clinics at a university and clinic. To determine which factors were associated with access to the Internet and with researching medical conditions, age distributions were compared by t-test and categorical variables (sex, level of education, residence, and medical condition) were compared by chi square analysis. **Results:** 1564 surveys (46% male, 54% female) were completed and analyzed. Overall, 8.6% of patients reported no Internet access, and an additional 4.1% reported access only at work or at a public location. Individuals with access to the Internet (mean age of 44.5) were significantly younger ( $p < .001$ ), more educated ( $p < .001$ ), and lived in more urban counties ( $p < .001$ ). Among the otolaryngology subspecialties, patients seen by head and neck oncologists were most likely to be without access (11.7%). **Conclusions:** Electronic health care tools are accessible to a majority of otolaryngology patients, but specific populations continue to lack online access. Practices with rural and older populations may not benefit as much from implementation of online correspondence and educational materials.

#### 44. **Blinded Randomized Control Study of a Web Based Otoscopy Simulator in Undergraduate Medical Education**

Camilla V. Stepniak, BMSc, London, ON Canada; Kevin Fung, MD FRCS(C), London, ON Canada; Brandon Wickens, MD FRCS(C), St. Catherines, ON Canada; Murad Husein, MD FRCS(C), London, ON Canada; Hanif M. Ladak, PhD, London, ON Canada; Sumit K. Agrawal, MD FRCS(C), London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the utility of a web based otoscopy simulator in undergraduate medical education.

**Objectives:** To evaluate the utility of a web based otoscopy simulator (Ototrain™) in increasing diagnostic performance in novice medical students. **Study Design:** Prospective blinded randomized control trial. **Methods:** Second year medical students were invited to participate in the study following the completion of a set of otology lectures as part of their preclinical curriculum. A pre-test was conducted, consisting of viewing a series of otoscopy videos followed by an open answer format assessment pertaining to the characteristics and diagnosis of each video. Participants were randomly divided into two groups - the experimental group was given unlimited weeklong access to Ototrain™. The control group did not. A post-test was completed using a separate set of otoscopy videos. Tests were graded based on a comprehensive marking rubric. The evaluators were blinded to which group the participants belonged. **Results:** Forty-one medical students were enrolled in the study. Both groups demonstrated significant improvement ( $P < .001$ ). However, compared to the control group, the experimental group had significantly higher post-test scores ( $P < .001$ ). Additionally, the experimental group was better able to distinguish various pathologies ( $P < .001$ ). **Conclusions:** The use of Ototrain™ increased the diagnostic otoscopic performance in novice learners. The use of Ototrain™ may be an effective teaching adjunct for undergraduate medical students.

#### 45. **Kikuchi-Fujimoto Lymphadenitis: A Case Report and Review of Literature**

Christopher G. Tang, MD, New York, NY; Maya Samman, New York, NY (Presenter); Andrew Blitzer, MD DDS, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a case of Kikuchi-Fujimoto lymphadenitis, to describe the presentation of this clinical entity, and review the differential diagnosis of a nonmalignant neck mass.

**Objectives:** To describe a case of Kikuchi-Fujimoto lymphadenitis, to describe the presentation of this clinical entity, and review the differential diagnosis of a nonmalignant neck mass. **Study Design:** Level 5 -- single case report. **Methods:** The medical records of a patient treated at a tertiary care academic facility was reviewed. A PubMed/Medline search was performed for the key words Kikuchi-Fujimoto lymphadenitis. **Results:** A 31 year old female presents with a several week history of a tender right neck mass. All other physical exam findings were normal. Patient was initially treated with a course of Avelox but did not improve. Two fine needle aspirates were performed which resulted in nondiagnostic findings.

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Over the course of 1 month the patient developed multiple nodes in the neck without resolution of the original neck mass. PET/CT confirmed the neck masses without any other significant findings. Patient was taken to the operating room for an excision of the initial neck mass which revealed Kikuchi's disease. **Conclusions:** Kikuchi's disease is a rare disease of unknown etiology that causes cyclic fevers, lymphadenopathy, skin rashes and headaches. Some studies have proposed either an infectious or autoimmune etiology, however, none have been confirmed. Kikuchi's disease is self-limiting and may overlap with Hodgkin's lymphoma necessitating care when evaluating young patients with neck masses. An extensive review of the differential diagnosis of a benign neck mass is included.

46. **John R. Lindsay, MD Resident Research Award**  
**Vibratory Stimulus Reduces In Vitro Biofilm Formation on Tracheoesophageal Voice Prostheses**  
Todd J. Wannemuehler, MD, Indianapolis, IN; Brian C. Lobo, MD, Indianapolis, IN; Jeffrey D. Johnson, MD, Indianapolis, IN; Christopher R. Deig, BA, Indianapolis, IN; Jonathan Y. Ting, MD, Indianapolis, IN; Richard L. Gregory, PhD, Indianapolis, IN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the microbiological basis of TEP malfunction and demonstrate an awareness of biofilm reduction technology.

**Objectives:** Demonstrate that biofilm formation will be reduced on tracheoesophageal prostheses when vibratory stimulus is applied compared to controls receiving no vibratory stimulus in a dynamic in vitro model of biofilm accumulation simulating the interface across the tracheoesophageal puncture site. **Study Design:** Prospective, randomized, controlled, crossover. **Methods:** Ex vivo tracheoesophageal prostheses were obtained from university affiliated speech language pathologists. Prostheses demonstrating physical integrity and an absence of gross biofilm accumulation were utilized. 16 prostheses were cleansed and sterilized prior to random placement by length in two modified Robbins devices arranged in parallel. Each device was seeded with a polymicrobial oral flora on day 1 and received basal artificial salivary flow continuously with three growth medium meals daily. One device was randomly selected for vibratory stimulus and 2 minutes of vibration was applied to each prosthesis before and after meals for 5 days. The prostheses were explanted, sonicated, and the biofilm cultured for enumeration. This process was repeated after study arm crossover. **Results:** Tracheoesophageal prostheses in the dynamic model receiving vibratory stimulus demonstrated reduced gross biofilm accumulation and a significant biofilm colony forming unit per milliliter reduction of 5.56 fold compared to non-vibratory controls ( $p < 0.001$ ). Significant reductions were observed within length subgroups. **Conclusions:** Application of vibratory stimulus around meal times significantly reduces biofilm accumulation on tracheoesophageal prostheses in a dynamic in vitro model. Further research using this vibratory stimulus method in vivo will be required to determine if reduced biofilm accumulation correlates with longer device lifespan.

47. **Implementation of a Depression Screening Tool in a Multidisciplinary Head and Neck Cancer Tumor Board**  
Lauren C. White, MD, Augusta, GA; Jessica E. Howell, MD, Richmond, VA; Barbara P. Carter, MSN RN, Augusta, GA; Michael W. Groves, MD, Augusta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the prevalence of depression in head and neck cancer and to demonstrate the feasibility of implementing a routine screening tool for early detection of depression in a population of newly diagnosed head and neck cancer patients.

**Objectives:** The purpose of this study is to demonstrate the feasibility of implementing a routine screening tool for early detection of depression in a population of newly diagnosed head and neck cancer patients. **Study Design:** Prospective cohort study. **Methods:** All patients undergoing evaluation at the multidisciplinary head and neck tumor board at a tertiary academic center were offered the opportunity to participate in the depression and anxiety screening protocol. Each patient who agreed to participate was asked to complete a Beck Depression Inventory (BDI) as well as a Hospital Anxiety and Depression Scale (HADS). Demographic data, tumor site and stage, history of depression and/or anxiety, family support, and social history including tobacco and alcohol use were obtained. **Results:** 32 patients at the multidisciplinary head and neck tumor board were enrolled in the study, including 7 females (21.9%) and 25 males (78.3%). The mean age was  $65.1 \pm 9.9$  years. 7/37 (21.9%) endorsed a previous history of anxiety and/or depression. On initial evaluation at the head and neck tumor board, 18/37 (48.6%) of patients screened positive for depression and/or anxiety with scores of at least borderline or abnormal according to the HADS scale. Similarly, 19/32 (59.4%) of patients screened positive for depression with scores ranging from mild to severe depression according to the BDI. 6/32 (82%) were stage III or higher. There was a statistically significant difference between depressed and non-depressed patients on HADS ( $p=0.00016$ ).

and BDI ( $p=0.0002$ ). There was no statistically significant difference between demographics, family support, history of depression, substance abuse, length of stay, feeding tube or tracheostomy/stoma. **Conclusions:** Depression and anxiety in head and neck cancer are prevalent and underreported. By implementing a brief, easy to use standardized diagnostic screening tool at a multidisciplinary tumor board initial visit, patients with these comorbid conditions can be identified and offered further evaluation and treatment.

## 48. Assessment of Anti-Infective Stewardship at a Tertiary Care Hospital

Elizabeth Anne Zambricki, MD MBA, Stanford, CA; Aslihan Selimbeyoglu, PhD, Stanford, CA; Sam Roosz, BS, Stanford, CA; Maria Birukova, BS, Stanford, CA; Stan Deresinski, MD, Stanford, CA; Anna H. Messner, MD, Stanford, CA

**Educational Objective:** At the end of the presentation, participants should be able understand the diagnosis related codes (DRG) and anti-infectives responsible for the majority of costs at a large tertiary care center. Additionally, they should be able to discuss the total realizable cost savings when compared to the University Health System Consortium (UHC) mean. Participants should then be able to set the groundwork for comparing and analyzing their own anti-infective utilization.

**Objectives:** In 2010, our academic hospital health system ranked 4th highest among the 86 hospitals in antibiotics used per 1000 patients. In 2014, our general medicine service ranked 78 out of 98 UHC hospitals in total antimicrobial costs per patient, with costs almost 3 times the mean cost per patient for UHC hospitals. Our objectives were to analyze UHC data to identify diagnoses and anti-infectives that represent opportunities for savings, as well as compare our anti-infective utilization to that of peer hospitals with equivalent outcomes and lower costs. **Study Design:** Cost comparison study using UHC data. **Methods:** UHC data from 98 peer hospitals were analyzed. Twelve DRGs were selected for deep dive analysis on the basis of total potential cost savings achievable in each. For each selected DRG, resource utilization was compared to top performing peer hospitals. The potential cost savings were quantitated and categorized by anti-infective across 12 prioritized DRGs. **Results:** The 12 DRGs prioritized for analysis collectively represent an opportunity for \$1.6M in annual cost savings compared to the UHC mean. Across these DRGs, only six anti-infectives were responsible for almost \$700K of potential annual savings. Compared to other UHC hospitals, our elevated anti-infective costs are due to both a difference in the rate of prescribing selected agents as well as duration of therapy relative to peer hospitals. **Conclusions:** Significant cost savings can be achieved by both selecting alternative anti-infective agents, as well as shortening our duration of antibiotic utilization. At our institution, over \$700K in annual savings can be achieved, even when focusing on only 6 anti-infectives across 12 DRGs.

## Head & Neck

### 49. Homologous Grafting: Novel Technique in the Repair of Persistent Tracheocutaneous Fistula

Rami Y. Abdou, MD, Newark, NJ; Chan W. Park, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe a novel technique for closure of a recurrent or persistent tracheocutaneous fistula using a homologous graft.

**Objectives:** Tracheocutaneous fistula (TCF), a persistent fistula tract between the airway and the skin, is a known complication following decannulation after tracheostomy with an incidence approaching 70% in patients cannulated for over 16 weeks. Several TCF closure techniques have been described including primary closure, fistulectomy with layered closure, and inversion of the fistula tract in purse string fashion with skin over-closure. However, recurrence is not uncommon, particularly in patients with history of irradiation and poor wound healing. While more complex procedures including pedicle and hinge flaps have been described, these have a higher rate of complications and require general anesthesia. **Study Design:** Here, we describe a novel technique utilizing homologous grafting in a case series of six patients that addresses prior closure failures while maintaining efficacy, can be performed expeditiously, is cost effective, and performed under local anesthesia. **Methods:** Patients with persistent or recurrent TCF with prior attempted closure using traditional techniques were selected to undergo the proposed procedure. The procedure involves placement of a homologous graft patch to repair the tracheal defect with a layered closure. **Results:** There were no recurrences of TCF in this series within 8 weeks of the procedure. The mean operative time was 34.4 minutes and all were performed successfully under local anesthesia. **Conclusions:** To our knowledge this is the first series to describe homologous grafting in the closure of persistent TCF and represents a novel technique for successful and safe TCF closure in patients with a history of recurrent or persistent TCF.

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## 50. Osteocutaneous Radial Forearm Free Flap in Non-Mandible Head and Neck Reconstruction

Faisal I. Ahmad, MD, Portland, OR; Alex Labby, BS, Portland, OR; Campbell Cross, BS, Portland, OR; Javier D. Gonzalez, MD, Portland, OR; Scott H. Troob, MD, Portland, OR; Mark K. Wax, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the diverse applications of the osteocutaneous radial forearm free flap in non-mandible head and neck reconstruction.

**Objectives:** The osteocutaneous radial forearm free flap (OCRFF) is a versatile microvascular flap primarily used to reconstruct composite defects involving the mandible. Little has been written about its use outside of the mandible. We describe our experience with this flap for non-mandible reconstruction in the head and neck. **Study Design:** Retrospective chart review of all OCRFF performed between 1998 and 2014. **Methods:** All patients undergoing non-mandible microvascular reconstruction with the OCRFF were evaluated. Etiology of the defect, demographic data, and outcomes were obtained through chart review. **Results:** There were 25 patients who underwent non-mandible OCRFF reconstruction. Indications included trauma (n = 4, 16%), oncologic reconstruction (n = 20, 80%), and infection (n = 1, 4%). Eleven patients (44%) failed non-microvascular reconstruction. Reconstruction was for defects of the: palatomaxillary complex (n = 15, 60%), orbitomaxillary complex (n = 4, 16%), nasomaxillary complex (n = 4, 16%), larynx (n = 1, 4%), and clavicle (n = 1). On average, 7.90 cm ( $\pm$  1.51, range: 5 - 11 cm) of radial bone was harvested. All harvest sites were plated prophylactically and there were no resulting radius fractures. There were no flap compromises. Postoperative complications were as follows: 2 partial intraoral dehiscences, 1 recipient site infection, and 1 seroma. Three palatomaxillary reconstructions developed fistulas that required revision. Five reconstructions required a second procedure to improve functional and/or cosmetic outcomes. **Conclusions:** The OCRFF is a robust flap that can be employed to reconstruct composite defects involving bone and soft tissue beyond the oral cavity.

## 51. The Impact of Direct Laryngoscopy and Biopsy on PET Scan Results

Julie Ahn, BS, Baltimore, MD; Selmin Karatayli Ozgursoy, MD, Balgat, Ankara Turkey; Alexander Antoniou, MD, Baltimore, MD; Rick Wray, MD, Baltimore, MD; Rathan M. Subramaniam, MD, Baltimore, MD; Simon R. Best, MD, Baltimore, MD

**Educational Objective:** The present study aims to determine the effect of recent direct laryngoscopy and biopsies on staging PET scans.

**Objectives:** Direct laryngoscopy (DL) with biopsy followed by positron emission tomography (PET) is an established staging protocol for newly diagnosed head and neck squamous cell carcinoma (HNSCC). However, inflammation from recent procedures could lead to false-positives on PET scans. We therefore sought to determine the rate of false findings on staging PET scans following DL. **Study Design:** Clinical record review. **Methods:** All initial staging PET scans performed over a one year period at a tertiary referral center for newly diagnosed HNSCC were reviewed. Clinical charts were reviewed to determine timing of DL, and matched controls without DL performed were identified. The gold standard for tumor location was determined by the surgeon's operative report and/or flexible laryngoscopy in clinic. False-positives were determined by 1) PET positivity clearly distinct from the primary tumor site noted in radiology reports; and 2) blinded reads of all scans by an attending nuclear medicine radiologist. **Results:** Seventeen newly diagnosed HNSCC patients were identified with a PET scan performed within 14 days after DL and biopsy. These scans were performed an average of 6 days (range: 1-13 days) following the procedure. 53% of index patients had false-positives on PET scan, compared to 18% of matched controls. The odds ratio for a false-positive finding on PET scan was 5.6 (CI: 1.2, 26.1; p=0.028) for index patients compared to controls. **Conclusions:** Inflammation due to DL and biopsy preceding a staging PET scan leads to an increase in false-positives. Radiologists and otolaryngologists should be aware of this possibility to avoid misdiagnosis.

## 52. The Role of Routine Long Term Locoregional Surveillance Imaging for Laryngeal Squamous Cell Carcinoma in Patients without Suspicious Symptoms or Signs

Aurash S. Alemi, MD, San Francisco, CA; Shirin M. Hemmat, BA, San Francisco, CA; Dexter L. Louie, BA, San Francisco, CA; Courtney P. Raybon, MD, San Francisco, CA; William R. Ryan, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the diagnostic utility and overall utility of routine surveillance imaging in the patient with laryngeal squamous cell carcinoma following treatment.

**Objectives:** To evaluate the diagnostic utility of routine surveillance imaging for identification of locoregional recurrence in patients with laryngeal squamous cell carcinoma (LSCC) beyond 6 months since treatment. **Study Design:** Retrospective cohort. **Methods:** Retrospective review of all patients with LSCC who received definitive treatment at our institution from 2005-2013 and underwent routine surveillance imaging with MRI, CT or PET/CT beyond 6 months following treatment with at least 6 months of followup after each routine scan. **Results:** From 140 patients with a diagnosis of LSCC, 23 patients had undergone 43 routine surveillance scans after 6 months since treatment (24 MRIs, 10 CTs, and 9 PET/CTs). The mean number of routine surveillance scans after 6 months per patient was 1.86 (range 1-4) with a mean time of 14 months between scans. Average total followup time since treatment was 54 months (range 15-120). No locoregional recurrences and two (8.6%) distant metastatic lesions were identified on these routine scans (1 PET/CT and 1 MRI). There was one false positive scan (4.3%) and no false negative scans.

**Conclusions:** In the absence of new suspicious signs or symptoms, the detection of locoregional recurrence in LSCC patients is low. Routine surveillance imaging is not useful enough to justify the costs. Regular symptom assessment and endoscopic physical exams are important to identify early concerning symptoms and signs of recurrent LSCC.

## 53. Volumetric Growth of Cervical Schwannoma as a Predictor of Surgical Intervention

Aurash S. Alemi, MD, San Francisco, CA; Chase M. Heaton, MD, San Francisco, CA; Mark D. Mamlouk, MD, San Francisco, CA; William R. Ryan, MD, San Francisco, CA; Steven J. Wang, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should have a better understanding of how volumetric growth rates of cervical schwannoma can inform the consideration of surgical management.

**Objectives:** To assess average growth rates and whether the degree of growth rate of cervical schwannoma is a predictor of having undergone surgical management. **Study Design:** A 20 year retrospective review. **Methods:** Chart review was performed to identify patients with at least 2 CT or MRI and pathologic or imaging characteristics of cervical schwannoma. The volume was calculated using  $\frac{4}{3} \pi xyz$ , with x, y, and z representing dimensions in the axial and coronal planes. The volume and rate of volume change and presence of symptoms were compared between observed, surgical, and gamma knife groups. **Results:** A total of 13 patients with a diagnosis of cervical schwannoma and at least 2 serial scans were identified. The patients were divided into surgical (n=5), observation (n=6) and gamma knife (n=2) subgroups. Mean followup time for all patients was 21 months (range: 1-80), and not significantly different among subgroups. The average change in volume was found to be 3.61 cm<sup>3</sup>/mo for the entire group, -2.75 cm<sup>3</sup>/mo (observation), 11.97 cm<sup>3</sup>/mo (surgery) and 1.78 cm<sup>3</sup>/mo (gamma knife). Average initial volume for the entire group was 124.4 cm<sup>3</sup> (range 5-608cm<sup>3</sup>) and average volume at followup was 142 cm<sup>3</sup> (range 5-613). The surgical resection group had a statistically significant change in volume (p=0.03), whereas no significant growth difference was seen in tumors managed nonoperatively. A statistically significant difference was seen between rate of growth of the surgical and observation groups (p=0.016) and between surgical patients and those managed with either observation or gamma knife (p=0.011). **Conclusions:** The average growth rate for volume of cervical schwannomas for all patients in our study is 3.61 cm<sup>3</sup>/mo. Patients undergoing surgery had a statistically significant difference in rate of volume change during the period of followup. Factors associated with cervical schwannomas undergoing surgery include growth rate and size at followup.

## 54. Outcomes of Free Flap Reconstruction following Acute Invasive Fungal Sinusitis

Jordan J. Allensworth, BS, Portland, OR; Tyler S. Weaver, MD, Portland, OR; Javier D. Gonzalez, MD, Portland, OR; Daniel Petrisor, MD, Portland, OR; Mark K. Wax, MD, Portland, OR

**Educational Objective:** Following this presentation, participants will be able to describe and incorporate novel outcomes data for reconstruction of midface defects in survivors of acute invasive fungal sinusitis (AIFS). Participants should be able to compare the benefits of free flap reconstruction versus prosthetic obturation for large defects created by serial debridement, an essential component of AIFS management. The cases presented illustrate the functional and structural indications for reconstruction, functional outcomes and overall survival following free tissue transfer.

**Objectives:** Acute invasive fungal sinusitis (AIFS) is a frequently fatal infection for which aggressive surgical debridement is a mainstay of therapy. Resulting defects such as maxillectomy are often debilitating and composite in nature, mandating free tissue transfer reconstruction. Because infection is rare, available reconstruction outcomes data are limited. The purpose of this study was to examine surgical outcomes and survival in patients undergoing free flap reconstruction following invasive fungal sinusitis. **Study Design:** Retrospective case series. **Methods:** Between 1995 and 2015, survivors who underwent operative debridement for AIFS and subsequent free flap reconstruction were identified using surgical records.

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Patient demographics, cause of immunodeficiency, defect description, flap type, perioperative complications, indications for revision surgery, functional outcomes and long term survival were reviewed. **Results:** Forty-three patients were treated for AIFS, of which 29 (67%) survived acute infection. Nine underwent maxillectomy, 5 with orbital exenteration, and were considered reconstruction candidates. Seven underwent free flap reconstruction. Immunodeficiency causes included diabetes mellitus (6) and lymphoma (1). Median debridement to reconstruction interval was 44 days. Flap types included latissimus dorsi, scapula, anterolateral thigh, rectus, radial forearm, and fibula. Median followup was 6.5 months. No perioperative complications were encountered, and all subjects remained disease free, able to speak and eat normally without prosthetic supplementation. Six patients (86%) are currently alive. **Conclusions:** Reconstruction of defects left by invasive fungal sinusitis using free tissue transfer resulted in successful flap survival with no disease recurrence for all defects and flap types reviewed. Survivors of AIFS are able to tolerate midface reconstruction with favorable functional outcomes and survival rates.

## 55. Epstein-Barr Virus Positive Mucocutaneous Ulcer of the Head and Neck: Report of a Case and Literature Review

Joshua K. Au, MD, Los Angeles, CA; Jonathan W. Said, MD, Los Angeles, CA; Ali R. Sepahdari, MD, Los Angeles, CA; Maie A. St. John, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the newly characterized pathologic entity of Epstein-Barr virus positive mucocutaneous ulcer (EBVMCU) within the differential diagnosis of morphologically aggressive, ulcerative tumors of the head and neck to avoid excessive treatment.

**Objectives:** To report a rare case of EBVMCU of the base of tongue followed by the largest review of the Western literature on EBVMCU in the head and neck. **Study Design:** Case report and literature review. **Methods:** A case is reported of a patient with EBVMCU of the base of tongue, and a retrospective review is conducted of all cases of EBVMCU of the head and neck at a single academic institution between January 1, 1986, and January 1, 2015. The Medline database was additionally queried for all reports of EBVMCU of the head and neck, and all pertinent clinical data were extracted. **Results:** The clinical presentation, treatment, and clinical response of a patient with EBVMCU of the base of tongue are presented. Short term followup of the patient noted a favorable response with discontinuation of immunosuppression and rituximab therapy. A review of the current literature supports conservative management and reduction of immunosuppression. Overall 96% of patients with followup greater than two months had spontaneous or complete remission. None of the patients in this cohort died of their disease. The current study is the largest series to report on the clinical presentation and treatment outcomes of EBVMCU in the head and neck. **Conclusions:** EBVMCU tends to follow an indolent and self-limiting clinical course, usually responding to reduction of immunosuppression and conservative management. It is imperative for clinicians to consider EBVMCU in the differential diagnosis of mucocutaneous ulcers of the head and neck to avoid excessive treatment.

## 56. CyberKnife Radiation Treatment and Dosing to Healthy Neurovascular Structures in Jugular Foramen Tumors

Jay M. Bhatt, MD, Irvine, CA; Yarah M. Haidar, MD, Irvine, CA (Presenter); Yaser Ghavami, MD, Irvine, CA; Hamid R. Djililian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, participants should be able to discuss radiation exposure to healthy neurovascular structures of patients with jugular foramen tumors treated with CyberKnife radiation therapy.

**Objectives:** To examine the relationship between the prescribed target dose and the dose to healthy neurovascular structures in jugular foramen tumor patients treated with CyberKnife radiation therapy. **Study Design:** Retrospective chart review. **Methods:** Three patients with jugular foramen tumors who were treated with fused CT/MRI guided CyberKnife radiation therapy were examined. Average radiation doses delivered to healthy neurovascular structures (e.g., carotid artery, basilar artery, and facial nerve, and trigeminal nerve) during treatment were analyzed. **Results:** The prescribed dose ranged from 17.10-23.35 Gy over 1-5 fractions to cover 95% of the target tumor volume. The mean dose to the carotid artery was 5.98 Gy (range 0.44-17 Gy); basilar artery was 2.68 Gy (range 0.98-5.32 Gy); facial nerve was 7.75 Gy (range 1.74-18.45 Gy); and trigeminal nerve was 3.03 Gy (range 0.52-7.75 Gy). **Conclusions:** Doses of 5-7 Gy to arteries have been found to initiate atherosclerotic processes. Nerve toxicity exhibits a dose related effect. Doses of < 13 Gy to the trigeminal nerve have a < 5% complication rate, while the facial nerve can tolerate up to 70 Gy without toxicity. Based on these results, we conclude that image guided treatment using CyberKnife allows for sufficient dose delivered to the target with low radiation dose to most surrounding neurovascular structures, making it a safe and effective option

to treat skull base tumors.

**57. Scapular Tip Donor Site as First Line for Microvascular Reconstruction of Complex Head and Neck Defects**

Bryan Brandon, MD, Chapel Hill, NC; Jeremiah C. Tracy, MD, Worcester, MA; Trevor G. Hackman, MD, Chapel Hill, NC; Jose P. Zevallos, MD, Chapel Hill, NC; Mark C. Weissler, MD FACS, Chapel Hill, NC; Samip N. Patel, MD, Chapel Hill, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the anatomic considerations in utilizing the scapular tip free flap in complex head and neck reconstruction.

**Objectives:** To describe the use of thoracodorsal artery based scapular tip free flaps (STFF) in the reconstruction of head and neck defects. **Study Design:** Case series. **Methods:** A retrospective review of the electronic medical record was performed, all patients who underwent reconstruction with STFF from 1/1/2014 through 7/1/2015 were included. Details of defect reconstructed were reviewed along with complications (medical, donor site, and recipient site). **Results:** 25 consecutive cases were performed at our institution within the period reviewed. The procedures included 6 maxillectomy and 19 segmental mandibulectomy defects. The average length of mandible reconstructed was 6.8cm (range: 4.0 - 10.2cm). Osteotomies were made to contour the STFF bone in 8 cases, including double osteotomies performed in two cases. The most common complications were orocutaneous fistula and postoperative hematoma, each of which occurred in 4/25 (16%) patients. There were no cases of flap failure. **Conclusions:** This series describes a large number of STFF performed in head and neck reconstruction. The average length of bony defect repaired is significantly larger than what has been previously described. The application of osteotomies to the STFF allows for reconstruction of anterior mandibular defects. The STFF offers the possibility of large, complex soft tissue components; a relatively long pedicle; and low donor site morbidity. The STFF should be considered a first line option in the reconstruction of composite defects of the head and neck.

**58. Capacity to Fragment Salivary Stones Correlates with Preoperative CT Stone Density Assessment**

Franklin J. Canady, BS, Iowa City, IA; Henry T. Hoffman, MD, Iowa City, IA; Michaelangelo R. Fuortes, MD, Iowa City, IA; Chad R. Tracy, MD, Iowa City, IA; Wendy R.K. Smoker, MD, Iowa City, IA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the role CT imaging may play in preoperative assessment of suitability to target salivary stones for endoscopic fragmentation.

**Objectives:** At the conclusion of this presentation, participants will understand the role CT imaging may play in preoperative assessment of suitability to target salivary stones for endoscopic fragmentation. **Study Design:** Chart review case reports. **Methods:** Correlation of the clinical findings with calculation of salivary stone radiographic density (Hounsfield units (HU)) on preoperative CT imaging is supplemented by literature review of similar analysis of kidney stone density. **Results:** A 5 mm right parotid stone was readily fragmented with the Holmium laser (energy setting = 0.3 to 0.5 joules, power 1.5 watts, total energy 0.07 joules) with successful endoscopic removal. CT stone density was 643 HU. In contrast, a 7 mm right submandibular stone with CT density of 1115 HU required open ductoplasty for removal due to its relative resistance to laser fragmentation (0.3 to 0.5 joules, power 1.5 watts). **Conclusions:** Calculation of salivary stone density by CT imaging may be a useful tool to aid in counselling patients about options and planning for treatment.

**59. A Carotid Canal Sympathetic Plexus Schwannoma: Imaging and Management**

Richard B. Cannon, MD, Salt Lake City, UT; Jason P. Hunt, MD, Salt Lake City, UT; Richard H. Wiggins, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the imaging characteristics and surgical management of a carotid canal sympathetic plexus schwannoma and explain how tonsillectomy significantly complicates the successful treatment of parapharyngeal space tumors.

**Objectives:** Schwannomas are common tumors that arise from peripheral, cranial, and autonomic nerve sheaths. Skull base schwannomas usually originate from the vestibular, trigeminal, or vagus cranial nerves or the cervical sympathetic chain. Our goal is to report a very rare case of a carotid canal sympathetic plexus schwannoma (CCSPS). **Study Design:** Case report. **Methods:** Case report of a patient with CCSPS and oropharyngeal involvement. **Results:** Our patient is a

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29 year old female referred with a right parapharyngeal space mass. She previously underwent a tonsillectomy, which exposed a significant portion of the tumor to the oropharynx. Core biopsy demonstrated a schwannoma. MRI showed a 6.1cm bland, well circumscribed, soft tissue mass anterior and medial to both the internal jugular vein and internal carotid artery, and immediately inferior and involving the horizontal petrous portion of the carotid canal. Unlike the other 3 reported cases, our patient did not present with diplopia. This lesion was surgically resected through a combined middle fossa, transcervical, and transoral approach and the oropharyngeal defect was repaired primarily. Postoperatively she did not develop any neuro deficits, V3 numbness, unilateral vocal fold paralysis, or Horner's syndrome. Three weeks postoperatively she developed a neck infection requiring I&D, hospitalization, and IV antibiotics. No evidence of CSF leak or intraoral breakdown was noted. She is now well healed. **Conclusions:** This is the fourth reported case of a CCSPS with a description of the imaging characteristics and surgical management. Parapharyngeal space tumors can be difficult to diagnose but tonsillectomy significantly complicates successful treatment.

## 60. A New Entity: Low Grade Sinonasal Sarcoma with Neural and Myogenic Features

Richard B. Cannon, MD, Salt Lake City, UT; Jason P. Hunt, MD, Salt Lake City, UT; Yusuf Dundar, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the imaging characteristics and surgical management of low grade sinonasal sarcoma with neural and myogenic features and explain how to identify and treat this new and rare malignancy.

**Objectives:** Low grade sinonasal sarcoma with neural and myogenic features (LGSSNMF) is a new and rare malignancy that creates a diagnostic dilemma. Our goal is to describe the imaging characteristics, pathologic features, and surgical management of this new tumor classification. **Study Design:** Case series. **Methods:** Case series of 2 patients with LGSSNMF. **Results:** The first case is a 67 year old female with diplopia and facial discomfort. MRI and CT identified an enhancing soft tissue mass in the right frontal ethmoidal recess which was T1 and T2 isointense with associated hyperostotic bone formation. She underwent a transnasal endoscopic anterior skull base resection. The bland spindle cell lesion showed a neoplastic proliferation infiltrating into bone which stained positive for S100, smooth muscle actin (SMA), and desmin. The second case is a 62 year old female with an enlarging left supraorbital mass. MRI and CT identified a T1 isointense, T2 hypointense enhancing mass in the left frontal sinus and had eroded through the posterior table, abutted the dural, and compressed the frontal lobe. It also had hyperostotic bone formation. She underwent a combined endoscopic and bicoronal approach to the anterior skull base for resection. The final pathology showed a tumor invading into the bone comprised of spindle cells without cytologic atypia that stained positive for S100 and SMA. Both patients did well with surgical resection without complications or recurrence. **Conclusions:** The diagnostic imaging, anatomic pathology, and surgical treatment of LGSSNMF is described to further characterize this unique, locally aggressive tumor.

## 61. Risk Factors for Venous Thromboembolism in Patients Undergoing Neck Dissection

Zachariah K. Chandy, BA, Irvine, CA; Rijul S. Kshirsagar, BS, Irvine, CA; Hossein Mahboubi, MD MPH, Irvine, CA; Sunil P. Verma, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the incidence of and risk factors for venous thromboembolism following neck dissection.

**Objectives:** To determine the rate of venous thromboembolism (VTE) following neck dissection and identify associated risk factors. **Study Design:** Retrospective analysis was performed using the 2011-2013 American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) dataset. **Methods:** All patients who underwent neck dissection in 2011-2013 were identified from the ACS-NSQIP database. Univariate analysis and multivariate logistic regression were used to determine independent risk factors associated with VTE. **Results:** Data from 7850 patients who underwent neck dissection were analyzed. The overall rate of VTE was 0.5%. Univariate analysis showed significant association ( $p < 0.05$ ) between the development of VTE and diabetes, dyspnea, chronic obstructive pulmonary disease, >10% weight loss in the previous 6 months, bleeding disorder, intraoperative transfusion of >4U packed red blood cells, wound classification of 2, and American Society of Anesthesiologists (ASA) class 3. Patients who developed a VTE were older ( $p = 0.018$ ) and had longer operative times ( $p < 0.001$ ). Multivariate logistic regression demonstrated independent risk factors for VTE including total operative time (odds ratio [OR] = 1.002; 95% confidence interval [CI]: 1.0002-1.004;  $p = 0.027$ ), wound classification of 2 (OR = 2.909; 95% CI: 1.327-6.375;  $p = 0.008$ ), and ASA grade 3 (OR = 2.33; 95% CI: 1.081-5.02;  $p = 0.031$ ). **Conclusions:** Total operative time, wound classification of 2, and ASA class 3 were independent risk factors for VTE. These findings will help identify higher risk patients who may need more extensive VTE prophylaxis.

**62. The Effect of Smoking during Radiotherapy on Development of Osteoradionecrosis and Subsequent Treatment Outcomes**

Mark B. Chaskes, MBA, Albany, NY; Mamie Higgins, MD, Albany, NY (Presenter); Alice Zhao Maxfield, MD, Albany, NY; Lisa Galati, MD, Albany, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the impact of smoking on the development and subsequent treatment outcomes of osteoradionecrosis.

**Objectives:** Osteoradionecrosis (ORN) is a rare, yet severe complication of radiation therapy. While staging systems and management algorithms have been proposed in the literature, little has been published concerning the risk factors affecting development and treatment outcomes of ORN. The purpose of this study was to evaluate the impact of smoking on these endpoints. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review of all patients with oral cavity and oropharyngeal cancer was conducted to identify cases of ORN diagnosed at a tertiary medical center between 2013 and 2015. Demographic information, including patient reported smoking habits, was retrieved. **Results:** Ten cases of ORN were documented, but only 9 were included in the study due to 1 incomplete record (5.3% incidence). Six were male, average age of onset of ORN was 57.0 years (44-70 years). The average duration between completion of radiotherapy and diagnosis of ORN was 3.3 years (0.5-11.6 years). Three patients were never smokers, 3 were former smokers, and 3 smoked during radiotherapy and ORN treatment. All but one patient was treated with debridement and adjuvant hyperbaric oxygen therapy; one patient refused this recommended treatment. Current smokers, on average, required 1.7 more debridements than never-smokers (1 vs 2.7, range 0-5). At an average follow-up period of 1 year from the initiation of ORN treatment, 2 cases were resolved. Of the resolved cases, one was a current smoker. **Conclusions:** The incidence of ORN is low in patients treated with radiation for oral cavity and oropharyngeal cancer; however, it is a condition with significant morbidity and impact on quality of life. There is no direct correlation between smoking and development of ORN, but healing may be delayed.

**63. Dean Lierle, MD Resident Research Award  
Liver Disease in Patients Undergoing Head and Neck Surgery: Incidence and Risk for Postoperative Complications**

John D. Cramer, MD, Chicago, IL; Urjeet A. Patel, MD, Chicago, IL; Sandeep Samant, MD, Chicago, IL; Stephanie S. Smith, MD MS, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the rate of liver disease in patients undergoing surgery of the upper aerodigestive tract versus other head and neck surgery. Participants should be able to identify and risk stratify patients with liver disease based on preoperative laboratory analysis. Finally, participants should be able to explain to their patients with mild or advanced liver disease their risk for postoperative mortality.

**Objectives:** Head and neck cancer patients have multiple risk factors for liver disease, however, little is known about the incidence of liver disease or the safety of surgery in these patients. **Study Design:** We conducted a multicenter, prospective, risk adjusted cohort study using the American College of Surgeons National Surgical Quality Improvement Program from 2005-2013. **Methods:** We identified patients with liver disease on routine preoperative laboratory analysis undergoing head and neck surgery by selecting patients with an aspartate aminotransferase to platelet ratio index  $\geq 0.7$  and further selected patients with advanced liver disease based on a model for end stage liver disease sodium score of  $\geq 10$ . We compared the rate of postoperative complications using multivariate logistic regression. **Results:** We identified 19,138 patients undergoing head and neck surgery. The incidence of any degree of liver disease was 6.8% for aerodigestive tract surgery and 3.3% for thyroid surgery. The 30 day mortality rate after major head and neck surgery which included composite resection, free tissue transfer and total laryngectomy with advanced, mild and no liver disease was 14.6%, 3.0% and 0.9% respectively ( $p < 0.001$ ) while for non-major surgery the mortality rate was 3.0%, 0.3% and 0.3% respectively ( $p < 0.001$ ). On multivariate analysis, patients with advanced liver disease experienced a 6 times higher rate of 30 day mortality (OR 6.1; 95% CI 2.9-12.8). **Conclusions:** Patients undergoing surgery of the upper aerodigestive tract are at increased risk of liver disease. Those with advanced liver disease are at high risk for perioperative mortality. Surgery should only be offered to those with advanced liver disease with caution.

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## 64. Factors Affecting Survival and Locoregional Control in Metastatic Cutaneous Squamous Cell Carcinoma of the Head and Neck

Francis X. Creighton, MD, Boston, MA; Alice C. Lin, MD, Brooklyn, NY; Derrick T. Lin, MD, Boston, MA; James W. Rocco, MD, Columbus, OH; Daniel G. Deschler, MD, Boston, MA; Kevin S. Emerick, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of factors affecting survival and locoregional control of metastatic cutaneous squamous cell carcinoma.

**Objectives:** To determine factors affecting locoregional control and disease specific survival in patients presenting with metastatic cutaneous squamous cell carcinoma (cSCCA) of the head and neck. **Study Design:** Retrospective review. **Methods:** Upon review of institutional pathology database to identify patients with metastatic cSCCA, 61 subjects met the inclusion criteria between 2009 to 2012. Cox proportional hazard ratios for disease specific survival and locoregional control were calculated for tumor, patient, lymph node, and treatment variables. These factors included: primary site, tumor grade, perineural invasion, extent of tumor invasion, age, immune status, parotid nodal status, invasion of facial nerve by parotid tumor, cervical nodal status, extracapsular spread, number of nodes involved, adjuvant XRT and chemotherapy. All variables were analyzed to determine impact on locoregional control and disease specific survival. A disease specific Kaplan-Meier curve was determined for the entire cohort. **Results:** 5 year survival was 56% for all patients. Presence of extracapsular spread and bone involvement of the primary tumor site resulted in statistically significant decreases in disease specific survival (HR 41.3 and 270 respectively,  $p = 0.02$  and  $p = 0.008$  respectively) and locoregional control (HR 8.41 and 11.1 respectively,  $p = 0.005$  and  $p = 0.04$  respectively). The remaining factors had no statistically significant effect on disease specific survival or locoregional control. **Conclusions:** The presence of nodal extracapsular spread and bone involvement by the primary tumor appear to be important to the outcome of patients with metastatic cSCCA. These factors should be considered when developing multidisciplinary care plans and future investigations.

## 65. A Rare Case of a Parapharyngeal Brachial Cleft Cyst

Deepa Danan, MD MBA, Charlottesville, VA; David C. Shonka Jr., MD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) describe a rare case of a parapharyngeal second branchial cleft cyst; and 2) discuss the radiologic findings, the differential diagnosis of parapharyngeal space lesions, and surgical approaches.

**Objectives:** Describe a rare case of a parapharyngeal second branchial cleft cyst. Discuss the radiologic findings, the differential diagnosis of parapharyngeal space lesions, and surgical approaches. **Study Design:** Case presentation. **Methods:** A 26 year old female presented with dysphagia, neck pain, and aural fullness responsive to antibiotics. On physical examination, she had tender fullness posterior to the right angle of mandible and medial deviation of the right tonsil. Contrast enhanced MRI revealed a 5 cm peripherally enhancing lesion in the right parapharyngeal space, displacing the carotid posteriorly and styloid process anteriorly. CT guided biopsy returned as bland squamous cyst. **Results:** The patient underwent transfacial/transparotid approach to the right parapharyngeal space. The cystic mass was closely involved with the main trunk and lower division of the facial nerve, requiring complete dissection of the nerve and superior mobilization of the nerve and parotid to access the mass. The cyst had fascial attachments to the skull base medial to the stylomastoid foramen. The cyst was removed in its entirety and final pathology returned as branchial cleft cyst. The patient did well postoperatively with all cranial nerves intact. **Conclusions:** The parapharyngeal space is a highly unusual location for a branchial cleft cyst. Cysts of this region expand towards the least resistant tissue planes, and can protrude submucosally into the oropharynx and extend superiorly towards the skull base. The differential diagnosis of a cystic mass in the parapharyngeal space includes cystic schwannomas and salivary gland tumors. MRI can help to distinguish between these lesions. These masses are generally excised via submandibular, transparotid/transfacial approach or via mandibulotomy. An unusual case of a parapharyngeal branchial cleft cyst is described, as well as the imaging characteristics and surgical approaches to this lesion.

## 66. The Utility of Medical Therapy in Mandibular Osteoradionecrosis

Deepa Danan, MD, Charlottesville, VA; Christopher Hill, MD, Charlottesville, VA; Mark J. Jameson, MD PhD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the utility of medical therapy for ORN.

**Objectives:** Mandibular osteoradionecrosis (ORN) is a challenging problem for the head and neck surgeon. Most cases of ORN occur within the first three years following radiation therapy (RT). Traditional conservative management of ORN has included oral hygiene, analgesics, antibiotics, limited surgical debridement and hyperbaric oxygen therapy, while advanced cases have required resection and reconstruction, usually necessitating microvascular free tissue transfer. More recently, there has been evidence supporting the use of pentoxifylline and tocopherol (P&T) as components of conservative medical management. The purpose of this study is to evaluate the outcomes of patients based on their medical treatment. **Study Design:** Retrospective cohort study. **Methods:** All patients with a diagnosis of mandibular ORN treated in a head and neck oncology clinic at a tertiary care medical center over an 11 year period (2003-2014) were reviewed. During this time frame, the use of P&T was introduced into the medical management of patients with ORN. Treatment details, symptoms, and outcomes including pathologic fracture, progression of disease, need for debridement, and need for resection and major reconstruction were assessed. **Results:** 48 patients met inclusion criteria. 43 patients (89.6%) were treated with antibiotics. 14 patients (29.2%) were treated with P&T. 17 (35.4%) patients presented with or progressed to pathologic fracture. 27 patients (56.3%) required a surgical procedure from minor debridement to resection with major reconstruction. 12 patients (27.9%) required mandibulectomy and reconstruction with microvascular free tissue transfer. Overall, progression of ORN was noted in 28 patients (58.3%). When assessed using standard Kaplan-Meier approach, there was no statistically significant difference between time to pathologic fracture or time to surgery for patients treated with or without P&T. However, despite not achieving statistical significance, a larger percentage of patients treated with P&T were noted to have disease progression (71.4% vs. 52.9% without P&T) and to have pathologic fractures (50.0% vs. 28.6% without P&T). **Conclusions:** There was no significant benefit of the use of P&T in patients with mandibular ORN in terms of time to pathologic fracture or time to surgical intervention. However, there was an apparent selection bias towards the use of P&T in more advanced cases. Future studies should match cases based on presenting severity in order to obtain a more complete evaluation of the impact of P&T. Additionally, comorbid factors (e.g., radiation dose, diabetes) and patient behaviors (e.g., tobacco use, compliance with medical regimen) need to be assessed for their contribution to outcome.

## 67. Sialadenitis and Sialosis and the Expanding Role of Sialography

Andrew B. Davis, MD, Iowa City, IA; Henry T. Hoffman, MD, Iowa City, IA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand two distinct pathologic processes that were simultaneously present in this patient and the expanding role for sialography in the face of the improved technology of sialoendoscopy in the context of gland preserving surgery.

**Objectives:** At the conclusion of this presentation, participants will understand two distinct pathologic processes that were simultaneously present in this patient and the expanding role for sialography in the face of the improved technology of sialoendoscopy in the context of gland preserving surgery. **Study Design:** Case report. **Methods:** Review of the clinical course of a 67 year old male with multiple medical comorbidities and recurrent left parotid gland swelling for 5 months is supplemented by literature review addressing sialadenitis. **Results:** His medical comorbidities included nonalcoholic steatohepatitis, cirrhosis, diabetes and hypertension. A CT scan with contrast identified bilateral fatty infiltration of the parotid gland, but no other pathology was noted. A subsequent left parotid sialogram identified a stricture and a subsequent small area of post-obstructive dilation, within the background of sialosis. **Conclusions:** Sialosis (sialadenitis) is described as a bilateral, diffuse enlargement of the salivary glands that may be painful. This case uniquely exhibited that despite the appearance of sialosis, a second disease process, sialadenitis secondary to stricture was present and was best imaged by sialography.

## 68. Laryngeal and Cervical Glomangiopericytomas: First Case Report

Daniel P. Fox, MD, Houston, TX; Kathleen Kelly Gallagher, MD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the presentation, imaging, pathology, and treatment of head and neck glomangiopericytomas.

**Objectives:** 1) To describe the first reported laryngeal, retropharyngeal, and cervical glomangiopericytomas; 2) to review the presentation, histopathology, immunohistochemistry, and treatment of glomangiopericytoma. **Study Design:** Case report. **Methods:** We present a case report and brief literature review of head and neck glomangiopericytoma. **Results:** A 64 year old female presented for evaluation of glottic and retropharyngeal masses found incidentally on CT angiography during a syncopal workup. Flexible laryngoscopy demonstrated submucosal fullness of the right false vocal fold with intact true vocal fold mobility and effacement of the ipsilateral pyriform sinus. MRI with contrast revealed contrast

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enhancing lesions that were T1 hypo- to-isointense and T2 hyperintense. After direct laryngoscopy and biopsy, pathology showed a neoplasm with spindled to small round cells with numerous branching thin walled vessels. No nuclear pleomorphism, increased mitotic activity or necrosis was noted. Immunohistochemistry was positive for smooth muscle actin (SMA) and desmin, and negative for CD34, pan-cytokeratin (PCK), S100, and CD99. Two independent pathologists confirmed the diagnosis of glomangiopericytoma. The patient subsequently underwent transcervical excision of the masses. Intraoperatively, an additional level 3 mass was noted. Pathology confirmed that there were in fact three separate glomangiopericytomas (laryngeal, retropharyngeal, and right level 3 mass). PubMed review revealed no reports laryngeal, retropharyngeal, or cervical glomangiopericytomas. **Conclusions:** Glomangiopericytoma is a rare tumor previously described in the sinonasal cavity but not the neck. This tumor is characterized by a perivascular myoid phenotype, and immunohistochemical stains are used to support the diagnosis. Glomangiopericytoma has a high propensity for local recurrence and requires definitive surgical resection.

## 69. A Review of Tracheal MALToma

John W. Frederick, MD, Los Angeles, CA; Sunita Bhuta, MD, Los Angeles, CA; Elliot Abemayor, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the disease process and treatment options of tracheal MALToma.

**Objectives:** Classically, MALTomas exhibit an indolent course, with 5 year survival as high as 99% in low risk groups. These tumors are often found in the GI tract, particularly the stomach, and have been shown to be closely associated with H. pylori infections, present in 90% of pathologic gastric MALToma specimens. While non-gastric MALToma is well described in the literature, tracheal MALToma is exceedingly rare. We present a case of tracheal MALToma and review current treatment options for this disease process. **Study Design:** A case report and literature review was performed at a tertiary care medical center. **Methods:** We present the case of a 77 year old male with a three month history of increasing dyspnea misdiagnosed as asthma and subsequently found to have a MALToma of the distal trachea. After review of current literature, we discuss treatment options and present additional manifestations of this uncommon disorder. **Results:** Management of MALToma first depends on location of the malignancy. Gastric MALToma is closely related to H. pylori infections and is generally treated conservatively with antibiotics (effective in more than 75% of gastric MALTomas) prior to considering chemotherapy, radiation, or surgery. Non-gastric MALToma is not associated with H. pylori and are treated with chemotherapy, radiation, and surgical debulking/resection. Tracheal MALToma typically presents with symptoms of airway obstruction, as seen in this case. **Conclusions:** Tracheal MALToma is an exceedingly rare disease but can safely and effectively be treated without complication.

## 70. Predicting Outcomes in P16 Positive Head and Neck Squamous Cell Carcinoma

John W. Frederick, MD, Los Angeles, CA; Bobby Tajudeen, MD, Los Angeles, CA; Jennifer A. Woo, MD, Los Angeles, CA; Haodong Xu, MD PhD, Los Angeles, CA; Maie A. St. John, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to further explain the impact of p16 positivity in head and neck cancer.

**Objectives:** P16INKa (p16) positivity in head and neck squamous cell carcinomas (HNSCCs) has been shown to correlate with an overall improved prognosis. However, within this population there remains a subset of patients that experience relentless disease progression. It is our objective to further characterize p16 positive HNSCCs in an attempt to better predict patient outcomes. **Study Design:** A retrospective cohort review was performed at a single tertiary care center. **Methods:** A total of 105 patients were identified to have p16 positive tumors of the head and neck between May 5, 2003 and August 5, 2014. **Results:** 104 patients were included in the final analysis. Mean followup was 13 months. 19 patients presented with a history of recurrence following initial treatment with chemoradiation. The most common primary site was the oropharynx, followed by oral cavity. Overall, 2 year recurrence free survival was 81%. Multivariate Cox regression analysis revealed that initial presentation with neck disease ( $p = 0.048$ ) and recurrence after failed chemoradiation ( $p = 0.014$ ) were independent predictors of recurrence. **Conclusions:** Although p16 positivity in HNSCCs is traditionally thought to indicate improved outcomes, we have identified specific patient characteristics associated with aggressive disease; further investigation into this stratification is warranted.

71. **Treatment and Survival in 30,561 Patients with Oropharyngeal Cancer: A Population Based Analysis**  
John W. Frederick, MD, Los Angeles, CA; Lynn D. Yi, MD, Los Angeles, CA; Maie A. St. John, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to characterize changes in the treatment of oropharyngeal cancer over time and to compare survival across different treatment types and patient populations.

**Objectives:** The goals of this review were to characterize changes in the treatment of oropharyngeal cancer over time and to compare survival across different treatment types and patient populations. **Study Design:** A population based retrospective cohort analysis. **Methods:** In order to analyze treatment paradigms for oropharyngeal cancer in the United States, the population based Surveillance, Epidemiology, and End Results (SEER) cancer registry was reviewed for all patients between 1972-2011 diagnosed with oropharyngeal malignancy. A retrospective cohort analysis of this group was compiled and treatments recorded. Differences in outcomes based on treatment modality, year of diagnosis, and demographic factors were evaluated using Kaplan-Meier methods and multivariate analysis. **Results:** We identified a total of 30,561 patients diagnosed with oropharyngeal malignancy. Of all patients identified, 73% were male. The majority of patients fell between the ages of 41-80 (91%). Three treatment groups were identified, with 75% of patients receiving radiation therapy. Surgery was the next most common treatment (20%), with only 14% having surgery and radiation. There was a significant difference in treatment modality depending on race, age, and gender. Improved survival was seen in female patients, white race, younger age at diagnosis, and with a more recent diagnosis. Variation in overall survival was also noted to depend on specific registry of treatment. **Conclusions:** We have identified factors associated with the treatment and survival of oropharyngeal cancer that should be taken into consideration when approaching this disease.

72. **Improving Short and Long Term Participant Awareness about Head and Neck Cancer at a Cancer Screening Event**  
Monika E. Freiser, MD MPH, Miami, FL; Erin R. Cohen, BS, Miami, FL; Mikhaylo Szczupak, MD, Miami, FL; Francesca N. Raffa, BS, Miami, FL; Dipan D. Desai, BS, Miami, FL; Zoukaa B. Sargi, MD MPH, Miami, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the importance of health education in improving head and neck cancer awareness at a cancer screening event.

**Objectives:** To assess the baseline head and neck cancer (HNC) awareness of participants at a cancer screening event and evaluate an educational program designed to improve their immediate and long term awareness. **Study Design:** Retrospective review of pre, immediate post, and delayed post screening awareness surveys. **Methods:** An educational program focusing on HNC prevention and early detection was designed that consisted of a short presentation involving visual aids. This program was offered to every participant at a series of HNC screening events during Oral Head and Neck Cancer Awareness Week. Upon arrival to the event, participants completed a baseline awareness survey before partaking in the educational program and subsequently undergoing screening for HNC. Immediately after screening, participants completed a followup survey. Long term awareness was assessed by a telephone survey at six months. Pretest-posttest analyses of the participants' knowledge were performed. **Results:** One hundred and ninety-seven (n=197) participants completed surveys. At baseline, 73 (18%) named tobacco as a risk factor, 48 (24%) named alcohol, and 15 (8%) named human papillomavirus. Knowledge of these three risk factors significantly increased immediately after the event (p<0.001). Analysis of feedback data revealed that 91% reported that they are very or somewhat likely to attend future screenings, and 41% mentioned education as a favorite component of the event. **Conclusions:** Baseline awareness about HNC is low among participants at a hospital based screening event. Involvement in a combined health education screening program increases awareness of important disease features and appears to be well received by participants.

73. **Managed Care Insurance Is Associated with Overall Improved Survival in Head and Neck Cancer Patients**  
Anna M. Garcia, MD, Detroit, MI; Steven Chang, MD, Detroit, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare overall survival in head and neck cancer patients with respect to type of insurance.

**Objectives:** Previous studies have shown that head and neck cancer (HNCA) patients without insurance present at a

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later stage and with a greater tumor burden. Furthermore, uninsured and Medicaid patients present later and have a higher risk of death even after diagnosis. Our hypothesis is that the coordination of care in an HMO model may improve overall survival. **Study Design:** A retrospective cohort study. **Methods:** We performed a retrospective cohort study of 797 patients diagnosed with squamous cell carcinoma of the head and neck from 1990 to 2013. All patients included in the study received primary treatment at our tertiary referral center. The endpoint was survival time. The categories of insurance included fee for service, health maintenance organization, Medicaid or uninsured, and other. The overall survival distributions are compared between insurance types using a log rank test. Stage at diagnosis was compared between insurance groups. **Results:** 792 patients were included in the analysis. The median survival in patients with HMO was 106.6 months compared with 75.5 and 28.2 in fee for service and Medicaid or uninsured, respectively. Patients diagnosed with stage 3 and 4 HNCA with HMO had greater overall survival compared with patients with stage 3 and 4 HNCA with fee for service and Medicaid or uninsured status. **Conclusions:** Patients with HMO insurance had improved overall survival compared to the other insurance types. The managed care model may lead to improved cancer survival.

## 74. **Surgical Outcomes of Mastoidectomy for Facial Nerve Preservation during Parotidectomy**

Shabnam Ghazizadeh, BS, Portland, OR; Javier Gonzalez-Castro, MD, Portland, OR; Daniel S. Brickman, MD, Portland, OR; Mark K. Wax, MD FACS FRCS, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss characteristics of patients who would benefit from mastoidectomy for facial nerve identification; and 2) discuss postoperative outcomes after successful facial nerve preservation using mastoidectomy for nerve identification.

**Objectives:** 1) Analyze a cohort of patients undergoing parotidectomy with concurrent mastoidectomy for facial nerve preservation; and 2) compare preoperative and postoperative facial nerve function after successful mastoidectomy for facial nerve preservation and describe postoperative outcomes. **Study Design:** Retrospective chart review of patients with mastoidectomy and parotidectomy from 2005-2014. **Methods:** Clinical and operative notes were analyzed to record demographic information, indication for mastoidectomy, pathology, other operative/reconstructive procedures, and preoperative and postoperative facial nerve function. **Results:** 75 patients were identified as undergoing parotidectomy with concurrent mastoidectomy. Patients who had mastoidectomy for reasons other than identification of the facial nerve for preservation were excluded (lateral temporal bone resections, malignancy identified at the stylomastoid foramen, perineural tumor involvement). Ultimately, fifteen patients who had mastoidectomy with successful preservation of the facial nerve were analyzed. The median age was 57 with 60% being women. Ten had a benign process while 5 had carcinoma. All had previous parotid surgery. Parotidectomies performed were: superficial (2), total (6), partial (2), revision (5). On followup, 10 had normal facial nerve function while 5 had decreased function. **Conclusions:** Parotidectomy is a common otolaryngologic procedure with facial nerve identification a key component. In the majority of cases this is a straightforward surgical exercise. Occasionally, identification at the stylomastoid foramen is not safe and more proximal identification is required. Mastoidectomy should be considered an adjunct to parotidectomy in selected patients to assist in facial nerve identification. While mastoidectomy can assist in successful identification and preservation of the nerve, a significant number will have a permanent deterioration of function.

## 75. **Merkel Cell Polyomavirus in Young Oral Tongue Cancer Patients**

Mickie J. Hamiter, MD, Shreveport, LA; Tara N. Medline-Moore, Shreveport, LA; Donna L. Rogers, PhD, Shreveport, LA; Gloria B. McClure, MS, Shreveport, LA; John A. Vanchiere, PhD MD, Shreveport, LA; Cherie-Ann Nathan, MD FACS, Shreveport, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the presents of Merkel cell polyomavirus in young oral tongue cancer patients.

**Objectives:** The young tongue cancer patients are known to have more aggressive disease with higher incidence of perineural invasion. We wanted to determine if Merkel cell polyomavirus is associated with these tumors as perineural invasion is present in 50% of Merkel cell Ca. **Study Design:** Retrospective study. **Methods:** IRB approval was obtained and charts were reviewed for oral tongue cancer prior to August 1, 2014. 17 formalin fixed paraffin embedded SCC oral tongue tumor specimens (15 patients) from a single academic institution representing oral tongue cancers of patients 45 and younger at time of biopsy (years 2001-2014) were identified. PCR using known Merkel cell polyomavirus primers was performed. DNA sequencing was then used to confirm positive results. **Results:** 2 of 15 (13.3%) patients tested positive for Merkel cell polyomavirus DNA and were confirmed by DNA sequencing. Perineural invasion was noted in 5 of 15 pathology reports, negative in 10 of 15. Both patients positive for Merkel cell had perineural invasion. **Conclusions:** This

is the first report noting association of Merkel cell polyomavirus with oral cavity cancer. Age of the specimens resulting in poor quality and limited DNA could account for only 2 of 15 patients being positive for Merkel cell polyomavirus. Repeat testing on fresh tissue, larger sample size and more importantly testing all non-tobacco head and neck cancers for Merkel polyomavirus would be useful in the future.

- 76. NOTCH1 Overexpression Correlates to Improved Survival in Cancer of the Oropharynx**  
Azeem S. Kaka, MD, Columbus, OH; Nicholas B. Nowacki, MD, Columbus, OH; Nicole V. Brown, MS, Columbus, OH; Pawan Kumar, PhD, Columbus, OH; Bhavna Kumar, MS, Columbus, OH; Theodoros N. Teknos, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain how NOTCH1 expression correlates to survival in oropharyngeal squamous cell carcinoma.

**Objectives:** To determine the correlation of NOTCH1 expression with survival in a large cohort of oropharyngeal squamous cell carcinoma. **Study Design:** Retrospective chart review with immunohistochemical analysis. **Methods:** We reviewed 225 patients with oropharyngeal squamous cell carcinoma who were surgically treated at a cancer hospital from 2002 to 2009. Immunohistochemical staining for NOTCH1 was performed, quantified by a pathologist, and correlated to clinical outcome. Stain proportion (0-100%) was multiplied by stain intensity (0-3) to determine overall expression score (OES). Cox proportional hazards models were used to assess univariate associations of biomarkers as predictors of death. To assess dual marker interactions, comparisons of survival curves were evaluated using the log rank test with adjustment for multiple comparisons. **Results:** Non-malignant tissue showed minimal NOTCH1 expression. When NOTCH1 OES was analyzed as a continuous variable, high NOTCH1 expression correlated to tumors which were p16+, HPV+, and patients who were nonsmokers. When NOTCH1 OES was analyzed as a dichotomous variable (with 25th percentile as cutoff), high NOTCH1 patients had improved survival (HR 2.7,  $p < 0.0001$ ). In multivariate analysis, in an HPV+ subset, we found that high NOTCH1 correlates to improved survival (HR 1.9,  $p = 0.0003$ ). This same finding was not significant for the HPV subset. High NOTCH1 significantly showed improved survival when cases were stratified by p16 status. **Conclusions:** This study represents the largest oropharynx cohort examining NOTCH1 expression to date. This data supports the notion that NOTCH1 acts as a tumor suppressor in oropharyngeal squamous cell carcinoma. This study highlights the possibility of using NOTCH1 agonists as therapeutic agents for oropharyngeal squamous cell carcinoma which express low levels of NOTCH1.

- 77. Mouse Model of Pectoralis Major Flap Ischemia**  
Nicholas S. Karter, MD, Farmington, CT; Kouros Parham, MD PhD, Farmington, CT; Aiswaria Padmanabhan, MS, Farmington, CT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to appreciate the robust nature of the pectoralis major myocutaneous rotational flap and its resistance to ischemia as demonstrated by our mouse model.

**Objectives:** Ischemia and flap necrosis have long been feared complications of head and neck reconstructive surgery. Our aim was to create a pectoralis major flap ischemic model in mice to aid investigations of novel strategies to reduce flap ischemia. Here we report initial results from this effort. **Study Design:** Basic science. **Methods:** Mice were allocated equally into groups receiving either traditional pectoralis major myocutaneous flap dissection or traditional dissection with constriction of the vascular pedicle. Preoperative thoracic laser Doppler images were compared to those obtained 13-15 days postoperatively to evaluate change in flow. **Results:** The mean change in flow in the region of interest was  $130.85 \pm 23.35$  SEM in the control group, and  $116.63 \pm 8.31$  SEM in the group with the constricted pedicle. T-test analysis revealed no significant difference in pre and postoperative region of interest flow between the two groups ( $p = 0.32$ ). **Conclusions:** Despite constriction of the vascular pedicle in the ischemic group, no statistically significant difference of flow could be demonstrated between the two groups. Our findings are consistent with the robust nature of the pectoralis major myocutaneous rotational flap and highlight its resistance to ischemia. Additional effort will be needed to further constrict blood flow toward development of ischemic muscle flap model.

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78. **Bio-Oss(R) Successfully Induces Bone Healing in a Segmental Mandibular Defect**  
Irene A. Kim, MD, Los Angeles, CA; Min Lee, PhD, Los Angeles, CA; Olga Bezouglaia, Los Angeles, CA; Tara Aghaloo, DDS MD PhD, 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 have an improved understanding of the physiology of bone regeneration in clinically relevant animal models that can potentially translate to patient care and improve the long term reconstructive success of patients with craniofacial defects. Previous research has determined that bone morphogenetic protein-2 (BMP-2) impregnated biomimetic scaffolds. Bio-Oss, a natural bone substitute derived from the mineral portion of bovine bone, is commonly used in human dental procedures as an osteoconductive graft, but its ability to heal segmental mandibulectomy defects has not previously been explored.

**Objectives:** To test the osteoregenerative potential of Bio-Oss in healing the critical size segmental mandibulectomy defect in the rat model in comparison to other biomimetic scaffolds. **Study Design:** Prospective study using an animal model. **Methods:** Twenty-five rats underwent segmental mandibulectomies with resultant 5 mm x 5 mm critical sized defects. The following were implanted into the defect sites: Bio-Oss, Bio-Oss with 5ug BMP-2, collagen sponge, collagen scaffold with 5ug BMP-2, and autologous bone. Two months postoperatively, bone healing was analyzed with microcomputerized tomography (microCT) and histopathologic analysis. **Results:** MicroCT analysis demonstrated no bridging of the bony defect in rats implanted with blank scaffolds (control group, mean bone union score = 0). Rats implanted with scaffolds containing Bio-Oss with BMP-2 demonstrated superior healing of critical sized segmental mandibular defects as compared with Bio-Oss or BMP-2 alone. **Conclusions:** Bio-Oss is an effective osteoconductive bone graft agent in healing segmental mandibular defects. This graft, in combination with BMP-2, showed the highest percentage healing of defect, percentage of bone within healed tissue, and total bone volume within the defect site when compared to the other biomimetic scaffolds.

79. **Distress in a High Risk Head and Neck Cancer Population as Evaluated by the Hospital Anxiety and Depression Scale (HADS)**  
Rachel A. Kominsky, BS, Philadelphia, PA; Bianca R. Lewis, BA, Philadelphia, PA; Jeffrey C. Liu, MD, Philadelphia, PA; Karen Y. Mechanic, MD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify elements that pose the greatest risk of distress to head and neck cancer patients.

**Objectives:** To identify characteristics within a high risk head and neck cancer patient population that associate with depression and anxiety. **Study Design:** Retrospective chart review. **Methods:** A database of HADS scores collected during psychiatric evaluations at a comprehensive cancer center from 2011-2015 was reviewed. The electronic medical records of these patients were analyzed to collect information regarding demographics, initial disease severity, treatment course, and psychiatric evaluation. Statistical analysis was performed to identify factors that most affected HADS scores. **Results:** 55 patients who had been diagnosed with head and neck cancer were available for study. Many patients provided HADS data more than once during different times of their care. Patients experienced the highest levels of anxiety and depression in the 12-24 months after treatment. Other factors were shown to be associated to increased HADS score including patients that continued smoking and/or alcohol consumption, tracheostomy tube or gastrostomy tube during treatment, tumor stage. Subsite alone did not associate with HADS scores. **Conclusions:** Not all populations of head and neck cancer patients experience the same amount of anxiety and depression. Certain factors can be used to predict the emergence of increased emotional distress in patients. These include time from the end of treatment, tumor stage at diagnosis, smoking and drinking status, as well as tracheostomy and G-tube dependence.

80. **Cribriform Morular Variant of Papillary Thyroid Carcinoma: Case Series and Literature Review**  
Edward C. Kuan, MD, Los Angeles, CA; John W. Frederick, MD, Los Angeles, CA; Sunita M. Bhuta, MD, Los Angeles, CA; Gerald S. Berke, MD, Los Angeles, CA; Elliot Abemayor, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the clinical and pathologic features of the cribriform morular variant of papillary thyroid cancer.

**Objectives:** While common, papillary thyroid carcinoma (PTC) is further subdivided into multiple histologic subtypes. The

cribriform morular variant is a rare and aggressive subtype which is associated with familial adenomatous polyposis. We report two cases of this unusual malignancy and review the literature. **Study Design:** Retrospective chart review and review of the literature via a Medline search. **Methods:** The medical records of two patients treated at a tertiary academic medical center for cribriform morular variant of PTC were reviewed. A Medline search was performed for the key words cribriform morular and thyroid. **Results:** Two female patients, ages 52 and 23, both presented to the head and neck surgery clinic with a right sided thyroid mass. Fine needle aspiration biopsy of both masses confirmed the diagnosis of PTC. Both patients underwent total thyroidectomy with neck dissection, with pathology returning as the cribriform morular variant of PTC, and later received postoperative radioactive iodine therapy. One patient presented with a recurrent mass of the right thyroid bed one year after initial presentation associated with right recurrent laryngeal nerve palsy; she underwent revision thyroidectomy which confirmed locoregional recurrence. Neither patient had a history of gastrointestinal pathology. **Conclusions:** The cribriform morular variant is a rare but aggressive subtype of PTC, often presenting with advanced locoregional disease. Due to its association with familial adenomatous polyposis, patients should be referred for gastroenterology evaluation.

## 81. Management of T1 Glottic Squamous Cell Carcinoma Comparative Outcomes between Laser and Radiotherapy Treatment

Tsu-hui H. Low, MBBS, London, ON Canada; David H. Yeh, MD, London, ON Canada (Presenter); S. Danielle MacNeil, MD MSc FRCSC, London, ON Canada; Anthony C. Nichols, MD FRCSC, London, ON Canada; John Yoo, 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 demonstrate an understanding of the similarities and differences in outcomes in the treatment of T1 glottic tumors with radiotherapy versus transoral laser microsurgery.

**Objectives:** T1 glottic squamous cell carcinomas (SCC) are commonly treated with either radiotherapy (RT) or transoral laser microsurgery (TLM). This study aims to compare the outcomes of patients between the two modalities as well as to provide detailed analysis of the differences between the two modalities. **Study Design:** Retrospective database review. **Methods:** All consecutive patients with T1 glottic SCC treated at a single large volume institution from 2000 to 2013 were analyzed. Tumor control, survival outcomes, and laryngectomy free survival were calculated. **Results:** A total of 168 cases of T1 glottic cancer with a mean age of  $65.4 \pm 13.0$  were included in the study. 105 were T1a (53 TLM, 52 RT) and 63 were T1b (3 TLM, 60 RT). The 5 year overall survival (OS) and disease specific survival (DSS) for T1a glottic SCC were 87% and 100% versus 87% and 97% for TLM versus RT respectively ( $p=0.887$ ,  $p=0.384$ ). For T1b, the OS and DSS were 86% and 95% respectively for patients treated with RT. The 5 year laryngectomy free survival rate for T1a disease was 100% for the TLM group versus 87% for the RT group ( $p=0.030$ ). Four patients within the TLM group required salvage radiotherapy. Ten patients within the RT group required salvage laryngectomy. 28.6% (16/56) of patients treated with TLM had local recurrences whilst 9.8% (11/112) of patients treated with RT had local recurrences. **Conclusions:** Patients with T1 glottic SCC treated with RT or TLM have similar survival outcomes. Patients with T1a tumor treated with TLM in this series had better laryngeal preservation compared to RT; however, these patients require closer surveillance as they had a higher rate of local recurrences.

## 82. Postoperative Complications and Readmission Rates following Surgery for Laryngopharyngeal Cancer

Hossein Mahboubi, MD MPH, Irvine, CA; Rijul S. Kshirsagar, BS, Irvine, CA; Zachariah Chandy, BA, Irvine, CA; Sunil P. Verma, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the common complications of surgery for laryngopharyngeal cancer, determine the time period at which they are most likely to occur, and describe the independent predictors of complications and readmissions/reoperations.

**Objectives:** 1) To investigate postoperative complications and reoperation/readmission rates following laryngopharyngeal cancer surgery; 2) to identify risk factors associated with overall complications and reoperation/readmissions. **Study Design:** Retrospective analysis was performed on the 2013 American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) dataset. **Methods:** Patients with oropharyngeal, hypopharyngeal, and laryngeal cancer were identified using relevant ICD-9-CM diagnosis codes. Demographics, perioperative information, and 30 day postoperative complications were analyzed. Multivariate analysis was used to evaluate risk factors associated with post-

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operative complications and reoperation/readmissions. **Results:** 430 patients underwent laryngopharyngeal cancer surgery. The overall complication rate was 26.5%. The most common complications were anemia requiring blood transfusion (14.9%), wound dehiscence (4.4%), and deep incisional infection (3.3%). Unplanned readmission and reoperation rate were 11.9% and 11.6%, respectively. Pulmonary comorbidity was a significant risk factor for a complication (odds ratio [OR] = 2.40; 95% confidence interval [CI]: 1.32-4.38;  $p = 0.004$ ) and reoperation/readmission (OR = 2.22; 95% CI = 1.18-4.20;  $p = 0.01$ ). Chronic steroid use was also significantly associated with a complication (odds ratio [OR] = 3.18; 95% confidence interval [CI]: 1.10-9.21;  $p = 0.03$ ) and reoperation/readmission (OR = 2.94; 95% CI = 1.03-8.36;  $p = 0.04$ ). **Conclusions:** Following laryngopharyngeal cancer surgery, the most common complications include anemia requiring blood transfusion, wound dehiscence, and deep incisional infection. Pulmonary comorbidity and chronic steroid use were risk factors for postoperative complications, readmission and reoperation. This information will help identify high risk patients and complications early.

## 83. p38 MAPK Mediates Epithelial to Mesenchymal Transition by Regulating p38IP and Snail in Head and Neck Squamous Cell Carcinoma

Jon Mallen-St. Clair, MD PhD, Los Angeles, CA; Yuan F. Lin, PhD, Los Angeles, CA; Fernando Palma Diaz, MD, Los Angeles, CA; Steven Sherven, PhD, Los Angeles, CA; Steven M. Dubinett, MD, Los Angeles, CA; Maie A. St. John, MD PhD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of p38 and p38IP in the regulation of epithelial to mesenchymal transition in head and squamous cell carcinoma.

**Objectives:** To investigate the role of p38-p38IP signaling in the inflammation induced promotion of epithelial to mesenchymal transition (EMT) in head and neck squamous cell carcinoma (HNSCC). **Study Design:** This is a basic science investigation of the role of p38 and p38IP signaling on the expression of markers of EMT transition in HNSCC. We utilized cell culture models of HNSCC to assess the impact of abrogating p38 and p38IP on EMT. We performed immunohistochemistry on HNSCC tissue and adjacent normal tissue to correlate levels of p38 and p38IP with markers of EMT. **Methods:** Quantitative RT-PCR, Western blot analysis, spheroid cellular modeling, and immunohistochemical staining of human HNSCC tissue sections were used. **Results:** p38 inhibitor treated and p38 shRNA HNSCC cell lines demonstrate a significant upregulation in E-cadherin mRNA and a decrease in the mRNA expression of Snail. p38 binds to and stabilizes p38IP, a subunit of histone SPT3-TAF9-GCN5 acetyltransferase (STAGA), resulting in enhanced transcription of Snail. p38 shRNA HNSCC cell lines show a less invasive phenotype in a spheroid model. In clinical HNSCC samples, p38 interacting protein (p38IP) is significantly increased compared to adjacent normal tissue. An inverse relationship between p38, p38IP and E-cadherin is demonstrated. **Conclusions:** Herein we provide the first report that p38-p38IP is required for the Snail induced E-cadherin downregulation and cell invasion in HNSCC.

## 84. Multi-Institutional Analysis of Unplanned Readmission for Head and Neck Patients Undergoing Parotidectomy

Emily Marchiano, BA, Newark, NJ; Jacob S. Brady, BA, Newark, NJ; Eric T. Carniol, MD, Newark, NJ; Jean A. Eloy, MD, Newark, NJ; Soly Baredes, MD, Newark, NJ; Richard C. Park, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the perioperative variables associated with 30 day unplanned readmission following parotidectomy.

**Objectives:** To analyze associations between perioperative factors and 30 day unplanned readmissions for patients that have undergone parotidectomy. **Study Design:** Retrospective study of cases from the American College of Surgeons National Surgical Quality Improvement Program database. Patients who underwent parotidectomy from 2011 to 2013 were identified. **Methods:** Patient demographics, preoperative comorbidities and laboratory values, and postoperative complications were analyzed. Univariate and multivariate analyses of unplanned readmission based on patient, laboratory, and hospital course characteristics were conducted. **Results:** In total, 3189 patients were included in the analysis. Overall 30 day readmission rate for parotidectomy was 1.8% ( $n=57$ ). On univariate analysis, factors associated with unplanned readmission were total parotidectomy with neck dissection, age > 60, hyponatremia, weight loss, hypertension, diabetes mellitus, disseminated cancer, steroid use, dialysis, class II ASA, surgical complications, medical complications, total operating time, mean length of stay, and reoperation ( $p < .05$ ). A multivariate analysis revealed that chronic steroid use (OR = 5.315 (2.311--12.225),  $p < 0.001$ ), dialysis (OR = 5.169 (0.996--26.828),  $p = 0.051$ ), weight loss (OR = 8.352 (1.685--41.398),  $p = 0.009$ ), and hyponatremia (OR = 2.723 (1.001--7.409),  $p = 0.05$ ) were associated with increased readmission.

A similar analysis of postoperative variables showed that medical (OR = 29.506 (13.739--63.365),  $p < 0.001$ ), and surgical complications (OR = 2.929 (1.139--7.528),  $p = 0.026$ ), were associated with increased readmission. Of the patients that had an unplanned readmission, 60.7% had a parotidectomy as an outpatient ( $p = 0.041$ ). **Conclusions:** Unplanned readmission after parotidectomy happens infrequently. Chronic steroid use and postoperative surgical and medical complications are most associated with unplanned readmission.

**85. First Reported Case of Reticular Schwannoma within the Submandibular Gland**

Sonya Marcus, MD, New York, NY; Ryan P. Lau, MD, New York, NY; Meghan T. Turner, MD, Pittsburgh, PA; Mari Hagiwara, MD, New York, NY; Ronaldo Zamuco, MD, New York, NY; Babak Givi, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the clinical presentation and morphology of reticular schwannoma in order to accurately diagnose this entity, prevent confusion with other neoplastic entities, and to avoid unnecessary treatments.

**Objectives:** Reticular schwannoma is a newly described variant of schwannoma. In contrast to classic schwannoma, it harbors predominantly microcystic/reticular features and has a predilection for the gastrointestinal tract. We report the first case of reticular schwannoma arising from the submandibular gland. **Study Design:** Case report. **Methods:** An otherwise healthy, 34 year old man presented to the otolaryngology clinic with an asymptomatic, slowly enlarging neck mass. Physical exam was normal except for a palpable, firm, nontender mass in the submandibular triangle. Computed tomography showed a lobulated mass extending posterolaterally from the otherwise normal appearing left submandibular gland into the parapharyngeal space. Fine needle aspiration of the mass revealed a spindle cell lesion. Patient underwent en bloc, complete excision of the mass and the left submandibular gland by transcervical approach, with selective level I neck dissection. Final pathology was concluded as reticular schwannoma. Patient remained recurrence free one year after the surgery. **Results:** Reticular schwannoma is a newly described, rare entity that is morphologically distinct but clinically similar to classic schwannoma, with no reported recurrences after complete excision. There is no need for more extensive resections or adjuvant treatments since these tumors have no malignant potential. **Conclusions:** We describe the first reported case of reticular schwannoma of the submandibular gland. Awareness of this entity is essential to prevent confusion with other neoplastic entities and to avoid unnecessary treatments.

**86. The Effect of Submandibular Preservation during Level IB Lymphadenectomy on Postoperative Xerostomia**

Jeffrey D. Markey, MD, San Francisco, CA; William G. Morrel, BS, San Francisco, CA; Steven J. Wang, MD, San Francisco, CA; William R. Ryan, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the risks and benefits of submandibular gland preservation and excision during a level IB neck dissection and compare databased outcomes.

**Objectives:** To compare the possible presence and degree of postoperative xerostomia following preservation or excision of the submandibular gland (SMG) during level IB neck dissection (ND) in patients with early stage oral or oropharyngeal carcinoma who did not undergo radiation. **Study Design:** Retrospective review with patient questionnaire. **Methods:** We enrolled sequential patients with a history of pT1-2 oral or oropharyngeal squamous cell carcinoma without aggressive histopathologic features who underwent resection and elective ND during which the SMG was excised or preserved without adjuvant radiation from April 2012 to March 2015. We assessed statistical differences in demographics, complications, and responses to the following questionnaires assessing postoperative xerostomia and general health: University of Michigan Xerostomia Quality of Life (XeQOL), Short Form-8 (SF-8), and a xerostomia visual analogue severity scale (XSS) on a scale of 0-10. **Results:** Sixteen SMG preservation group patients and 15 SMG excision group patients completed the questionnaires. There were no significant differences between the two groups for the XeQOL, SF-8, and XSS questionnaires ( $p = 0.54, 0.56, 0.79$ , respectively). Eight (50%) SMG preservation group patients and 7 (47%) SMG excision group patients reported the presence of current xerostomia with mean severity scores being higher in SMG excision patients (4.5) compared to the SMG preserved patients (2.8) without statistical significance ( $p = 0.22$ ). Complications were low and equivalent (1 seroma and 1 marginal mandibular nerve weakness in each group). **Conclusions:** SMG preservation during level IB ND although safe does not appear to necessarily have an impact on postoperative subjective xerostomia in non-irradiated patients.

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87. **Medullary Thyroid Microcarcinoma Survival Outcome: A Single Institution Experience**  
Suhael R. Momin, MD, Cleveland, OH; Deborah J. Chute, MD, Cleveland, OH; Brian B. Burkey, MD, Cleveland, OH; Joseph Scharpf, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss and explain factors affecting outcomes in patients with medullary thyroid microcarcinoma and compare outcomes to those patients with non-micro medullary thyroid carcinoma.

**Objectives:** Medullary thyroid carcinoma (MTC) has a propensity for local and distant metastatic spread, with observed metastases in even micro tumors, defined as less than or equal to 1 cm. We review our recent institutional experience with medullary thyroid microcarcinoma. **Study Design:** Retrospective case series. **Methods:** Chart review of patients with micro MTC who underwent at least total thyroidectomy with curative intent. **Results:** Retrospective case series examining patients with micro MTC who underwent at least total thyroidectomy with curative intent. Twenty seven patients met inclusion criteria. The average age was 44.6 years. The average followup time was 30.5 months, median 22 months. Twelve patients (44.4%) had a known RET mutation, the remainder of cases were sporadic (13) or untested (2). Twenty five patients (92.5%) were clinically N0 at presentation, with 2 (7.5%) demonstrating evidence of lateral neck disease (N1b) at presentation. Five patients underwent a central neck dissection, and 3 underwent a lateral neck dissection. Twelve additional patients had non-comprehensive node sampling from the central compartment. Of 23 patients who had calcitonin checked >60 days postoperatively, 21 (91.3%) achieved biochemical cure. Of those who achieved cure, 5 year biochemical recurrence free survival was 100%. Among all patients, including those with elevated calcitonin, the 5 year disease free survival, defined as no identifiable structural disease locally, regionally nor distant was 94.2%. The 5 year overall survival was 94.5%. **Conclusions:** MTC is an infrequent thyroid tumor. Although the majority of microcarcinoma patients do not have evidence of metastatic spread at presentation, there is a significant risk of cervical metastatic disease. Regardless, when compared with non-micro tumors, the rates of biochemical cure and overall survival are excellent.

88. **Fluorescence Guided Surgery: Determining the Threshold for Cancer Detection Using Near Infrared Optical Imaging in a Head and Neck Model**  
Lindsay S. Moore, MD, Birmingham, AL; Melissa L. Korb, MD, Birmingham, AL; Jason M. Warram, PhD, Birmingham, AL; Marie E. Warren, BS, Birmingham, AL; Kurt R. Zinn, PhD DVM, Birmingham, AL; Eben L. Rosenthal, MD, Stanford, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the basic concepts of optical fluorescence imaging to guide the surgical resection of cancer. Furthermore, participants should be able to discuss the threshold for cancer detection using this method in head and neck cells and the resulting implications and limitations.

**Objectives:** Optical imaging to guide cancer resections is being translated into the operating room; however, the sensitivity of this technique to detect subclinical disease remains poorly characterized. The purpose of this study was to determine the minimum number of cancer cells that can be detected by optical imaging using near infrared (NIR) fluorescence imaging devices intended for use intraoperatively and for surgical pathology processing. **Study Design:** Head and neck squamous cell carcinoma cells (SCC-1) were incubated in vitro with cetuximab IRDye800 (dose range 8.6 $\mu$ m to 86nm) and implanted subcutaneously in mice (n=3, 5 tumors/mouse). Additionally, following incubation with 8.6x10<sup>-2</sup> $\mu$ m of cetuximab IRDye800 in vitro, serial dilutions of each cell type (1x10<sup>3</sup> - 1x10<sup>6</sup>) were implanted subcutaneously (n=3, 5 tumors/mouse). **Methods:** Tumors were imaged with open field (LUNA) and closed field (Pearl Impulse) NIR fluorescence imaging systems, and the minimum cell number visualized was calculated. A Scatchard analysis was performed to determine the EGFR receptor density. **Results:** This model was developed to simulate islands of disease, as well as poor penetration of the imaging agent into the tumor. Under these conditions, the closed field system was able to detect a minimum of 5x10<sup>4</sup> SCC-1 cells. The open field device was less sensitive than Pearl, but was still able to detect as few as 1.5x10<sup>5</sup> SCC-1 cells. The average EGFR receptor density was found to be 1.2x10<sup>5</sup> receptors/cell. **Conclusions:** Cetuximab IRDye800 can detect subclinical amounts of disease in the surgical setting. This study supports the clinical utility of cetuximab IRDye800 to surgically assist the resection of certain malignancies, thereby decreasing positive margin rates.

89. **Repurposing Optical Imaging Devices for Fluorescence Guided Surgery of Head and Neck Cancer**  
Lindsay S. Moore, MD, Birmingham, AL; Jason M. Warram, PhD, Birmingham, AL; Esther D. De Boer, BSc, Birmingham, AL; William R. Carroll, MD, Birmingham, AL; Anthony B. Morlandt, MD DMD, Birmingham, AL; Eben L. Rosenthal, MD, Stanford, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the basic principles of fluorescence guided surgery using optimal imaging for the resection of cancer in the head and neck.

**Objectives:** During fluorescence guided surgery, a cancer specific optical probe is visualized intraoperatively using a compatible device to provide visual contrast between diseased and normal tissue. This technique aims to improve the resection of cancer and minimize the resection of adjacent normal tissues. **Study Design:** Six patients with squamous cell carcinoma of the head and neck (oral cavity (n=2), oropharynx (n=1), hypopharynx (n=1), and cutaneous (n=2)) were injected with an EGFR targeting antibody (Cetuximab) conjugated to a near infrared (NIR) fluorescent dye (IRDye800) 3, 4, or 7 days prior to surgical cancer resection. **Methods:** Tumors were imaged using commercially available open and closed field near infrared (NIR) imaging devices daily after dye infusion, intraoperatively, and postoperatively. The mean fluorescence intensity (MFI) of the tumor was calculated at each imaging time point. Adjacent normal tissue served as an internal anatomic control for each patient to establish a patient matched background fluorescence. Tumor to background ratios (TBRs) were calculated for each patient using both devices. Fluorescence histology was correlated with the gold standard pathologic tissue assessment to verify the specificity of antibody dye conjugate binding. **Results:** Peak TBRs using the open field device ranged from 2.2 to 11.3, with an average TBR of 4.9. Peak TBRs were achieved between days 1 and 4 post-infusion. **Conclusions:** This study demonstrated that commercially available NIR imaging devices suited for intraoperative use and surgical pathology tissue processing can successfully be used with a fluorescently labeled dye to delineate cancerous and normal tissue. This single cohort human study illuminates the potential for fluorescence guided surgery to improve cancer resection and decrease positive margin rates.

90. **WITHDRAWN -- An Exploratory Evaluation of Perceived Body Image and Quality of Life in Individuals with Head and Neck Cancer**  
Melissa M. Nash, MSc, London, ON Canada; Kevin Fung, MD, London, ON Canada; S. Danielle MacNeil, MD, London, ON Canada; Grace M. Scott, MSc, London, ON Canada; John H. Yoo, MD, London, ON Canada; Philip C. Doyle, PhD, London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the value of assessing body image following the treatment of head and neck cancer. Further participants should be able to compare the merits of different body image assessments.

**Objectives:** One of the most distressing aspects of head and neck cancer (HNC) treatment is the possibility of disfigurement and its potential visibility to others. Such changes may directly impact one's perceived body image (BI) with a secondary potential to impact long term functioning; hence, BI may be seen as an influence on quality of life (QOL). Optimized QOL is an identified priority following treatment; therefore, identifying factors that result in a reduction in QOL is essential, as doing so has the potential to influence outcomes following treatment. **Study Design:** This study sought to identify the potential influence of BI on QOL following treatment of HNC. The study further sought to determine the essential elements to identify body image disturbance among this population. **Methods:** All participants completed four previously validated questionnaires including two related to QOL and two related to body image. **Results:** Participants included 45 men and 35 women diagnosed and treated for HNC. Data indicate that 30% of both men and women demonstrated some level of concern relative to their perceived BI. This finding revealed concurrent reductions in perceived QOL. However, deficits in perceived BI exist independent of clearly identifiable treatment related physical head/neck alteration. **Conclusions:** The identification of disturbances in BI can be accomplished with minimal additional consultation. Thus, potential changes in BI should be monitored in all individuals treated for HNC. Because disruption in BI may interfere with one's resumption of previous roles and routines post-treatment, the identification of such concerns and efforts to reduce its impact may facilitate improved rehabilitation outcomes.

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91. **Volumetric Growth Rate of Recurrent Major Salivary Gland Pleomorphic Adenoma**  
Margaret L. Naunheim, MD, San Francisco, CA; Chase M. Heaton, MD, San Francisco, CA;  
William Ryan, MD, San Francisco, CA; Steven J. Wang, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) quantify the growth rate of recurrent pleomorphic adenomas; and 2) use this information to determine intervals of serial imaging to follow growth of recurrent pleomorphic adenomas.

**Objectives:** Pleomorphic adenoma (PA) is the most common benign tumor of the major salivary glands. Surgical excision is the treatment of choice due to potential for malignant degeneration. Inadvertent capsule rupture may lead to tumor recurrence. Surgery for recurrent PA is challenging and carries a high risk of patient morbidity, specifically in regards to facial nerve function. Slow tumor growth may obviate the need for undergoing salvage surgery. Our objective was to determine the growth rate of recurrent pleomorphic adenomas. **Study Design:** Case series. **Methods:** All patients at our tertiary academic medical center with recurrent PA between the years 2003-2013 were identified. Patients who had at least two interval imaging studies without intervening surgical intervention were included. A neuroradiologist calculated total volume of recurrent tumor on both studies. Our main outcomes were percent change in TV, as well as tumor growth rate. **Results:** Fourteen patients met inclusion criteria. Median interval time between imaging studies was 12.8 months. The median rate of growth was 0.9% per month. Three tumors demonstrated no growth between interval imaging studies and two tumors had interval reduction in TV. For the 9 patients who had tumor growth, median percent change in TV was 31.0%. The median growth rate of these tumors was 1.8% per month. **Conclusions:** The growth rate of recurrent pleomorphic adenoma is variable, though the median growth rate for enlarging tumors is estimated at 2% per month. Physicians may weight the risk of this slow growth with the morbidity of reoperation, which can pose significant morbidity.

92. **Minimally Invasive Robotic Neck Dissection Using Insufflation and an Infraclavicular Approach: A Feasibility Study Using a Human Cadaver**  
Hillary A. Newsome, BS, Pittsburgh, PA; F. Chris Holsinger, MD, Stanford, CA; Umamaheswar Duvvuri, MD PhD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants will have explored a novel approach to neck dissection. Participants will be able to discuss the pros and cons of this minimally invasive method compared to traditional, open approaches.

**Objectives:** Strong impetus to reduce known morbidities from open approach neck dissection for the treatment of head and neck cancer exists. The goal of this study was to determine the feasibility of performing a robotic neck dissection using an infraclavicular incision and insufflation in a human cadaveric model. **Study Design:** We hypothesized that remote incisions outside of the neck could be used to introduce the da Vinci Surgical Robot System (Si) into the neck for nodal packet dissection. **Methods:** A whole fresh frozen human cadaver was thawed before experimentation. The insufflation based neck dissection technique was implemented on both sides of the cadaver's neck. **Results:** Access to the neck was granted using a 3cm incision in the infraclavicular plane. Subplatysmal skin flaps were manually dissected to the level of the mandible. Wound edges were retracted with an Alexis self-retaining retractor covered with a folded over latex glove. The fingers of the glove acted as port guides and allowed for placement of the da Vinci port into this gloved wound retractor apparatus. Insufflation of this region allowed for adequate exposure of the cervical structures. The tremor free motion system enabled dissection of the nodal packet, en bloc, without injury to surrounding neurovascular structures of the neck. **Conclusions:** We show the feasibility of performing neck dissection through an infraclavicular incision using insufflation. This approach might be useful for robotic cervical lymphadenectomy. This technique's small, remote incision potentially reduces morbidities associated with open techniques, such as visible neck scarring.

93. **Utility of the Highly Articulated Flex® Robotic System for Head and Neck Procedures: A Cadaveric Study**  
Hillary A. Newsome, BS, Pittsburgh, PA; Magis Mandapathil, MD, Marburg, Germany; Yoon W. Koh, MD PhD, Seoul, South Korea; Umamaheswar Duvvuri, MD PhD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate the potential usefulness of the Flex Robotic System in head and neck surgeries. Comparison will be made between the Flex system and current robotic technology.

**Objectives:** Robotic head and neck surgery offers the ability to reduce the morbidity associated with traditional open procedures, but has its limitations. The goal of this study was to employ a novel highly articulated robotic system (Flex® Robotic System) for several head and neck procedures, including a retroauricular facelift approach thyroidectomy, submandibular gland (SMG) removal, and cervical lymphadenectomy. **Study Design:** It was hypothesized that the Medrobotics Flex® Robotic System could safely be used for transcervical head and neck surgical procedures. **Methods:** Two fresh upper body human cadavers were thawed prior to use. The Flex® Robotic System was used to complete a thyroidectomy, neck dissection, and SMG removal on both cadavers. **Results:** A retroauricular incision and flap was raised in the standard fashion before the Flex® Robotic System was introduced into the neck. The system was rolled up to and positioned on the right side of the cadaver's head. The system's manually controlled flexible instruments and highly shapeable, robot assisted scope were used to perform a thyroid lobectomy. Neck dissection was completed without damage to the surrounding neurovascular structures. SMG removal was also safely performed. **Conclusions:** Although a promising technology, the current robotic system (Intuitive Surgical Inc., Sunnyvale, CA) has limitations due to its rigid and large configuration, which decreases exposure and access. The new Flex® Robotic System, with its shapeable, computer assisted scope, seeks to partially reduce some of these difficulties, and may be better adapted for transcervical approaches to the neck. This study demonstrated the feasibility of using the Flex® Robotic System for standard head and neck operations.

## 94. Survival Outcomes in Early Stage Laryngeal Cancer

Haig Panossian, MD, New York, NY; Uchechukwu Megwalu, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the survival outcomes of patients receiving surgical and radiation therapy for early stage laryngeal cancer.

**Objectives:** To evaluate survival outcomes of radiation therapy versus surgical therapy in the treatment of early stage laryngeal cancer in the United States using a large population based cancer database. **Study Design:** Population based, non-concurrent cohort study. **Methods:** Data was extracted from the Surveillance, Epidemiology, and End Results (SEER) 18 database. The study cohort included 5,301 patients diagnosed with stage I and II laryngeal squamous cell carcinoma between 1992 and 2009 who were treated with either radiation therapy alone or surgical therapy alone. **Results:** The use of radiation therapy increased over time, from 59.0% in the 1992-1997 cohort, to 80.1% in the 1998 to 2003 cohort, and 82.5% in the 2004 to 2009 cohort ( $p < .001$ ). Patients who received radiation therapy had worse overall survival (OS) than patients who received surgical therapy ( $p < 0.001$ ). On multivariable analysis, patients who received radiation therapy had worse OS (HR 1.29) after adjusting for year of diagnosis, AJCC stage, age, sex, subsite, race, and marital status. **Conclusions:** The use of radiation therapy in the management of patients with early stage laryngeal cancer has significantly increased over time. Surgical therapy leads to better survival outcomes than radiation therapy for patients with early stage laryngeal cancer. Patients need to be made aware of the modest but significant survival disadvantage associated with radiation therapy as part of the shared decision making process during treatment selection.

## 95. William W. Montgomery, MD Resident Research Award

### Detection of Circulating Thyroid Tumor DNA in Patients with Thyroid Nodules

Krupal B. Patel, MD, London, ON Canada; John W. Barrett, PhD, London, ON Canada; John Yoo, MD, London, ON Canada; Kevin Fung, MD, London, ON Canada; S. Danielle MacNeil, MD, London, ON Canada; Anthony C. Nichols, MD, London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants will be able to explain the role of circulating tumor DNA in thyroid nodules and their role in detecting thyroid cancer.

**Objectives:** Detection of circulating tumor DNA (ctDNA) in cancer patients can potentially serve as an ultra-sensitive test of disease status. Although well described in other cancers, ctDNA has largely not been investigated in thyroid disease with the exception of a small pilot study. The purpose of this study was to determine the ability to detect BRAF(V600E) mutations in the plasma of patients with thyroid nodules, with the goal of distinguishing between benign and malignant nodules. **Study Design:** Prospective study where consecutive patients with thyroid nodules consented for surgery were approached and plasma samples were obtained preoperatively and one month postoperatively. **Methods:** Quantitative PCR was used to determine the levels of BRAF(V600E) gene preoperatively and postoperatively. These were compared to formalin fixed samples from the index nodule. **Results:** Thirty-nine pairs of preoperative and postoperative plasma samples were collected and analyzed. On final pathology 11 patients had benign thyroid nodules, 18 had classical papillary thyroid cancer (PTC), 9 had non-classical PTC, and 3 had follicular thyroid cancer. Total of 7 (17.9%) patients had detectable BRAF (V600E) mutations preoperatively: 5/18 (27.8%) had classical PTC and 2/11 (18.2%) had benign thyroid

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nodules. 6/7 (85.7%) of them had no detectable BRAF(V600E) postoperatively while the remaining patient had a significant decline in his levels. Higher T-stage in papillary thyroid cancer was associated with positive BRAF(V600E) ctDNA ( $p < 0.05$ ). **Conclusions:** BRAF(V600E) circulating thyroid tumor DNA can be detected in plasma. Although, BRAF(V600E) mutations were seen in both tumor and benign samples, postoperative drop in ctDNA BRAF(V600E) levels in all cases suggest its utility as a tumor marker.

## 96. A Case of Pseudarthrosis in Eagle Syndrome and Review of the Literature

Ann W. Plum, MD, Syracuse, NY; Naushad M. Khakoo, MD, Syracuse, NY; Grace T. Wu, MD, Syracuse, NY; Mark F. Marzouk, MBBCH, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe Eagle syndrome, its clinical manifestations and treatment, as well as be aware that extensive calcification of the stylohyoid ligament and elongated styloid process can lead to the formation of a pseudarthrosis.

**Objectives:** 1) To describe a case of Eagle syndrome with extensive calcification of the stylohyoid ligament and elongated styloid process with the presence of a pseudarthrosis; and 2) to provide a review of the prior literature on Eagle syndrome. **Study Design:** Case report and review of the literature. **Methods:** This is a retrospective description of a single case of Eagle syndrome at a single academic institution as well as review of the available literature in PubMed on Eagle syndrome. **Results:** Here, we describe a case of Eagle syndrome in a patient who had significant odynodysphagia due to compression of the lateral pharyngeal wall by a thick and densely calcified stylohyoid and elongated styloid. Due to the extensive calcification, a transcervical excision was performed. Intraoperatively, a pseudarthrosis was noted in the middle of the stylohyoid. A malleable retractor is usually placed underneath the styloid and stylohyoid to protect the pharyngeal wall and carotid artery. However, in this case, the thickness of the stylohyoid and styloid prevented placement of a malleable retractor. Therefore, we disarticulated the pseudarthrosis and were able to complete the excision without any complications. The patient subsequently did well postoperatively with resolution of his odynodysphagia. **Conclusions:** The presence of a pseudarthrosis in Eagle syndrome should always be noted as disarticulation of the pseudarthrosis can be useful when excising a stylohyoid ligament that is densely calcified.

## 97. Design of a Biocompatible Hydrogel Cell Capsule for Use in Salivary Gland Tissue Engineering Applications

Swati Pradhan-Bhatt, PhD, Newark, DE; Robert L. Witt, MD, Newark, DE (Presenter); Xian Xu, PhD, Newark, DE; Daniel A. Harrington, PhD, Houston, TX; Xinqiao Jia, PhD, Newark, DE; Mary C. Farach-Carson, PhD, Houston, TX

**Educational Objective:** At the conclusion of this presentation, the participants will have learned about the progress toward development of a tissue engineered salivary gland and understand the challenges involved in choosing the correct biomaterial scaffold and its desired mechanical properties. Participants will also learn about in vivo models and be able to discuss the need for regeneration of artificial tissues/organs, especially in the area of head and neck, as they are often lost due to cancer and radiation treatments.

**Objectives:** Develop a biocompatible hydrogel capsule for use in an implantable salivary gland for patients suffering from post-radiation xerostomia. **Study Design:** Reconstruction of functional salivary glands builds on generation of cell laden mini-modules (MMs) that reconstitute glandular secretory units when encased within a mechanically stable, yet biodegradable hydrogel capsule that persists long term in vivo. Survival of such hydrogel implants requires stable vasculature. The ability to recruit and allow host blood vessel infiltration was evaluated in a rat model. **Methods:** We developed a scaffold that combines thiolated and acrylated hyaluronate to produce a mechanically stronger, porous, hydrogel than the encased, soft MMs used to house salivary structures. Test capsules were implanted in rat parotid resection model and stability and biocompatibility were evaluated over 5 weeks in vivo under conditions that permitted blood vessel infiltration. **Results:** The test capsule, with an elastic modulus of 260Pa, provided a stiffer gel than the cell containing MMs at 60Pa. Immunocompetent rats with implanted hydrogel capsules in their resected parotid bed showed no inflammation over 5 weeks during which implants were retained with minimal degradation. Blood vessels were seen around the implant at all time-points, but no infiltrating vessels were observed within hydrogels. **Conclusions:** A stable, biocompatible and biodegradable hydrogel capsule for use in a modular hydrogel implant was identified. Ongoing studies included angiogenic growth factor loaded hydrogel particles to encourage vascular infiltration into the capsule. The modular hydrogel culture system reported here will aid long term survival and retention of salivary structures in vivo, and assist development of a tissue engineered salivary gland.

**98. Perioperative Glucose Levels and Complications in Patients Undergoing Microvascular Reconstruction**

Katherine K.S. Rieth, MD, Rochester, NY; Mark A. Miller, BS, Rochester, NY; Mark A. Merkley, MD PhD, Rochester, NY; Paul D. Allen, PhD, Rochester, NY; Matthew C. Miller, MD, Rochester, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of perioperative glucose levels in patients who have undergone a surgical procedure involving microvascular reconstruction in regard to complications, including flap failure.

**Objectives:** Glycemic control and surgical outcomes in research outside of otolaryngology suggest the importance of perioperative glycemic control as a risk factor for complications, with or without a preexisting diagnosis of diabetes. A growing body of research within the field of otolaryngology has established the importance of diabetes as a risk factor in head and neck cancer patient outcomes and complications. There remains an unexplored role for closely controlled perioperative glucose levels in all patients, with and without diabetes, to reduce complications, including flap failure. The objective of this study is to determine if elevated perioperative blood glucose levels in patients undergoing microvascular reconstruction are associated with increased complications, including flap failure. **Study Design:** Retrospective case series from a single institution of microvascular reconstruction procedures completed between 2011-2014. **Methods:** 125 head and neck microvascular reconstruction procedures from 2011-2014 performed at a single institution were identified and surgical outcomes, demographics, comorbidities and blood glucose measurements recorded between postoperative day 0-7 were abstracted from the patients' medical records. Logistic regression analyses were performed between peak and average glucose levels and the occurrence of medical and surgical complications, including flap failure. Patient demographics and comorbid conditions were also investigated. **Results:** Preliminary analysis does not suggest a statistically significant increase in free flap complications associated with increased perioperative glucose levels. However, the previously reported association between diabetes and increased surgical complications was replicated. **Conclusions:** These data do not indicate an association between elevated blood glucose levels in the perioperative period and increased risk for complications, including flap failure. However, diabetic patients undergoing free flap procedures may be at higher risk of complications for other reasons, as yet unidentified.

**99. Isolated Mesenteric Metastasis from Head and Neck Cancer of Unknown Primary**

Zain H. Rizvi, MD, Los Angeles, CA; Dinesh Chhetri, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the clinical and radiographic manifestations of mesenteric and small bowel metastasis from head and neck cancers.

**Objectives:** Describe a rare metastatic site of head and neck cancer. Discuss the clinical, diagnostic, and therapeutic options for mesenteric and small bowel metastases. **Study Design:** Case report including a radiological and histopathologic analysis as well as review of the literature. **Methods:** A case is described from a university affiliated hospital. Clinical, radiographic, and histologic details are described. A review of the literature including clinical manifestations, incidence, and prognosis is provided. **Results:** This case describes a male with a 2 month history of unilateral neck adenopathy. FNA biopsy of the lesion demonstrated squamous cell carcinoma. Clinical and radiographic workup was suggestive of a possible oropharyngeal primary. During his workup, he developed severe abdominal pain and oral intolerance and PET-CT demonstrated scattered mildly FDG avid lymph nodes in the mesentery. CT guided biopsy of these lesions demonstrated metastatic squamous cell carcinoma favoring head and neck primary. **Conclusions:** Mesenteric and gastrointestinal metastasis from head and neck cancer is a relatively rare phenomenon. This case describes mesenteric metastases without any metastatic lesions noted elsewhere. The initial symptom solely manifested as abdominal pain and oral intolerance and other diagnoses for his symptoms were entertained until histologic confirmation of metastasis was noted. This highlights the vast spectrum of metastatic potential and the need for rigorous and thorough evaluation and surveillance.

**100. Malignant Transformation of Warthin Tumor Presenting as a Satellite Lesion to the Skin**

Stefani M. Schwartz, Hershey, PA; Shivani Shah, MD, Hershey, PA; Genevieve A. Andrews, MD, Hershey, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand that Warthin tumor (WT) has potential to transform into mucoepidermoid carcinoma (MEC) in rare cases; 2) demonstrate that

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cutaneous mucin producing adnexal neoplasms can have similar appearance to MEC on histology; and 3) exercise caution when evaluating and identifying cutaneous lesions of the head and neck.

**Objectives:** 1) To report a unique case of a parotid gland mucoepidermoid carcinoma ex-Warthin tumor; and 2) to discuss pitfalls in the histologic diagnosis of extraparenchymal mucoepidermoid carcinoma. **Study Design:** Case report and literature review. **Methods:** A 47 year old gentleman presented with a history of recurrent left postauricular cyst. Excisional biopsy was histologically consistent with an adnexal mucin producing carcinoma. Based on the malignant diagnosis, and subsequent imaging, the patient underwent further resection of the skin, parotid and cervical lymph nodes which ultimately revealed extraparenchymal extension of a superficial parotid mucoepidermoid carcinoma arising in a Warthin tumor. An initial literature review was conducted of all articles published on this topic between 1995 and 2015. Nine reports of mucoepidermoid carcinoma arising within Warthin tumor were identified and systematically reviewed. **Results:** Of the 9 reported cases of mucoepidermoid carcinoma ex-Warthin tumor, none have identified extraparenchymal extension to the skin as the presenting finding, nor has the confounding histologic diagnosis of mucinous carcinoma been previously described. **Conclusions:** Warthin tumor is one of the most common benign tumors of the parotid gland. Malignant transformation is extremely rare, and very few cases of transformation to mucoepidermoid carcinoma have been reported. Histologically, cutaneous mucin producing adnexal neoplasms can have a similar appearance to mucoepidermoid carcinoma extending to skin. In the clinical setting, cutaneous lesions of this type arising in the head and neck, especially those which are multiple or recurrent, should be carefully reviewed as potential extension or metastasis of primary lesions located elsewhere.

## 101. Quality of Life and Functional Outcomes of TORS without Adjuvant Radiation Therapy for Oropharyngeal Cancer

Rishabh Sethia, BS, Columbus, OH; Nicole V. Brown, MS, Columbus, OH; Matthew Old, MD, Columbus, OH; Amit Agrawal, MD, Columbus, OH; Theodoros N. Teknos, MD, Columbus, OH; Enver Ozer, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the quality of life, functional, and clinical outcomes of patients with oropharyngeal cancer who undergo TORS alone to those who had TORS with adjuvant RT or CRT.

**Objectives:** To compare quality of life (QOL) of patients who underwent transoral robotic surgery (TORS) with adjuvant radiation therapy (RT), adjuvant chemoradiation therapy (CRT), or no adjuvant therapy in the treatment of oropharyngeal cancer. **Study Design:** Prospective cohort study. **Methods:** Medical records were reviewed for 112 patients treated for oropharyngeal cancers at a tertiary care academic center from April 2008 to July 2015. Patients were administered the Head and Neck Cancer Inventory (HNCI) to evaluate QOL preoperatively, and at 3 weeks, 3 months, 6 months, and 1 year post-surgery. QOL data was compared between 14 patients treated with TORS alone, 31 with adjuvant RT, and 67 with adjuvant CRT by a linear mixed effects model. Demographic, clinicopathologic, and followup data were also collected. **Results:** Mean followup was 35 months. The HNCI response rates at 3 weeks and 3, 6, and 12 months were 80%, 60%, 55%, and 46%, respectively. Eating scores for TORS alone were significantly higher than for adjuvant RT or CRT at 3 and 6 months post-surgery. Patients with TORS alone and adjuvant RT had higher social function when compared to adjuvant CRT at 3 months. There were no statistically significant differences ( $p < .05$ ) in overall QOL, speech, or aesthetics at any time point. **Conclusions:** Patients with oropharyngeal cancer treated with TORS alone maintain higher QOL than with adjuvant RT or CRT in eating and social function following surgery. Adjuvant RT and CRT appear to negatively affect QOL, suggesting a potential need for deintensification of radiation or chemotherapy to preserve postoperative patient function.

## 102. A Potential Role for Pioglitazone in the Chemosensitization of Human Sinonasal Undifferentiated Cancer Cells (SNUC)

Wade G. Swenson, MD, Minneapolis, MN; Beverly R. Wuertz, BS, Minneapolis, MN; Wendy A. Miller, MS, Minneapolis, MN; Frank G. Ondrey, MD PhD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the potential role for pioglitazone as a chemosensitization agent in the treatment of SNUC.

**Objectives:** Sinonasal undifferentiated cancer (SNUC) is an aggressive malignancy with median survival time of less than 18 months. Chemotherapy plays a central role in treatment. In multiple other cancers, PPAR<sup>3</sup> activation results in increased differentiation and apoptosis, and in some cases chemosensitization has been demonstrated. No prior study

has evaluated PPAR $\alpha$  in SNUC. We aimed to 1) determine if pioglitazone was able to effectively activate PPAR $\alpha$  in SNUC cells; 2) assess whether cisplatin and pioglitazone co-treatment further decreased cellular proliferation vs cisplatin alone in human SNUC cells; and 3) assess whether cisplatin and pioglitazone co-treatment further increased cellular apoptosis vs cisplatin alone in human SNUC cells. **Study Design:** This was a translational research project using human cell lines with in vitro experiments. **Methods:** A human SNUC cell line (MDA8788-6) was used. PPAR response element (PPREx3) reporter gene assays were utilized to measure PPAR $\alpha$  ligand binding activity. Cellular proliferation was determined using MTT assays. Cellular apoptosis was determined by measuring caspase 3/7. **Results:** A dose dependent increase in PPAR $\alpha$  ligand binding activity was seen with pioglitazone treatment of the SNUC cells. Cellular proliferation was reduced with cisplatin (2-20 $\mu$ M) treatment and an even further reduction in cellular proliferation was seen with cisplatin and 10 $\mu$ M pioglitazone co-treatment ( $P < 0.001$ ) at 48 and 72h. 10 $\mu$ M pioglitazone co-treatment with 10 $\mu$ M cisplatin also significantly increased cellular apoptosis ( $P = 0.0180$ ) when compared to cisplatin alone. **Conclusions:** We determined pioglitazone treatment increased PPAR $\alpha$  ligand binding in SNUC cells and pioglitazone decreased cell proliferation and enhanced cisplatin induced apoptosis in human SNUC cells. Further study is needed to determine whether this finding could ultimately translate to chemosensitization and improved prognosis in patients receiving chemotherapy for SNUC.

### 103. Transoral Robotic Excision of Parapharyngeal Chordoma: A Case Report

Grace Tan, MD, Baltimore, MD; Allen L. Feng, MD, Boston, MA; Jeremy D. Richmon, MD, Baltimore, MD

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) consider transoral robotic surgery as a minimally invasive approach to the resection of parapharyngeal chordoma; 2) compare a transoral robotic approach to other approaches such as transnasal and transmaxillary; and 3) discuss the risks and benefits of a transoral robotic approach to the parapharyngeal space.

**Objectives:** We aim to demonstrate that the transoral robotic surgery (TORS) approach is feasible for the excision of parapharyngeal chordomas. **Study Design:** Case report. **Methods:** A video of the surgery was recorded and his intra-operative and postoperative course was reviewed. **Results:** We present a case report of recurrent clival chordoma in the parapharyngeal space resected via a transoral robotic approach. This is a 78 year old man who previously underwent resection of clival chordoma 4 years ago via an expanded endonasal endoscopic approach. He was treated with radiation postoperatively but had a recurrence around the right longus colli muscle. Intraoperatively, the mass was removed en bloc with clear margins. The patient tolerated the procedure well and was discharged on postoperative day one tolerating a full liquid diet. He experienced pain and neck stiffness while recovering but had no postoperative complications. **Conclusions:** Depending on the location and extent of the tumor, TORS may be a feasible approach to resection of recurrent clival chordoma in the parapharyngeal space. This approach is safe, minimally invasive, has limited morbidity, and has a rapid postoperative recovery.

### 104. Increasing Use of the Surveillance, Epidemiology, and End Results Database in Otolaryngology

James A. Teng, MD, Charlottesville, VA; Mark J. Jameson, MD PhD, Charlottesville, VA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the limitations of studies using large medical registries and become aware of possible discrepancies between results drawn from registries when compared to randomized controlled studies.

**Objectives:** The Surveillance, Epidemiology, and End Results (SEER) database is a large registry containing cancer related demographics and health data. The number of studies utilizing SEER data has increased in recent years. This study seeks to identify inconsistent results between SEER studies and prospective, randomized controlled studies that may affect real world practices. **Study Design:** Literature review. **Methods:** PubMed search of literature using the MeSH search terms ("SEER Program"[Mesh]) AND "Head and Neck Neoplasms"[Mesh]. Additional search terms ("SEER Program"[Mesh]) AND "Head and Neck Neoplasms/therapy"[Mesh] were used to identify articles pertaining to therapy. Searches for non-SEER studies were performed using an internet search engine. These studies were reviewed and the conclusions of SEER studies were compared to non-SEER studies. **Results:** A total of 424 studies using the SEER database were identified on the PubMed database. Over half of the studies (242) were published between 2010 and 2014. We identified conclusions from the SEER database that contradicted conclusions from published prospective studies. Some conclusions from the SEER database were not corroborated by other papers using the same database. **Conclusions:** The SEER database is a valuable tool utilizing a very large dataset. However, results from these studies should not replace prospective and randomized studies. Readers should carefully interpret results from SEER studies.

# Posters

## 105. Length of Stay and Cost after Total Laryngectomy in the United States: Analysis of Health Care Disparities Based on Insurance Status

Richard W. Thompson, MD, Shreveport, LA; Jose M. Flores, MPH, Baltimore, MD; Cherie-Ann O. Nathan, MD FACS, Shreveport, LA; Vikas Mehta, MD FACS, Shreveport, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the difference in length of stay (LOS) between Medicaid and other payer sources and discuss how preoperative identification of insurance status contributes to a reduction in LOS and more efficient use of health care resources.

**Objectives:** The presence of disparities in health care is an ongoing, multifaceted and well documented problem. Medicaid and uninsured populations anecdotally incur higher cost and length of stay (LOS) for nonmedical, discharge related issues. This study investigated the relationship between primary payer source and LOS/cost, after controlling for medical related factors, in total laryngectomy (TL) patients. **Study Design:** The sample includes 4,128 patients undergoing TL in the 2005-2010 National Inpatient Sample. Patients were categorized into 4 subgroups based on primary payer status: Medicare, Medicaid, uninsured, and private insurance. **Methods:** Multilevel regression analysis examined differences in LOS and total hospitalization costs, adjusting for individual and hospital factors. Weighting maximized national generalizability. **Results:** Sample age mean was 62.8 year and 80.5% were male. The unadjusted median LOS was similar across groups. Differences manifested in the upper quartile of LOS: Medicaid patients had the largest interquartile range (IQR 7-18) compared to Medicare (7-17), uninsured (7-16), and privately insurance (7-13). After adjustment, the odds of being in the top quartile of LOS increased for Medicaid patients by 41% (OR = 1.41; 95% CI 1.03 - 1.92) compared to privately insured patients. Unadjusted median cost was highest for Medicare (\$73,232) compared to Medicaid (\$71,267), private insurance (\$63,763) and uninsured individuals (\$62,151). However, unlike LOS, adjusted costs were not significantly different across insurance groups. **Conclusions:** Based on the study, while controlling for other variables, Medicaid patients do have increased length of stay. While overall costs were highest for those with public insurance, no difference was seen for the adjusted cost.

## 106. Clear Cell Hidradenocarcinoma of the Skin: A Case Report and Literature Review of a Rare, Highly Malignant Lesion

Kiranya E. Tipirneni, BA, Jefferson, LA; Grayson M. Gremillion, MD, New Orleans, LA; Blythe E. Bowman, MD, Jefferson, LA; Christian P. Hasney, MD, Jefferson, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize clear cell hidradenocarcinoma as a rare, yet highly malignant lesion and discuss relevant treatment options, which often include aggressive surgical management.

**Objectives:** The aim of this report is to increase awareness of clear cell hidradenocarcinoma (CCH), a rare disease in head and neck pathology, by discussing its clinical course, histological features, diagnosis, and management options. **Study Design:** Retrospective case report. **Methods:** The medical records of a patient with CCH were reviewed at a tertiary medical center. The PubMed database was searched for clear cell hidradenocarcinoma and keywords malignant and eccrine carcinoma. **Results:** Here we report a case of a 59 year old female who presented with a nonspecific lesion of her right cheek. She underwent wide local excision (WLE) by an outside otolaryngologist, which demonstrated CCH, and was referred to us for definitive management. One month postop, patient developed a swollen right neck mass and underwent repeat WLE with right parotidectomy and modified radical neck dissection, which subsequently revealed 3 nodes positive for metastatic clear cell carcinoma. **Conclusions:** CCH is a rare tumor of eccrine gland origin uncommonly described in the literature. Malignant eccrine tumors occur in one out of every 13,000 dermatopathological biopsies. CCH commonly presents as a centrally ulcerated subcutaneous nodule that is often confused for skin carcinomas. Due to their clinical rarity and resemblance to other malignancies, misdiagnosis is common and presents a difficult challenge to management. Though there is no standard management protocol, CCH should be treated aggressively with complete surgical resection as they are prone to both local recurrence and metastasis in greater than 50% of previously reported cases. Despite surgical management, a 5 year disease free survival is reported in less than 30% of patients.

107. **Intranasal Eosinophilic Angiocentric Fibrosis: A Rare and Suspicious Appearing Lesion**  
Kiranya E. Tipirneni, BA, Jefferson, LA; Virginia M. Plauche, MD, New Orleans, LA; Christian P. Hasney, MD, Jefferson, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to consider appropriate differential diagnoses and recognize the potentially destructive nature of a benign lesion and discuss effective treatment options.

**Objectives:** The aim of this report is to describe a case of eosinophilic angiocentric fibrosis (EAF) and raise its awareness in head and neck pathology by discussing its clinical course, histological features, diagnosis, and management options. **Study Design:** Retrospective case report. **Methods:** The medical records of a patient with EAF were reviewed at a tertiary medical center. The PubMed database was searched for keywords eosinophilic angiocentric fibrosis and intranasal. **Results:** Here we report a case of intranasal EAF in a 49 year old male who presented with a several month history of right sided lateral nasal skin swelling and a 10 year history of chronic congestion. On physical examination, patient had a non-pigmented, rubbery right sided nasal skin lesion. Nasopharyngoscopy revealed a submucosal intranasal lesion of the right middle vault. Punch biopsy and fine needle aspiration revealed no malignancy. Final pathologic diagnosis after surgical excision revealed extensive perivascular onion skin fibrosis, consistent with EAF. A comprehensive review of the literature revealed less than 60 reported cases of EAF. **Conclusions:** EAF is a benign fibrosing vasculitis of unknown etiology that affects mucosal surfaces of the sinonasal and upper respiratory tracts. Patients commonly present during the fifth and sixth decades of life with chronic symptoms of nasal obstruction, sinusitis, epistaxis, and breathing difficulties. The nonspecific presentation and rarity of disease should raise suspicion of more common differentials, including Wegener's granulomatosis, Churg-Strauss syndrome, and granuloma faciale. Although the clinical course is slow growing, management remains challenging due to difficulties in establishing diagnosis and high risk of recurrence with a propensity for progressive local destruction.

108. **Squamous Cell Carcinoma Arising in Epidermodysplasia Verruciformis: Case Report and Literature Review**  
Chelsea A. Troiano, MD, Boston, MA; Ali Al-Haseni, MB ChB, Boston, MA; Debjani Sahni, MD, Boston, MA; Sharukh Jalisi, MD FACS, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate their knowledge of HPV subtypes important in epidermodysplasia verruciformis (EDV) malignant degeneration, explain the workup for cutaneous squamous cell carcinoma and discuss the clinical conundrum of radiation therapy for high risk disease in EDV patients.

**Objectives:** Epidermodysplasia verruciformis (EDV) is a rare autosomal recessive skin condition that predisposes patients to HPV infection and are at high risk for squamous cell carcinoma (SCC). We report a case of forehead SCC in a 24 year old patient with EDV and review the literature regarding the diagnosis, management and outcomes. **Study Design:** Retrospective chart review and review of the literature via a PubMed search. **Methods:** The patient's medical record was reviewed and photographs were taken. The PubMed search was performed using epidermodysplasia verruciformis. **Results:** The patient had a two year history of a right forehead lesion which slowly grew and became ulcerated. Physical exam showed a 5x7 cm deep ulcerated plaque with a pink base and foci s of necrosis. Frontalis was immobile on the right. There was a history of rash since infancy consisting of hypopigmented macules scattered over the torso and raised flat warts on the dorsum of the hands and feet. The patient underwent wide local excision, right superficial parotidectomy, selective neck dissection with radial forearm free flap reconstruction. Tumor board discussed postoperative radiation given facial nerve involvement. Literature review suggests avoiding radiation as this increases recurrence and malignant transformation of other lesions. **Conclusions:** Treatment of cutaneous squamous cell carcinoma is wide local excision with lymph node dissection based upon imaging studies. Radiation is recommended for patients with high risk features which contradicts the most recent literature which does not recommended radiation for patients with EDV.

109. **Use of Implantable Venous Flow Coupler in Head and Neck Free Flap Reconstruction**  
Scott H. Troob, MD, Portland, OR; Deniz Gerecci, MD, Portland, OR; Javier D. Gonzalez, MD, Portland, OR; Daniel Petrisor, MD, Portland, OR; Mark K. Wax, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the utility of the flow coupler for postoperative monitoring of free flaps in head and neck reconstruction.

# Posters

**Objectives:** To describe the use of flow couplers to detect venous thrombosis of free flaps in head and neck reconstruction. **Study Design:** Retrospective review of flow couplers implanted between July 2014 and July 2015. **Methods:** Rates of flap revision, salvage, and failure were compared between patients receiving flow couplers and those who did not. The false positive rate (FPR), true positive rate (TPR), and false negative rate (FNR) of signal loss were determined for the flow coupler group. **Results:** Of 142 flaps performed during the study period, 72 patients received flow couplers, while 70 patients were monitored by Cook-Schwartz Doppler. The rate of take-back was 14% (10/72) in the flow coupler group and 10% (7/70) in the non-flow coupler group (P= 0.6066). In 1 patient, complete loss of flow coupler signal identified venous kinking during initial surgery. Complete loss of signal correctly indicated venous thrombosis upon take-back of 10 patients. Venous signal was transiently lost postoperatively in 2 patients whose flaps were ultimately viable. The FNR was 0%, the FPR 3.3%, and the TPR 100%. Rate of flap salvage was 43% (3/7) in the non-flow group, and 80% (8/10) in the flow coupler group (P= 0.1618). Flap failure rates were 5.7% (4/70) in the non-flow group and 2.8% (2/72) in the flow coupler group (P= 0.4381). **Conclusions:** Complete loss of venous flow coupler signal correlated with venous thrombosis. The flow coupler is a viable option for the postoperative monitoring of free flaps and is associated with a high salvage rate.

110. **More than Just Tissue Diagnosis in a Patient with Maxillofacial Bony Lesions and Hypercalcemia**  
Andrew M. Vahabzadeh-Hagh, MD, Los Angeles, CA; Jon Mallen-St. Clair, MD PhD, Los Angeles, CA; Bob B. Armin, MD, Los Angeles, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of what brown tumors are, how they typically present, and what causes them. They will be able to discuss the findings of these lesions clinically, on histopathology, and radiographically. They will also demonstrate a thorough understanding of the workup of such lesions as well as the therapeutic options for this terminal stage of hyperparathyroidism.

**Objectives:** Brown tumors are a definitive feature of hyperparathyroidism, whether primary or secondary. They are well demarcated osteolytic lesions commonly in the appendicular skeleton. They are composed of giant cells within a fibrovascular stroma with foci of hemorrhage from which they get their color and name. Primary hyperparathyroidism at present is most often suggested by hypercalcemia and hypophosphatemia on routine lab tests. Much more rarely do these cases present with a craniofacial mass. Here we detail a case presenting with a growing mass along the maxilla associated with loosened dentition. **Study Design:** A case report and literature review. **Methods:** We investigate a unique presentation of terminal stage primary hyperparathyroidism emphasizing the importance of a broad differential diagnosis and thorough workup. **Results:** 45 year old female with several months of a growing mass of the left maxilla now with loose teeth, pain, and bleeding. She details a 2 year history of diffuse bone pain, headaches and mood swings. Labs include calcium of 14.4 mg/dL, phosphorous 2.0 mg/dL, and PTH of 1202 pg/mL. 4D parathyroid CT scan demonstrates 1.5 cm hyperenhancing mass subjacent to the right thyroid gland and multiple lytic lesions within the mandible and maxilla with arterial phase hyperenhancement. Biopsy of the maxilla was suggestive of a brown tumor. Parathyroidectomy retrieved a 1.5 gram parathyroid adenoma with subsequent laboratory and clinical improvement. **Conclusions:** Hyperparathyroidism can present in very unique ways. As an otolaryngologist in the frontline we must think beyond just tissue diagnosis so that appropriate and expedited care may be implemented.

111. **Atypical Spindle Cell Neoplasm of the Nasal Sidewall**  
Varun V. Varadarajan, MD, Gainesville, FL; William O. Collins, MD, Gainesville, FL; Raja Sawhney, MD, Gainesville, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to review the uncommon spindle cell neoplasms of the head and neck, present a unique case of a rare spindle cell neoplasm of the nasal sidewall, and present a reasonable treatment plan that may assist other clinicians.

**Objectives:** To review the uncommon spindle cell neoplasms of the head and neck, report the case of a rare spindle cell neoplasm, and present a reasonable treatment plan that may assist other clinicians. **Study Design:** Case report and literature review. **Methods:** The medical records of a ten year old patient with an uncommon spindle cell neoplasm of the nasal sidewall were reviewed. The PubMed database was searched for literature describing the uncommon spindle cell neoplasms of the head and neck with the key words "spindle cell" or "atypical spindle cell" with "head and neck", "nasal", "nose", or "sinus." **Results:** A ten year old female patient presented with an atypical spindle cell neoplasm of the nasal sidewall that did not fit the morphological or immunohistochemical characteristics of well known diagnostic entities. The lesion recurred twice, requiring extensive nasal sidewall resection and left paramedian forehead flap reconstruction.

Given the patient's age, rarity and location of the lesion, as well as psychological impact of cancer resection, decisions regarding cancer surveillance and reconstructive timing and technique were difficult and required cautious oncologic, psychological, and surgical management strategies. She continues to undergo monitoring and has had multiple revision surgeries. She has not had a third recurrence of her malignancy to date. **Conclusions:** Spindle cell neoplasms remain a diagnostic challenge and an invasive lesion may not resemble well known oncological diagnoses. For child or adolescent patients that are suffering similar conditions with a significant defect after cancer resection, we recommend a multidisciplinary approach to management, frequent contact and followup with family, and early involvement of psychology.

## 112. Cervical Mature Teratoma Masquerading as a Thyroglossal Duct Cyst

Denny Varughese, BA, Brooklyn, NY; Lyuba Gitman, MD, Brooklyn, NY (Presenter); Raavi Gupta, MD, Brooklyn, NY; Charles Shao, MD PhD, Brooklyn, NY; Joshua B. Silverman, MD PhD, Brooklyn, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the presenting characteristics, radiological characteristics, origins, and pathological findings of a mature cervical teratoma.

**Objectives:** Teratomas of the cervical neck are rare tumors which usually occur in children. We describe a case of a mature cervical neck teratoma in an adult patient undergoing anterior neck mass excision and concurrent left hemithyroidectomy for treatment of a follicular neoplasm and review the literature regarding cervical teratomas. **Study Design:** Case report and review of literature via PubMed and Cochrane searches. **Methods:** The medical records of a patient treated for cervical teratoma and thyroid follicular neoplasm were reviewed with PubMed and Cochrane searches using the terms cervical teratoma, neck mass, thyroid mass, thyroid neoplasm, thyroid carcinoma, and various combinations of the terms were performed. **Results:** In this case, the patient presented with a several month history of a slowly enlarging anterior neck mass as well as a thyroid gland mass. She underwent surgical excision of both. Pathology of the anterior neck mass showed a mature cervical teratoma. This is to our knowledge, the first case reported in literature of a concurrent thyroid follicular neoplasm with papillary thyroid carcinoma and a cervical teratoma. **Conclusions:** Cervical teratomas should be included in the list of differential diagnoses for an anterior neck mass, with increased suspicion if CT scan demonstrates heterogeneous content, including lipid and calcifications. Due to their propensity to consist of almost any type of tissue, they can often mimic more common pathologies. Pathological analysis is essential to rule out malignancies and other concerning diagnoses. Treatment should include complete surgical excision to obtain a final pathological diagnosis.

## 113. Extracapsular Dissection with Facial Nerve Dissection for Benign Parotid Tumors

Robert L. Witt, MD, Newark, DE

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare extracapsular dissection with facial nerve dissection to partial superficial parotidectomy with facial nerve dissection, and extracapsular dissection without facial nerve dissection.

**Objectives:** To describe technique and outcomes for extracapsular dissection with facial nerve dissection for benign parotid tumors, a technique not previously reported, where the facial nerve is dissected, unlike the published techniques on extracapsular dissection, where the facial nerve is not dissected. **Study Design:** Retrospective analysis, single institutional, single practice surgeon. **Methods:** Retrospective analysis performed for tumors that underwent extracapsular dissection with facial nerve dissection, nerve monitoring, FNAC, and frozen section between 2006 and 2015. The results in this series of extracapsular dissection with facial nerve dissection are compared to the author's previously published series of partial superficial parotidectomy with facial nerve dissection for recurrence, permanent and transient facial nerve dysfunction, subjective Frey's syndrome, and sialoceles. **Results:** 108 benign tumors underwent extracapsular dissection with facial nerve dissection. There were 44 pleomorphic adenomas, 8 other parotid adenomas, and 56 Warthin's tumor. There were no recurrences for parotid adenomas thus far during the study period, with mean followup of 4.5 (range 1-9) years. There were no cases 0/108 (0%) of permanent facial nerve dysfunction; 4/108 (4%) with transient lower facial nerve dysfunction; subjective Frey's syndrome occurred in 5/108 (5%); and sialoceles in 9/106 (8%). Subjective residual periauricular numbness occurred in 108/108 (100%). **Conclusions:** Extracapsular dissection with facial nerve dissection for benign parotid tumors resulted in lower rates of transient facial nerve dysfunction, Frey's syndrome, and sialoceles than partial superficial parotidectomy without increasing the risk of permanent facial nerve dysfunction and thus far recurrence. Residual periauricular numbness persists.

# Posters

## 114. Fungal Contribution in Chondroradionecrosis of the Larynx

Mary L. Worthen, MD, Louisville, KY; Andrew Vaughn, MD, Louisville, KY; Mia Jusufbegovic, MS, Louisville, KY; Elizabeth Cash, PhD, Louisville, KY; Jeffrey M. Bumpous, MD, Louisville, KY; Paul A. Tennant, MD, Louisville, KY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the pathophysiology of chondroradionecrosis and demonstrate the potential role of fungus in the etiology and progression of the disease.

**Objectives:** To assess the prevalence of invasive fungal elements in salvage total laryngectomy specimens of patients who underwent primary radiotherapy and subsequently developed chondroradionecrosis and nonfunctional larynx in the absence of recurrent or persistent malignancy. **Study Design:** Retrospective chart review. **Methods:** One hundred fifty-nine patients were identified who underwent salvage total laryngectomy. Pathology reports were reviewed, and all laryngectomy specimens that did not contain residual malignancy were reevaluated for evidence of invasive fungal elements. **Results:** Twelve of 159 (7.5%) patients who underwent total laryngectomy after primary radiotherapy or chemoradiotherapy had no evidence of residual malignancy. Each of these specimens contained histopathologic evidence of chondronecrosis; invasive fungal elements were identified in 25%. There was no statistical difference in demographic or treatment related variables between patients who had persistent or recurrent malignancy and patients who underwent total laryngectomy without evidence of residual or recurrent malignant disease. Patients with evidence of ulceration or necrosis in the laryngectomy specimen had reduced overall survival, irrespective of the presence of persistent malignancy (OR=2.923, 95% CI=1.023-8.352, p=.045). **Conclusions:** Among salvage total laryngectomy patients, there was no difference between those who had malignancy identified in their pathology specimens and those who did not. Invasive fungal elements were detected in several laryngectomy specimens that did not contain malignancy; empiric antifungal therapy may therefore benefit patients diagnosed with chondroradionecrosis who are at risk for progression to nonfunctional larynx. Patients with evidence of ulceration or necrosis in the salvage laryngectomy specimen had worse overall survival.

## 115. Hypopharyngeal Cancer Arising in a Field of Crohn's Inflammation: Case Report and Review of the Literature

Christina M. Wray, BA, Philadelphia, PA; Darshana N. Jhala, MD, Philadelphia, PA; Devraj Basu, MD PhD, Philadelphia, PA

**Educational Objective:** At the conclusion of this presentation, participants should be able to describe the head and neck manifestations of Crohn's disease as well as diagnostic, staging, and therapeutic considerations for head and neck cancer patients with extra-intestinal Crohn's manifestations.

**Objectives:** Ulcerative mucosal manifestations of Crohn's disease in the head and neck are uncommon but can share clinical and radiographic traits with head and neck squamous cell carcinomas (HNSCCs). We present a diagnostically challenging case of a HNSCC of the pyriform sinus arising within a field of active Crohn's related inflammation that was the primary cause for loss of laryngeal function. **Study Design:** Case report. **Methods:** N/A. **Results:** A 67 year old male smoker with a history of intestinal Crohn's presented with a destructive pyriform sinus lesion associated with distorted supraglottic anatomy and ipsilateral vocal fold fixation. Biopsy showed HNSCC, leading to staging as T4aN0M0 by clinical and radiologic criteria. Pathologic analysis following laryngectomy revealed a well circumscribed T2N0M0 tumor confined to the pyriform sinus, with laryngeal destruction instead arising from previously unrecognized multifocal Crohn's inflammation in continuity with the cancer. Thus no adjuvant therapy was given and durable cancer control was achieved. **Conclusions:** To our knowledge, this is the first report of a HNSCC rising within a field of active Crohn's inflammation. The case reveals challenges in integrating clinical, radiologic, and pathologic findings for accurate diagnosis and staging of a head and neck mucosal lesion in patients with Crohn's disease. The case further highlights uncertainties inherent in treating HNSCC in patients with head and neck manifestations of Crohn's. Given the association of Crohn's with intestinal malignancy, the case further raises speculation regarding head and neck Crohn's as an unrecognized risk factor for HNSCC.

**116. Does Timing of Neck Dissection and Transoral Robotic Surgery for Oropharyngeal Cancer Affect Fistula and Bleed Rates? A Systematic Review and Meta-Analysis**

Kevin Y. Zhan, MD, Charleston, SC; Zachary Farhood, MD, Charleston, SC; Elizabeth A. Nicolli, MD, Charleston, SC; Shaun A. Nguyen, MD, Charleston, SC; Terry A. Day, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand variables that influence timing of neck dissections in transoral robotic surgery for oropharyngeal cancer resection as well as what the literature reports on complication rates.

**Objectives:** Transoral robotic surgery (TORS) is seeing increased use for resectable oropharyngeal cancers. However, postoperative fistula (POF) and postoperative bleeding can be major and catastrophic complications from surgery. Some institutions stage their neck dissections (ND) after primary excision to prevent these outcomes, whereas others perform ND concurrently. A systematic review and meta-analysis of proportions was performed to investigate whether ND timing has significantly different complication rates. **Study Design:** Systematic review and meta-analysis. **Methods:** Two independent reviewers searched PubMed and Scopus for studies on TORS for oropharyngeal cancers that utilized ND and reported fistula and/or bleeding complications. **Results:** Out of 266 articles screened, 21 (n = 968 patients) were included and analyzed where applicable. A majority overall (83.0%) had concurrent ND. Sixteen and eleven articles were analyzed for POF and bleed rates in concurrent ND, compared to five and four articles in staged ND, respectively. When comparing ND timing with comparison of proportions tests, no significant difference was found comparing rate of postoperative fistulas (POF) [ $0.80\%$  (95%CI -1.96 - 1.98%),  $p = 0.64$ ] or postoperative bleeds [ $3.59\%$  (-0.70 - 6.75%),  $p = 0.12$ ]. Weighted proportions for POF and bleed were 1.34 (0.67-2.39) and 5.78 (3.79-8.42) for concurrent ND and 0.54 (0.01-3.17) and 2.20 (0.53-5.90) for staged ND, respectively. **Conclusions:** There is insufficient evidence to find a significant difference between postoperative fistula and bleed rates between concurrent and staged neck dissections for transoral robotic surgery in oropharyngeal cancer resection.

**117. Effect of Triptolide on MDM2 Expression in HPV Positive Squamous Cell Carcinoma**

Qi Zhang, MD, Minneapolis, MN; Beverly R. Wuertz, BS, Minneapolis, MN; Emiro E. Caicedo-granados, MD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to have a basic understanding of the effect of triptolide on MDM2 and P53 expression in head and neck squamous cell carcinoma. This effect will be compared between HPV positive and HPV negative cell lines in order to demonstrate the differing effects that triptolide can have depending on HPV status.

**Objectives:** 1) Assess MDM2 activity in cell lines following treatment with triptolide (TPL); 2) investigate the relationship between MDM2 and TP53 in HPV positive cell lines following exposure to TPL; and 3) examine the association between HPV status and MDM2 expression in head and neck squamous cell carcinoma (HNSCC) specimens. **Study Design:** Basic/laboratory science. **Methods:** HPV positive cell lines, UM-SCC-47 and 93-VU-147, HPV negative tumor cell line UM-SCC-11A were cultured and incubated with dimethyl sulfoxide (solvent vehicle) or triptolide (concentration range 50-200nM) at 1, 2, 4, and 24 hours. MDM2 and TP50 protein quantification was determined by Western blotting. Real time quantitative polymerase chain reaction was performed to measure fold change in MDM2 and TP53 mRNA. Immunohistochemistry was performed on 36 tumor specimens (18 HPV+/18 HPV-) using MDM2 antibody (Sigma SMP-14). **Results:** When treated with TPL, HPV positive cell lines demonstrated increased TP53 and no change in MDM2 expression, compared with HPV negative cell lines that showed significantly decreased TP53 and increased MDM2 expression ( $p < 0.05$ ). There was no difference between MDM2 total protein levels following treatment with increasing TPL titrations based on Western blot analysis. There was no significant difference in total MDM2 staining between HPV positive vs HPV negative tumor samples. **Conclusions:** We found an increase in relative expression of MDM2 with treatment of TPL in HPV negative HNSCC cell lines, whereas there was no change in MDM2 expression in HPV positive cell lines. Increased TP53 activity was also demonstrated following treatment with TPL in HPV positive cell lines. MDM2 levels did not change with treatment of TPL either in the titration or time course, suggesting an indirect relationship with p53. There was no difference in MDM2 expression based on HPV status in HNSCC tumor samples. Triptolide, a novel chemotherapeutic agent, reactivates tumor suppressor gene p53 in HPV positive HNSCC, inducing tumor cell death. MDM2 appears to play an indirect role in TPLs mechanism of action.

# Posters

## 118. Pediatric Desmoid Fibromatosis of the Parapharyngeal Space: A Case Report and Review of Literature

Zhong Zheng, MD, New York, NY; Raymond Chai, MD, New York, NY; Adrienne Jordan, MD, New York, NY; Alyssa Hackett, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the clinical presentation and diagnosis of pediatric desmoid fibromatosis and to discuss management options.

**Objectives:** This case report discusses the etiology, clinical presentation, diagnostic evaluations, pathological analysis, and surgical treatment of a large pediatric desmoid fibromatosis in the head and neck region. We review the existing literature to discuss the optimal treatment strategies of this rare disease entity and hope to raise awareness for future research. **Study Design:** Case report and literature review. **Methods:** The case of a 14 month old male with an 8 centimeter desmoid tumor in the right parapharyngeal space is reviewed. Clinical presentation, imaging studies, pathological analysis, and intraoperative findings were examined. A literature review was performed to provide an overview of diagnosis and management of pediatric head and neck fibromatosis. **Results:** A 14 month old male presented with a rapidly enlarging painless right neck mass. CT scan demonstrated a mass in the right parapharyngeal space inseparable from the right parotid gland, abutting the stylomastoid foramen and traversing the stylomandibular tunnel. Incisional biopsy and histology revealed a bland spindle cell neoplasm with collagenous stroma, consistent with nodular fasciitis versus desmoid fibromatosis. A near total resection of the mass was accomplished with retrograde dissection and preservation of the facial nerve. **Conclusions:** Pediatric desmoid fibromatosis of the head and neck is an exceedingly rare disease entity. Surgical excision with clear margins remains the mainstay of treatment, with special consideration given to preservation of function and cosmesis. Further prospective studies are needed to establish a clear role of adjuvant treatment for recurrent or progressive disease.

## Laryngology/Bronchoesophagology/Sleep Medicine

### 119. Laryngeal Spindle Cell Rhabdomyosarcoma in an Adult

Conor M. Devine, MD, Cleveland, OH; Paul C. Bryson, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the management of rhabdomyosarcoma in the head and neck.

**Objectives:** To describe a case of rare spindle cell rhabdomyosarcoma of the larynx, including presentation, management, and review of literature. **Study Design:** Case report and review of literature. **Methods:** An extensive review of the literature was performed searching for cases of reported spindle cell rhabdomyosarcoma in the head and neck in the adult population. **Results:** A 44 year old female presented with a 3 year history of hoarseness. One year ago, she was evaluated at an outside hospital where a right vocal fold mass was biopsied and shown to be a benign lesion. When her symptoms continued, she sought a second opinion and was noted to have a large smooth lesion on the mid right vocal fold with normal vocal fold motion. She underwent micro direct laryngoscopy and excision of a 0.5cm right mid vocal fold lesion. Unexpectedly, final pathology revealed spindle cell rhabdomyosarcoma. Imaging studies revealed no destruction of the laryngeal framework and no evidence of metastatic disease. An institutional multidisciplinary tumor board reviewed her case and recommended further excision to obtain oncologic margins as initial margins were microscopically positive. All subsequent margins were negative. Postoperatively, she initiated treatment with vincristine, dactinomycin, and cyclophosphamide with planned post-chemotherapy radiation. **Conclusions:** This is the first case of laryngeal spindle cell rhabdomyosarcoma reported in the literature. A rare variant of embryonal rhabdomyosarcoma, little is known about the behavior of spindle cell RMS in the adult, and no other cases have been reported arising from the larynx.

### 120. Plastic Bronchitis in a Postoperative Pediatric Patient with Congenital Heart Disease

Priya Kesarwani, MD, Rochester, NY; Margo M. Benoit, MD, Rochester, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the condition of plastic bronchitis and when it should be considered in the differential for diagnosing a child in acute respiratory distress.

**Objectives:** To discuss a rare case of acute pediatric respiratory distress due to plastic bronchitis and to review the pertinent literature. **Study Design:** Case report and literature review. **Methods:** We discuss a case of plastic bronchitis.

We present a PubMed search generated using keywords plastic bronchitis and congenital heart disease, which yielded 44 articles. This was further narrowed to 30 articles by filtering the results for English and pediatric (age 0-18 years) articles. **Results:** We present the case of a 6 year old male with congenital heart disease who underwent Fontan procedure that was complicated by hypoxia on postoperative day 18. Chest radiograph revealed complete right lung atelectasis and pleural effusion. Bedside flexible bronchoscopy demonstrated tenacious bronchial plugging. Pediatric otolaryngology emergently performed rigid bronchoscopy, revealing an obstructed right mainstem bronchus. Optical forceps were passed to remove large soft casts from the endobronchial tree, which improved respiratory parameters. Plastic bronchitis can occur in patients with asthma, with cystic fibrosis and, less commonly, after surgery for congenital heart disease. For cardiac surgical patients, the average time to developing plastic bronchitis is around 1-2 years, and prognosis is poorer with an earlier postoperative diagnosis. Proposed risk factors in pediatric cardiac surgery patients include postoperative chylothorax, chest tube insertion and ascites. Despite medical and surgical treatment strategies, overall disease specific mortality in cardiac surgery patients is 30-50%. **Conclusions:** Plastic bronchitis is a rare, potentially fatal airway condition in postoperative pediatric patients with congenital heart disease, in which extensive endobronchial casts arborize throughout the lung.

**121. Pneumoparotitis--An Increasing Concern with Use of Positive Pressure Sleep Devices**

Daniel J. Lee, BS, Iowa City, IA; Henry T. Hoffman, MD, Iowa City, IA; Joan E. Maley, MD, Iowa City, IA; Phillip C. Lee, MD, Mason City, IA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the potential link between positive pressure airway devices and pneumoparotitis.

**Objectives:** Pneumoparotitis is a rare cause of parotid swelling that may occur from retrograde insufflation of air into Stensen's duct. Previous case reports have identified occupational exposure (e.g. glass blowers or wind instrument players) and self-induced habits as the cause of salivary air insufflation. In this case report, we aim to identify use of full face positive pressure sleep devices (CPAP) as a potential cause for pneumoparotitis. **Study Design:** Case report. **Methods:** A 54 year old man with a history of obstructive sleep apnea treated with CPAP presented with a 7 month history of unilateral parotid swelling. Sialography--done with care to avoid air introduction during the study--and computed tomography (CT) were reviewed. **Results:** CT imaging with contrast showed increased homogenous enhancement of the right parotid gland. Sialography demonstrated parotid gland strictures with multiple air locules within the main parotid duct. The patient was counseled regarding the clinical findings of pneumoparotitis and potential sequelae of recurrent acute sialadenitis. He was transitioned from oral to nasal CPAP with extended course antibiotics and counseled about other options. **Conclusions:** Expanded use of positive pressure sleep devices may result in a more common occurrence of pneumoparotitis. Management options may include modifying treatment of obstructive sleep apnea or more innovative approaches to modifying Stensen's duct at its opening into the oral cavity.

**122. Corticosteroid Eluting Implant in the Management of Subglottic Stenosis**

Emily Marchiano, BA, Newark, NJ; Remy Friedman, BS, Newark, NJ; Alejandro Vázquez, MD, Newark, NJ; Evelyne Kalyoussef, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand a novel technique in the management of subglottic stenosis.

**Objectives:** Describe the novel use of corticosteroid releasing implant as adjunct therapy in the management of subglottic stenosis. Review the literature on management of subglottic stenosis (SGS). **Study Design:** Case report. **Methods:** Retrospective review of a single case of SGS in a tertiary care setting. **Results:** An 18 year old female with a history of SGS was evaluated for persistent biphasic stridor. One year earlier, she had suffered acute respiratory failure related to a drug overdose; she remained intubated for two weeks and subsequently self-extubated. Initial management for SGS consisted of awake tracheotomy, balloon dilation and resection of tracheal granuloma. Due to persistent stridor, she underwent direct laryngoscopy, resection of subglottic scar using cold instruments and placement of a PROPEL steroid releasing implant (ENT Intersect, CA), a device originally designed for sinus surgery. The patient was later successfully decannulated. **Conclusions:** Locally delivered corticosteroids may play a role as adjunct therapies in the management of SGS.

# Posters

123. **Evaluation of Surgical Outcomes for Nasal Pharyngeal Stenosis Surgery**  
Priyanka P. Patel, BA, Kansas City, KS; Jeff P. Searl, PhD CCC-SLP, Kansas City, KS; Debby B. Daniels, PhD CCC-SLP, Kansas City, KS; Brian T. Andrews, MD, Kansas City, KS

**Educational Objective:** At the conclusion of this presentation, the participants should be able to assess long term outcomes of revision pharyngoplasty.

**Objectives:** Our study examined whether VPI revision surgeries performed on subjects with nasopharyngeal stenosis improved their nasal breathing, sleep, and speech. Revision VPI surgery undergone by our subjects is believed to improve their nasal breathing and speech outcomes. **Study Design:** Retrospective chart review. **Methods:** Four subjects who underwent velopharyngeal insufficiency revision surgeries for nasal breathing and speech difficulties secondary to nasal stenosis were examined. Speech evaluations for the subjects assessed nasal emission, hypernasality and hyponasality pre- and post-revision. The ratings were given on a 1-5 scale according to the score given to the subject by the speech therapist during the encounter. The four subjects' pre-revision ratings were averaged in each of the three categories, nasal emission, hypernasality, and hyponasality respectively. The same was done for the post-revision ratings. **Results:** The subjects' average pre-revision nasal emission score was 1.1 and was .94 post-revision. The subjects' average pre-revision hypernasality score was 1.3 and was .86 post-revision. The subjects' average pre-revision hyponasality score was 2.13 and was 1.63 post-revision. When looking at average scores, nasal emission, hypernasality, and hyponasality improved post-revision. Therefore nasal breathing and speech improved due to the decrease in not only hyponasality scores, but also the decreases in hypernasality and nasal emission, which show that speech improved. **Conclusions:** All four subjects improved in nasal emission, hypernasality, and hyponasality post-revision when considering the average speech scores. On average, the revision surgery helped improve their nasal breathing and positively affected their speech.

124. **Injection Pharyngoplasty with Autologous Fat: Successful Treatment for Stress Velopharyngeal Insufficiency in Two Instrumentalists**  
Mausumi N. Syamal, MD, Cleveland, OH; Paul C. Bryson, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to become familiar with the evaluation and treatment for stress velopharyngeal incompetence (SVPI) in professional musicians.

**Objectives:** To review the evaluation of and treatment for stress velopharyngeal incompetence (SVPI) in professional musicians with lipoinjection to the posterior pharyngeal wall. **Study Design:** A retrospective and literature review. **Methods:** Two professional musicians suffering from stress VPI patients treated with autologous lipoinjection to the posterior pharyngeal wall are presented. Nasopharyngoscopy was performed in the office while playing their instrument both before and after injection. **Results:** After successful autologous lipoinjection of the posterior pharyngeal wall, both patients resumed full play with resolution of their nasal emissions and no surgical complications. One patient is now 3 years s/p lipoinjection pharyngoplasty. **Conclusions:** Stress VPI is often a career threatening condition for professional brass and woodwind musicians, with a cited incidence of 34%. Various treatment options in the literature include observation, speech and language pathology referral for pharyngeal strengthening, lipoinjection of the soft palate and more invasive options such as sphincter pharyngoplasty, pharyngeal flaps and V-Y pushback. In this review, we describe the evaluation of these patients and present a less invasive, potentially permanent treatment option for SVPI with autologous fat injection pharyngoplasty of the posterior pharyngeal wall.

125. **Reverse Phonation: A Pathologic Entity**  
Raluca T. Tavaluc, MD, Bronx, NY; Nicole Free, MS-SLP, Bronx, NY; Melin Tan, MD, Bronx, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the pathologic presentation and treatment options of reverse phonation.

**Objectives:** Reverse phonation is well recognized as a possible therapeutic intervention in certain laryngeal disorders. It is also known as a normal voicing technique in some languages. However persistent phonation during inhalation is unusual as a manifestation of paradoxical vocal cord motion. **Study Design:** We aim to report two unique cases of dysphonia secondary to reverse phonation. **Methods:** Case report of two patients with both pre- and post-intervention presentation and with review of literature on reverse phonation. **Results:** Two patients presented to our institution with a chief complaint of dysphonia and unrelenting dyspnea. Exam findings were significant for aberrant persistent adduction of the vocal folds during both quiet breathing and phonation. Phonation occurred during the inhalation phase. Both

patients underwent therapeutic measures with a speech language pathologist to redirect and retrain phonation during the expiration phase rather than inhalation phase. Subjective improvement was reflected in both stroboscopic exam and aerodynamic measurements. **Conclusions:** Persistent reverse phonation as a pathologic state is a rare entity that can be successfully redirected through therapeutic measures.

## 126. Outcomes of Tongue Base Reduction and Lingual Tonsillectomy for Residual Pediatric Obstructive Sleep Apnea after Adenotonsillectomy

Seckin O. Ulualp, MD, Dallas, TX

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the outcomes of tongue base reduction and lingual tonsillectomy for the treatment of residual pediatric OSA after adenotonsillectomy.

**Objectives:** Multisite airway obstruction is one of the risk factors for residual obstructive sleep apnea (OSA) in children after tonsillectomy and adenoidectomy (TA). The aim of the present study is to evaluate outcomes of tongue base reduction and lingual tonsillectomy in children with persistent OSA after TA. **Study Design:** Case series with chart review. **Methods:** Medical charts of children who underwent tongue base reduction and lingual tonsillectomy for persistent OSA after TA were reviewed to obtain information on history and physical examination, past medical history, findings of drug induced sleep endoscopy (DISE), cine MRI, and polysomnogram, and surgical management. Pre and postoperative polysomnograms were evaluated to assess resolution of OSA and determine improvement in obstructive apnea hypopnea index (AHI) and total AHI before and after surgery. **Results:** Six children (3 male, 3 female, age range: 10 to 17 years, mean: 5.8+3.4) underwent tongue base reduction and lingual tonsillectomy. DISE and cine MRI revealed airway obstruction due to posterior displacement of base of tongue and hypertrophy of lingual tonsils. All patients reported subjective improvement in OSA symptoms. All patients had improvement in obstructive AHI and total AHI. Postoperative obstructive AHI (mean=3.5 events/hour, range: 1-5) and total AHI (mean=3.9 events/hour, range:1.8-6.2) after surgery were less compared to obstructive AHI (mean=29.7 events/hour, range:5.7-73.9) and total AHI (mean=31.6, range:6.6-74.7) before surgery. **Conclusions:** Tongue base reduction and lingual tonsillectomy resulted in subjective and objective improvement of OSA in children with airway obstruction due to posterior displacement of tongue base and hypertrophy of lingual tonsils.

## 127. Laryngeal Heterotopic Ossification: An Atypical Etiology of Respiratory Distress

Jarrett E. Walsh, MD PhD, Iowa City, IA; Parren S. McNeely, MD, Iowa City, IA; Henry T. Hoffman, MD, Iowa City, IA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the workup, diagnosis and management for heterotopic ossification of the larynx and identify the airway risks associated with this diagnosis.

**Objectives:** Benign bony lesions involving the larynx are very rare. The objective is to review the differential diagnosis and management of laryngeal heterotopic bone formation through a case report presenting as acute respiratory distress. **Study Design:** Case report. **Methods:** Patient chart review, intraoperative imaging and radiographic studies are reported along with appropriate literature review. **Results:** A 46 year old female presented in respiratory distress with a history of progressive hoarseness for one year and intermittent stridor for six months, worsened with activity. Her symptoms were initially treated as asthma exacerbations but failed to improve. Flexible fiberoptic exam revealed a fixed right vocal cord. Followup CT demonstrated widespread heterotopic ossification resulting in fusion of the hyoid bone, thyroid cartilage, cricoid cartilage and right arytenoid cartilage. A tracheostomy was performed to secure her airway. Further workup included Tc-99m MDP SPECT scan to confirm the diagnosis of heterotopic ossification. **Conclusions:** This case report presents a rare etiology for respiratory distress and the principles of workup and management of heterotopic ossification. While management for laryngeal heterotopic ossification should preclude oncologic etiologies, this benign case may represent a novel presentation of tracheopathia osteochondroplastic.

# Posters

## Otology/Neurotology

### 128. Venous Malformation of the Internal Auditory Canal: A Case Report

Omar H. Ahmed, MD, New York, NY; Eric W. Cerrati, MD, New York, NY; David R. Friedmann, MD, New York, NY; Matija Snuderl, MD, New York, NY; Mari Hagiwara, MD, New York, NY; Daniel Jethanamest, MD, New York, NY

**Educational Objective:** This case report demonstrates pathology of the IAC that may clinically and radiographically mimic vestibular schwannoma.

**Objectives:** Vascular lesions of the internal auditory canal (IAC) are exceedingly rare and may clinically and radiographically mimic vestibular schwannoma. **Study Design:** Case report. **Methods:** Case report. **Results:** A 54 year old male who presented with intermittent right sided tinnitus, severe hearing loss, and recurrent episodic severe vertigo for 1.5 years that impaired his ability to work. Weber testing lateralized to the left, otherwise the physical exam was unremarkable. Audiogram demonstrated profound sensorineural hearing loss across all frequencies on the right. Cerebral magnetic resonance imaging (MRI) was performed. A T2 weighted MRI CISS sequence demonstrated a slightly hyperintense 7x5mm soft tissue lesion in the fundus of the right IAC. Only a small, lateral portion of the lesion enhanced. A translabrynthine approach to resection of the lesion was performed. Histopathologic evaluation demonstrated fibrous tissue containing large vascular spaces, consistent with venous malformation. Postoperatively, the patient's vertigo and tinnitus had fully resolved. **Conclusions:** Vascular lesions of the IAC are extremely rare. To our knowledge, there have only been three reports of an intracanalicular venous malformation occurring in an adult patient. Refractory vertigo and tinnitus can be caused by microvascular compression of the vestibulocochlear nerve inside in the IAC and may mimic the indolent clinical course and radiography of vestibular schwannoma.

### 129. Radiologic Classification of Auditory Brainstem Implant Array Placement

Samuel R. Barber, MS, Boston, MA; Elliott D. Kozin, MD, Boston, MA; Mary Elizabeth Cunnane, MD, Boston, MA; Sidharth V. Puram, MD PhD, Boston, MA; M. Christian Brown, PhD, Boston, MA; Daniel J. Lee, MD FACS, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare classification types of auditory brainstem implant array placement and understand implications for the role of imaging in ABI surgery.

**Objectives:** The auditory brainstem implant (ABI) provides hearing sensations to children and adults who are ineligible for cochlear implantation due to anatomic constraints. Audiometric outcomes vary widely among similar cohorts of ABI users. One hypothesis is that blind array placement is associated with differential outcomes. We propose a classification system for resolving array position using postoperative imaging. **Study Design:** Retrospective case review. **Methods:** Subjects included pediatric (n=5) and adult (n=7) ABIs. True axial reformatted series of postoperative computed tomography (CT) were created using the McRae line. The basion and electrode tip coordinates were marked in multiplanar reconstruction. Using maximum intensity projection in three orthogonal views, angles and linear distances between landmarks were measured. Angles included (V) vertical in sagittal, (H) horizontal in axial, and (T) lateral tilt in coronal planes. Distances were (D1) vertical from basion and (D2) lateral from midline. Position was categorized into classifications I-IV. **Results:** Mean angles for V, H, and T were  $39.97^\circ \pm$  standard deviation (SD)  $33.8$ ,  $20.91^\circ \pm 30.5^\circ$ , and  $32.83^\circ \pm 57.52^\circ$ . Average distances for D1 and D2 were  $1.78\text{cm} \pm 0.29$  and  $1.34 \pm 0.47$  cm for adults and  $1.34 \text{ cm} \pm 0.025$  and  $0.99\text{cm} \pm 0.20$  cm. Half of the arrays were class II (angled superiorly and posteriorly) and most had lateral tilt. **Conclusions:** This study is the first to systematically measure postoperative ABI position. ABI placement varies widely between patients and may explain variable outcomes. Future studies correlating classification and outcomes may guide development of novel intraoperative placement techniques during ABI surgery.

### 130. Intratympanic Dexamethasone in the Treatment of Meniere's Disease: A Retrospective Review

Jason A. Beyea, MD PhD FRCSC, Kingston, ON Canada; Ryan S. Instrum, BSc, London, ON Canada; Sumit K. Agrawal, MD FRCSC, London, ON Canada; Lorne S. Parnes, MD FRCSC, London, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the success rate of vertigo control in Meniere's disease with intratympanic dexamethasone therapy and to evaluate hearing changes that occur while on intratympanic dexamethasone therapy.

**Objectives:** This study sought to understand the effect of intratympanic dexamethasone on vertigo control in unilateral Meniere's disease and to document hearing progression during intratympanic dexamethasone therapy. **Study Design:** Retrospective case series review from a tertiary neurotology clinic. **Methods:** One hundred and twenty-five consecutive adult patients with definite unilateral Meniere's disease who had failed medical management were studied for an average of 1061 days. None had prior ablative treatment. Intratympanic dexamethasone was injected and repeated for unchanged/worsened symptoms. The main outcome measures were requirement for subsequent ablative therapy in the form of intratympanic gentamicin injection. Hearing outcomes were measured using standard audiometry. **Results:** The number of intratympanic dexamethasone injections per patient ranged from 1 to 29 (median = 4). Survival analysis with the Kaplan-Meier method demonstrated that the predicted survival (patients not requiring intratympanic gentamicin ablation) at two and four years following initial treatment was 84.3% and 79.9%, respectively. In patients only treated with intratympanic dexamethasone, most recent pure tone averages (0.5, 1, 2, and 3kHz) had declined compared to pre-treatment values ( $p=0.000002$ ). **Conclusions:** The majority of Meniere's patients appear to have control of vertigo with intratympanic dexamethasone, though this must be measured against the disease natural history. Hearing mildly declined over the treatment course, which may represent natural disease progression or treatment effect. Our results support a modest benefit of intratympanic dexamethasone. A large multi-center double blinded randomized placebo controlled trial is needed to further evaluate this treatment modality.

## 131. Treatment of External Auditory Canal Exostoses Using an Ultrasonic Serrated Knife

Jay M. Bhatt, MD, Irvine, CA; Olubunmi Ajose-Popoola, MD, Irvine, CA (Presenter); Kanwar S. Kelley, MD JD, Irvine, CA; Yaser Ghavami, MD, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the management of EAC exostoses using the Sonopet® ultrasonic serrated knife.

**Objectives:** To describe a novel transcanal approach for removal of external auditory canal exostosis. **Study Design:** Description of technique and a retrospective review of charts for patients undergoing the procedure from June of 2014 to February of 2014. **Methods:** Sonopet Ultrasonic Aspirator® (Stryker Corporation, Kalamazoo, MI) with a serrated knife attachment was used in a transcanal approach, in combination with 1 mm and 2 mm osteotomes, to incrementally remove external auditory canal exostosis in symptomatic patients. Preoperative and postoperative clinical evaluation and audiologic testing was performed on all patients. **Results:** Six ear canals were treated with the Sonopet®. A 100% removal of the symptomatic exostoses was achieved in all cases. The external auditory canal walls healed in 4 weeks in 5 of 6 patients. The prolonged healing time in 1 patient was secondary to thermal injury to the bone. Complications, including tympanic membrane perforation, facial paralysis, hearing loss, stenosis and temporomandibular joint derangements, were not seen. **Conclusions:** The ultrasonic serrated knife was used in addition to the osteotomes to effectively address fine bone dissection. It increases efficacy and safety when managing large sessile, broad based exostoses that are typically challenging with osteotomes.

## 132. Cartilage Tympanoplasty for Flight Induced Otolgia

David S. Bick, MD, Boston, MA; Jonathon S. Sillman, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the use of cartilage tympanoplasty in their algorithm for the treatment of flight (otic barotrauma) induced otalgia.

**Objectives:** To present a series of cases for which cartilage tympanoplasty was used to treat flight induced otalgia. To review the treatment algorithm for otic barotrauma related otalgia. **Study Design:** Retrospective case series. **Methods:** A retrospective chart review was performed of cartilage tympanoplasty performed by a single surgeon in the past 10 years for the treatment of flight induced otalgia. Progress notes, operative notes and audiograms were reviewed to assess indications for operative repair, operative technique, and patient outcomes, including subjective improvement and audiometric results. **Results:** A total of 4 ears (3 patients) underwent cartilage tympanoplasty for flight induced otalgia. Three of the four ears had been operated on previously. All patients noted complete resolution of pain with flying. No patient had a complication related to surgery, including postoperative perforation, significant hearing loss or infection. **Conclusions:** Currently, decongestants, pressure equalizing earplugs or tympanostomy tube placement remains the mainstay of treatment for flight (otic barotrauma) induced otalgia. Cartilage tympanoplasty can be considered as an alternative treatment option, especially for those who failed or wish to avoid tympanostomy tube placement. In the future more research is needed to further evaluate the effectiveness of cartilage tympanoplasty for treating otic barotrauma induced otalgia.

# Posters

## 133. Otolgic Adverse Effects of the 100 Most Prescribed Drugs

Daniel A. Carlton, MD, New York, NY; Enrique R. Perez, MD, New York, NY; Sujana S. Chandrasekhar, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the frequency of otologic adverse effects of commonly prescribed drugs.

**Objectives:** To determine the frequency of otologic adverse effects of the 100 most commonly prescribed branded drugs in the United States. **Study Design:** The 100 most commonly prescribed branded drugs were reviewed in detail and otologic adverse effects as reported on FDA mandated labeling were identified. **Methods:** FDA prescribing information for each of the 100 most prescribed branded drugs from October 2014 through September 2015 were reviewed for their potential otologic adverse events. The following search terms were used: hearing loss, tinnitus, vertigo, and dizziness. The frequency for each side effect was calculated. When available, dose related otologic adverse effects were collected. **Results:** The following otologic adverse drug reactions were cited. 6% of the drugs' prescribing information reported hearing loss, 19% reported tinnitus, 26% reported vertigo, and 73% reported dizziness as possible side effects. **Conclusions:** Otologic side effects are very common among the most frequently prescribed drugs in the United States. Otolaryngologists and primary care physicians need to be aware of these possible side effects and should carefully review patients' medications and their possible side effects when they present with an otologic complaint.

## 134. An Analysis of Patients Treated for Cerebrospinal Fluid Otorrhea in the United States from 2002--2010

Eric T. Carniol, MD MBA, Newark, NJ; Emily Marchiano, BA, Newark, NJ; Joseph A. Elfar, BA, Newark, NJ; Milap D. Raikundalia, BS, Newark, NJ; Soly Baredes, MD FACS, Newark, NJ; Jean A. Eloy, MD FACS, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand demographics and outcomes of patients treated for cerebrospinal fluid (CSF) otorrhea.

**Objectives:** To analyze associations between patients treated with and without surgical intervention for CSF otorrhea. **Study Design:** Retrospective study of cases from the Nationwide Inpatient Sample (NIS) database. **Methods:** The NIS database was queried for all hospital admissions of CSF otorrhea between 2002-2010. Patient demographics, length of stay, hospital charges, comorbid diagnoses, and complications were analyzed between patients who received surgical intervention (group I) and those treated without surgical repair (group II). **Results:** When compared to group II patients, patients in group I were more commonly female, older, more likely to be obese, have hypertension, pulmonary disease, an encephalocele, and have had an associated ear operation during the admission. Group II patients were significantly more likely to pay with Medicaid ( $P < 0.001$ ). Lengths of stay were similar between the two groups, however group I patients incurred higher hospital charges ( $P < 0.001$ ). Acute medical complications were similar in both groups with the exception of acute cerebrovascular event, which occurred in 6.4% of group I patients ( $P = 0.008$ ). **Conclusions:** Retrospective review of patients who presented with CSF otorrhea demonstrated that patients who underwent repair were more likely to be female, have obesity, hypertension, pulmonary disease, and were more likely to have either an encephalocele or have had an associated ear surgery. Despite the similar lengths of hospital stay, patients who underwent repair incurred significantly higher hospital charges.

## 135. The Influence of Hearing Aids and Cochlear Implants on Balance during Ambulation

Eduardo J. Carrera, BS, Aurora, CO; Ingmar C. Seiwerth, MD, Halle (saale), Germany; Timothy E. Hullar, MD, Portland, OR

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the effect of hearing amplification on dynamic balance.

**Objectives:** Increasing evidence suggests that auditory inputs are important for maintaining postural stability, but little is known about their effects on dynamic balance. We hypothesize that hearing aids and cochlear implants have a corrective effect on balance during ambulation in the presence of sound localizing sources when compared to unaided situations. **Study Design:** Case control. **Methods:** We tested 20 adults who were experienced users of bilateral hearing amplification (4 bilateral hearing aids, 8 bilateral cochlear implants, and 8 bimodal users) performing the Unterberger (Fukuda) stepping test, which is a common clinical measure of dynamic stability. Testing was carried out in the presence of a 65 dBA

white noise point sound source located at ear level 1.85 m in front of the participant. The median of the absolute angle of rotation from the starting position after 50 paces was recorded. 15 subjects performed poorly during an initial screening in the unamplified condition (error >20 deg). We then retested these subjects in a unilaterally and bilaterally aided condition to determine if augmenting auditory input could improve their performance. **Results:** Subjects performed better in the bilateral aided condition compared to the unaided condition ( $p=0.0322$ ). Bilateral amplification was also better than in the unilateral condition ( $p=0.0163$ ), which was no different from the unaided condition. **Conclusions:** Our results suggest that hearing aids and cochlear implants can be considered as balance rehabilitation devices, but only when used bilaterally. Unilateral amplification provides little benefit perhaps due to poor sound localization of monaural listeners.

## 136. **Eight Cases of Cholesteatoma with Labyrinthine Destruction, Skull Base Involvement and Intracranial Extension: Management and Long Term Followup**

Christina C. Cobb, Seattle, WA; Douglas D. Backous, MD, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify the clinical signs of intracranial and labyrinthine invasive cholesteatoma. The participants should also be able to develop logical long term management plans in this difficult patient population.

**Objectives:** We analyze the clinical presentation, imaging findings, and surgical treatment of 8 patients with acquired cholesteatoma with labyrinthine destruction, skull base erosion, or intracranial extension. **Study Design:** A retrospective case series at a tertiary referral center. **Methods:** From 1997 to 2015, 4 males and 4 females, age 12 to 73 (mean, 41.75) years were treated for acquired cholesteatoma with skull base or labyrinthine invasion. Two patients had no prior surgery while 6 had an average of two prior procedures. All 8 complained of hearing loss, 3 had otorrhea, 2 had acute facial palsy, 2 had otalgia and 2 presented with progressive imbalance. Followup ranged from 8 to 216 (mean, 76.6) months. Audiometric, CT and MRI findings are compared to intraoperative outcomes. **Results:** At surgical exploration, 2 patients had cholesteatoma with destruction of the cochlea, 3 had skull base invasion and 3 had intracranial involvement. Three patients required temporal bone obliteration, 2 had radical cavities with exteriorization of the petrous apex, and 3 required modified radical cavities. One patient with VII palsy recovered to HB grade III. One patient with labyrinthine destruction maintained residual hearing postop. No patients had additional complications from their definitive surgical procedures. **Conclusions:** Acquired cholesteatoma with labyrinthine destruction, skull base extension, and intracranial involvement can have surprisingly subtle presentations. Balancing disease exteriorization with preserving labyrinthine function requires prudent radiological workup and surgical planning. Disease eradication is often not possible. Long term clinical followup with periodic imaging and aggressive debridement is often necessary for disease control.

## 137. **Racial and Ethnic Disparities in Vestibular Schwannoma Excision in the US 2005-2012**

Maura K. Cosetti, MD, Shreveport, LA; Adam N. Master, MD, Shreveport, LA (Presenter); Jose M. Flores, PhD, Baltimore, MD; Vikas Mehta, MD MPH, Shreveport, LA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) identify areas of racial and ethnic disparity in outcomes following vestibular schwannoma excision in the US; 2) explain the way in which these findings clarify prior literature; and 3) understand the implications for treatment decision making.

**Objectives:** Ethnic disparities in surgical outcomes have been well documented. Prior research documenting poor outcomes for African Americans undergoing vestibular schwannoma (VS) excision advocated nonsurgical treatment to avoid adverse postoperative outcomes. The present study examines national trends following VS excision. **Study Design:** Cohort study. **Methods:** The National Inpatient Sample (NIS) was used to identify all patients who underwent VS excision during 2005-2012 (N=2,620.) Uni and multivariate analysis were performed between race and 4 postoperative outcomes (morbidity, mortality, cost and length of stay (LOS)) with subsequent adjustment for age, sex, primary payer status, and hospital size. Models were reestimated with and without adjustment for tumor severity at presentation (minor, moderate, major, and extreme loss of function) and weighted to maximize national generalizability. **Results:** Before adjustment for severity, the uni and multivariate mortality odds ratios (OR) comparing African Americans to white patients were 10.1 ( $p<0.005$ ) and 11.3 ( $p<0.005$ ), respectively. After severity adjustment, however, the uni (OR=3.04) and multivariate (OR=4.44) associations were no longer statistically significant (95% CI 0.67-29.3). Relative to white patients, Asian Americans and Pacific Islanders had 13% longer LOS (95% CI 2%-24%) and significantly more costly hospitalizations before (17% increased costs; 95% CI 5%-29%) and after adjustment for severity (13% increased costs; 95% CI 4%-22%). **Conclusions:** Our results replicated prior reports suggesting that African Americans have a higher risk of mortality following VS excision compared to white patients. However, our findings suggest this association is largely due to tumor severity

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at presentation. In addition other ethnic subgroups may confront disproportionate morbidity and longer LOS compared to whites, regardless of tumor characteristics.

- 138. The Use of an Alternate Approach to Cochlear Implantation in a Patient with CHARGE Syndrome**  
Walid I. Dagher, MD, Boston, MA; Ameer T. Shah, MD, Boston, MA (Presenter); Mark A. Vecchiotti, MD, Boston, MA; Jonathon S. Sillman, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the classic approach to cochlear implantation and understand alternate approaches to cochlear implantation.

**Objectives:** 1) Review the classic approach to cochlear implantation; 2) review the alternate approaches to cochlear implantation; and 3) describe a combination of alternate approaches to the successful implantation of a pediatric patient with CHARGE syndrome. **Study Design:** Case report. **Methods:** The literature on cochlear implantation approaches was reviewed with particular emphasis on alternate approaches. We describe the clinical, audiological, and radiological findings in a 6 year old patient with profound sensorineural hearing loss and the CHARGE syndrome and report a combination of alternate approaches used for successful implantation. **Results:** A 6 year old female patient presents with profound bilateral hearing loss in the setting of CHARGE syndrome. CT scan of the temporal bones revealed significant bilateral middle and inner ear malformations (bilaterally fused ossicles, bilateral Mondini malformations, bilaterally absent semicircular canals) and a narrow facial recess with poor mastoid aeration. A successful right cochlear implantation was performed via a combination of alternate approaches (superior meatal approach (SMA) and pericanal electrode insertion technique (PEIT)) to the classical one. Review of the literature identified no such reported approach in a pediatric patient with CHARGE syndrome. **Conclusions:** Severe to profound sensorineural hearing loss is common in CHARGE children. In addition, significant middle and inner ear malformations are also common, making the classic cochlear implantation approach difficult. Alternate approaches should be considered when important surgical landmarks are absent. We describe a combination of alternate approaches that was used to successfully implant a pediatric patient with the CHARGE syndrome.

- 139. Posterior Temporal Bone Arachnoid Granulations: CT and MR Imaging Findings**  
Nicholas L. Deep, MD, Phoenix, AZ; Joseph M. Hoxworth, MD, Phoenix, AZ; Christopher J. Stevens, MD, Rochester, MN; Colin L.W. Driscoll, MD, Rochester, MN; Christopher P. Wood, MD, Rochester, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the imaging characteristics of posterior temporal bone arachnoid granulations and review the differential diagnosis of posterior petrous bone lesions presenting as a focal erosion.

**Objectives:** Present a case series of posterior temporal bone arachnoid granulations, including two pathologically or surgically proven cases. Review the characteristic imaging findings of posterior temporal bone arachnoid granulations and their differentiating features from other posterior temporal bone pathologies, especially endolymphatic sac tumors. **Study Design:** Diagnostic imaging studies, including CT and MRI, were retrospectively analyzed in patients with presumed posterior temporal bone arachnoid granulations and in two patients with surgically or pathologically proven arachnoid granulations. **Methods:** A comprehensive literature review was performed including the histology and pathology of arachnoid granulations, their prevalence and imaging appearance in the posterior temporal bone and the differential diagnosis. **Results:** The radiologic appearance of arachnoid granulations in typical locations is well established and they are rarely mistaken for other pathologies. When seen in atypical locations, however, arachnoid granulations can be a source of diagnostic and therapeutic confusion. Rarely, presumed arachnoid granulations have been reported to involve the posterior temporal bone, where they present as focal erosions of the posterior petrous bone. These can be mistaken for various aggressive neoplasms including endolymphatic sac tumor, paraganglioma, chordoma, chondrosarcoma and metastases. Although described previously in the literature, lesions with the characteristic appearances of arachnoid granulations are usually presumed without requiring pathological correlation. We demonstrate two cases which are surgically or pathologically proven, supporting prior hypotheses in the literature that these represent arachnoid granulations. **Conclusions:** The posterior temporal bone is an atypical location for arachnoid granulations and can lead to diagnostic confusion. Familiarity with the characteristic imaging appearance of arachnoid granulations in this location can help avoid misinterpretation of a more aggressive pathology.

**140. Vestibular Evoked Myogenic Potential (VEMP) in Cases of Vestibular Schwannomas**  
Hani Farouk El Garem, MD, Alexandria, Egypt

**Educational Objective:** At the conclusion of this presentation, the participants should be able to consider VEMP as a good indicator for the function of the vestibulospinal reflexes in cases of vestibular schwannoma which help in postoperative vestibular rehabilitation.

**Objectives:** 1) Assess vestibulospinal reflexes in cases of vestibular schwannoma (VS) to help in postoperative vestibular rehabilitation. 2) Apply vestibular evoked myogenic potential (VEMP) as a tool in diagnosis of VS. **Study Design:** This study was carried in the period between March 2012 and April 2015. The study included 15 patients, 11 females and 4 males, suffering from VS with ages between 20 and 63 years, and 15 normal controls with age and sex matching those of patients. **Methods:** All subjects had full ENT and neurological examination, radiological examination (CT, MRI), caloric testing, basic audiologic testing. VEMP recordings (p1 and n1 latencies and peak to peak amplitude) were done on both sides. **Results:** VEMP was elicited in 4 patients (26.6%): 3 patients (20%) had VEMP absent on the same side of the lesion but preserved on the contralateral side and one patient (6.6%) had it preserved bilaterally with marked decrease in response between the two sides (3.3 uv on affected side and 12.4 uv on normal one). There was a significant difference between the latencies of p1 and n1 waves in patients with elicited VEMP and controls, while there was no significant difference between them as regards of the peak to peak amplitude. **Conclusions:** VEMP is a good indicator of vestibulospinal reflexes bilaterally which helps in good planning of postoperative rehabilitation in combination with visual and proprioceptive systems. P1 and n1 latencies could reliably be used in diagnosis of CPA lesions.

**141. Next Generation Shape Memory Prosthesis (NiTiBOND) for Stapedotomy: Short Term Results**  
J. Douglas Green Jr., MD, Jacksonville, FL; John T. McElveen Jr., MD, Raleigh, NC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss differences between current shape memory prosthesis and next generation shape memory prosthesis (NiTiBOND); and 2) compare surgical results for current shape memory prosthesis and next generation shape memory prosthesis (NiTiBOND).

**Objectives:** The NiTiBOND prosthesis is a next generation shape memory prosthesis that allows sequential self-crimping with heating of the prosthesis away from the long process of the incus, allowing a potentially more secure connection. We review our hearing results and complications for the NiTiBOND and compare them with the results for current shape memory prosthesis (SMart). **Study Design:** Retrospective, multicenter chart review. **Methods:** Primary laser stapedotomy surgery was performed using either NiTiBOND or a SMart prosthesis. A total of 84 ears in 79 patients were included in the study (66.7% female). Forty-four ears received the NiTiBOND prosthesis and 40 the SMart prosthesis. Data collected included demographic variables, pre and postoperative pure tone air and bone conduction thresholds, speech reception thresholds, speech discrimination scores, complications and the need for revision surgery. Pure tone average (PTA) and PTA air bone gap (ABG) pre and postoperative were computed. Success was defined as a postoperative ABG of  $\leq 10$  dB. **Results:** There were no significant differences between groups in short term hearing results (mean = 4.6 and 5.0 weeks, respectively), including improvement in ABG, change in speech discrimination, change in air or bone PTA, or change in high frequency bone PTA. However, short term success rate for the NiTiBOND prosthesis was 85.4% compared to 69.2% for the SMart prosthesis, a difference approaching statistical significance (p=0.084). No revision surgery took place in either group, and there were no significant differences in complications such as dizziness, tinnitus or taste disturbance, though the NiTiBOND group tended to have a lower rate of transient or permanent vertigo. **Conclusions:** Compared with the SMart prosthesis, the NiTiBOND prosthesis is a safe prosthesis that achieves at least comparable hearing results and may offer some surgical advantages.

**142. John E. Bordley, MD Resident Research Award**  
**Assessment of Rural Adult Hearing Health Disparities--Access to Care in Cochlear Implantation**  
Brian W. Hixon, MD, Lexington, KY; Stephen A. Chan, BS, Lexington, KY; Jennifer B. Shinn, PhD, Lexington, KY; Matthew L. Bush, MD, Lexington, KY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain differences in urban and rural patient populations with respect to socioeconomic status and access to specialized healthcare as well as compare relative impact of profound hearing loss and benefits of cochlear implantation between the groups.

**Objectives:** A significant population of rural residents faces barriers to specialized healthcare. The purpose of this study

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is to examine the socioeconomic characteristics of rural adult cochlear implant (CI) recipients and compare the impact of hearing loss and timing of hearing loss management with urban adult CI recipients. **Study Design:** Cross-sectional questionnaire study. **Methods:** Adult CI recipients from a tertiary medical center were identified and mailed a questionnaire assessing socioeconomic information, impact of hearing loss on education and employment and timing of onset, diagnosis and treatment of hearing loss. We also assessed the benefits obtained from cochlear implantation. **Results:** Of the 90 participants, 32 were from rural counties and 58 were from urban/suburban counties. Rural implant recipients experienced a significantly longer commute time to the cochlear implant center ( $p < .001$ ) and reported a lower income ( $p = .009$ ) and higher percentage of Medicaid coverage ( $p = .004$ ). There was a trend toward delayed diagnosis and amplification in rural participants. The average time elapsed from onset of hearing loss to cochlear implantation was 28.1 years in urban adults compared to 34.5 years in rural adults ( $p = 0.136$ ). Hearing loss negatively affected educational attainment and employment in urban and rural adults in a similar degree and both groups reported similar degree of benefit from cochlear implantation. **Conclusions:** Rural CI recipients differ from urban residents in socioeconomic characteristics. Distance from cochlear implant centers may affect timely diagnosis and treatment of profound hearing loss. Further research and efforts to expand access to cochlear implant services may benefit rural adult patients.

**143. Aberrant Internal Carotid Artery Discovered after Attempted Myringotomy Tube Placement**  
Terence E. Imbery, MD, Syracuse, NY; Brian D. Nicholas, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the diagnosis and pathogenesis of an aberrant middle ear carotid artery.

**Objectives:** Highlight epidemiology, pathogenesis, diagnosis, and potential treatments for this rare vascular anomaly. **Study Design:** Case report and literature review. **Methods:** We report a case of an aberrant internal carotid artery (ICA) encountered in the left middle ear space of a five year old female after an aborted myringotomy tube placement. The patient presented with a history of chronic otitis media with effusion and underwent bilateral myringotomy tube placement. Profuse pulsatile bleeding was encountered after left myringotomy. **Results:** Bleeding was controlled with topical phenylephrine and packing. The ear was ultimately packed with an Oto-Wick with no further bleeding noted. Subsequent high resolution CT scan revealed an aberrant course of the left ICA through the middle ear space, essentially abutting the tympanic membrane. **Conclusions:** Correct diagnosis requires a high degree of suspicion, as an aberrant ICA encountered in the middle ear space is a relatively rare condition, with over just 100 cases having been documented to date. Physical examination, as in this case, can often mimic other middle ear pathology such as chronic effusion. Treatment is typically conservative with intervention reserved for only those with severe symptomatology.

**144. Utilization of a Nerve Integrity Monitor to Perform Clinical Promontory Stimulation Testing in Cochlear Implant Candidacy**  
Elizabeth A. Kelly, MD, Minneapolis, MN; Kristin E. Gravel, AuD, Minneapolis, MN; Dianna L. Hart, AuD, Minneapolis, MN; Samuel C. Levine, MD, Minneapolis, MN; Tina C. Huang, MD, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand an alternative method to perform promontory stimulation testing in cochlear implant candidates using a nerve integrity monitor.

**Objectives:** To demonstrate the feasibility of a nerve integrity monitor as a tool for promontory stimulation testing in patients with profound sensorineural hearing loss considering cochlear implantation. **Study Design:** Retrospective case review. **Methods:** Four patients with profound sensorineural hearing loss underwent promontory stimulation testing in the clinic setting to determine candidacy for a cochlear implant. By using a Prass probe and the nerve integrity monitor, transtympanic promontory stimulation testing was performed to assess auditory nerve function. The stimulus amplitude was started at 0.01 mA and gradually increased, but did not exceed 0.3 mA. Patients indicated if they heard the stimulus. **Results:** Of the four patients completing the promontory stimulation tests, 3 patients heard the stimulus and 1 patient did not hear the stimulus. Of the 3 patients with a positive stimulation test, 2 patients have a history of progressive profound sensorineural hearing loss and 1 patient had a history of severe blunt temporal bone trauma. Two of these patients proceeded with cochlear implantation. The patient that had a negative promontory stimulation test has a history of neurofibromatosis 2 and is currently being considered for an auditory brainstem implant. The testing was performed without difficulty using the Prass probe and nerve integrity monitor. **Conclusions:** The nerve integrity monitor is a convenient tool used in the clinic setting to perform promontory stimulation tests and aid in determining cochlear implant candidates, specifically in those patients that require verification of auditory nerve function. The use of this tool is a feasible and appropriate method

for promontory stimulation testing.

**145. Mastoid Obliteration with Bioactive Glass: A Comparative Analysis of Long Term Outcomes**  
Ruwan Kiringoda, MD, San Francisco, CA; Lawrence R. Lustig, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the role of mastoid obliteration in canal wall down mastoidectomy surgery and understand the characteristics of an ideal oblitative agent. They should be able to explain how mastoid obliteration using bioactive glass compares to obliteration using autogenous biologic materials, in terms of short and long term postoperative complications.

**Objectives:** We sought to compare the use of bioactive glass to autogenous materials (fascia, cartilage, periosteum) for mastoid obliteration. Specifically we examined the rates of postoperative complications (such as infection or persistent otorrhea) and need for revision surgery for canal wall down mastoid cavities obliterated with bioactive glass versus native biologic materials. **Study Design:** Retrospective review. **Methods:** Single surgeon study from 2008 to 2014, 36 patients underwent 37 procedures with bioactive glass cavity obliteration. 32 patients underwent 33 procedures with native material obliteration. Only patients with at least 1 year of postoperative followup were included. Operative reports and all documented postoperative clinical visits were reviewed. Complications including infection or drainage requiring medication and need for reoperation were compared between groups. **Results:** There were no significant differences in rates of infection or drainage requiring medical intervention at any time postoperatively (13.5% in the bioactive glass group, versus 12.1% in the native obliteration group). Similarly, there was no significant difference in need for revision mastoidectomy (2.7% with bioactive glass versus 6.1% with autogenous material obliteration). **Conclusions:** Mastoid obliteration is an important concept in canal wall down mastoidectomy for chronic ear disease, reducing the size of the cavity while facilitating ease of cleaning. Bioactive glass, which stimulates osteogenic cells to produce mitogenic growth factors and form trabecular bone, is safe and effective for obliteration of mastoid cavity defects. There is no evidence of increased postoperative infection rate when using bioactive glass, nor is there an increased need for revision mastoidectomy on long term followup.

**146. 3D CAD/CAM Manufacture of Autologous Otologic Grafts: Human Cadaver Trials**  
Glenn W. Knox, MD, Jacksonville, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to: 1) discuss how 3D CAD/CAM can save money by reducing inventory and complications; and 2) discuss how 3D CAD/CAM manufacture of otologic allografts in the OR can save time.

**Objectives:** Conventional middle ear prosthetics, including total ossicular replacement prostheses (TORPs) and partial ossicular replacement prostheses (PORPs), are expensive, require large inventories for otologic surgery services, and carry the risk of extrusion. Autologous bone and cartilage can be used for many of these applications, but they require expensive operating room time for carving to the appropriate shape and size. Computer assisted manufacture on demand in the operating room (subtractive 3D CAD/CAM) can quickly produce accurate bone and cartilage autografts on demand, resulting in significant cost savings. Such a technology can save money by reducing operating room time and reducing the need for expensive inventories of various shapes, sizes, and types of prosthetic devices. Since autologous materials are less likely to extrude or cause other problems such as infection, this could also reduce costs. We undertook this study to build on our previous experiences with machinist's wax and bovine bone materials. **Study Design:** Prospective human cadaveric laboratory study. **Methods:** The methods of our previous study with machinist's wax and bovine bone were adapted to the present study. A Roland MDX-40A 3D milling machine (Roland DGA, Irvine, CA) was utilized. The CNC-RP approach features completely automated fixture planning, tooling and setup planning for creating a part directly from a CAD file. The use of a fourth (rotation) axis eliminates the need for reclamping of the part. For each orientation, all the visible surfaces are machined while a set of sacrificial supports keeps the part connected to the uncut end of the stock material. Once all the operations are complete, the supports are severed and the part is removed. In the present study, cadaveric human occipital bone was utilized. A Richards PORP was selected as an initial example to demonstrate the process. The dimensions of the Richards PORP were imported into an .stl file. The .stl file was opened in the SRP player software included with the MDX-40A machine. The SRP player software orients the part, generates toolpaths and sends it to the MDX machine. The part is then milled by subtraction. Cadaveric occipital bone was selected because it is inexpensive and commercially available. It has similar machining characteristics to cadaveric temporal bones but is less costly and more available. **Results:** Cadaveric human occipital bone utilization resulted in reliable production of prototype middle ear prosthetics, in this case a Richards PORP. The size of the implant was varied to show how the implant can be

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customized. **Conclusions:** Subtractive 3D CAD/CAM can potentially produce accurate autografts in the operating room environment. This subtractive technique differs from additive 3D printing in that the material is carved down from an initial block of material, rather than being printed by additive application of materials such as resin or plastic. This technology can save money on prosthesis costs, reduction of inventory, reduction of operating room time and reduction of complications. Autografts are less likely to cause extrusion or infection. Further research on prospective surgical trials is indicated.

## 147. Anemia: An Overlooked Etiologic Factor for Dizziness in the Inpatient Setting

Glenn W. Knox, MD JD, Jacksonville, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss 1) how anemia is a common cause of dizziness in the inpatient setting; 2) how anemia is often overlooked, underdiagnosed, and untreated; and 3) how the etiology for each case of anemia is important and often overlooked.

**Objectives:** 1) To determine the incidence of anemia as a causative factor for dizziness in the inpatient setting; 2) to analyze the anemic dizzy patient case to determine anemia etiology and treatment, if any; and 3) to raise awareness of this problem among referring physicians and other otolaryngologists. **Study Design:** Retrospective chart review. **Methods:** Charts from inpatient consults for dizziness were examined from 2011 to the present at our institution. Important parameters were examined: symptoms such as lightheadedness when standing, incidence of anemia or borderline anemia, etiology of anemia if known, treatment of anemia if any. Statistical analysis via chi square analysis. **Results:** 87 charts were available for review with adequate documentation for the purposes of this study. 78% of the inpatient consultations for dizziness were noted to have anemia or borderline anemia. 63% of these patients had lightheadedness upon standing as an important symptom. **Conclusions:** Anemia is an important etiologic factor for dizziness in the inpatient population. Awareness of this factor among healthcare providers is low. Surprisingly, many of the anemic patients in this study had little or no workup for anemia. Lightheadedness when standing is an important symptom in the diagnosis of anemia related dizziness.

## 148. 3D Printed Biomimetic Tympanic Membrane Approximates Sound Induced Motion of Human Eardrum

Elliott D. Kozin, MD, Boston, MA; Nicole Black, BS, Boston, MA; Jeffrey T. Cheng, PhD, Boston, MA; Jennifer A. Lewis, ScD, Boston, MA; John J. Rosowski, PhD, Boston, MA; Aaron K. Remenschneider, MD MPH, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand how to create a tympanic membrane using 3D printing techniques.

**Objectives:** Patients undergoing tympanoplasty are at risk for postoperative graft retraction and persistent conductive hearing loss. Three dimensional (3D) printing technology can potentially address the mechanical limitations of current graft materials, such as temporalis fascia, while improving upon sound transmission. We hypothesize that the acoustic properties of a 3D printed TM graft can be reliably tuned to approximate the motions of a human TM in middle ear sound conduction. **Study Design:** In vitro study of 3D printed TMs and cadaveric tissue. **Methods:** Biomimetic TM graft scaffolds of varying circumferential and radial fiber counts were fabricated using filamentary extrusion 3D printing and infilled with a biologic hydrogel. Intact cadaveric human TMs, uncoupled from the ossicular chain, and cadaveric temporalis fascia served as controls. Digital opto-electronic holography (DOEH) and laser Doppler vibrometry (LDV) were used to measure the acoustic properties of each material. **Results:** 3D printed TM grafts showed symmetric frequency dependent variations in surface motion patterns when stimulated by pure tones of 400 to 6000 Hz. The patterns varied with frequency similar to the human TM, ranging from simple through complex to ordered. Fascia exhibited less organized patterns. LDV demonstrated consistent velocity patterns across frequency sweeps (100~10000Hz) for printed grafts and human TMs, while fascia velocity varied considerably between specimens. **Conclusions:** 3D printers can now produce biomimetic TM grafts with acoustic properties tuned by DOEH and LDV that approximate the human TM. These data have implications for the clinical application of 3D printed biomimetic TMs to improve tympanoplasty outcomes.

149. **Natural Progression of Hearing Loss following Hearing Preservation Cochlear Implantation Surgery**  
George Kurien, MD, Toronto, ON Canada; Leah Smith, MA, Toronto, ON Canada; Euna Hwang, MDCM, Toronto, ON Canada; Joseph Chen, MDCM, Toronto, ON Canada; Julian Nedzelski, MD, Toronto, ON Canada; Vincent Lin, MD, Toronto, ON Canada

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) understand the natural progression of hearing loss in the contralateral ear over time; and 2) correct for hearing loss in the contralateral side when interpreting the results of hearing preservation cochlear implant surgery.

**Objectives:** Determine the natural progression of hearing loss in the contralateral ear in hearing preservation cochlear implant (HPCI) surgery. **Study Design:** Single center retrospective review. **Methods:** Patients undergoing HPCI with devices from a single manufacturer from 2008-2013 were identified. Preoperative and postoperative pure tone thresholds at 250Hz and 500Hz were obtained for the implanted as well as contralateral ears. Patients with bilateral implants and previously nonresponsive contralateral ears were excluded. **Results:** 150 patients who underwent HPCI surgery from 2008 to 2013 were identified. Of these, 52 had complete preoperative data for both ears, with an average followup of 2.03 years. Average preoperative thresholds at 250Hz and 500Hz on the operated side were 53dBHL and 66dBHL, which dropped postoperatively to 95dBHL and 105dBHL, respectively ( $p < .001$ ). Average preoperative thresholds at 250Hz and 500Hz on the contralateral ear were 47dBHL and 62dBHL, which dropped postoperatively to 54 dBHL and 69 dBHL respectively ( $p = .002$ ). No correlation between these threshold shifts emerged between the ears at either frequency ( $p > .16$ ,  $R^2 < .03$ ). **Conclusions:** Our data shows a natural 7dB drop in hearing thresholds in the contralateral ears of our patients who received HPCI surgeries from 2008-2013. We are proposing a 7dBHL correction factor to be applied to the operative ear when interpreting the results of HPCI surgeries.

150. **Are We Getting Alarm Fatigue from the Facial Nerve Monitor?**  
Samuel C. Levine, MD, Minneapolis, MN; Candice C. Colby, MD, Minneapolis, MN; Rheanne Zimmerman, BA, Minneapolis, MN

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify alarm fatigue characteristics.

**Objectives:** To study the frequency and grouping of alerts from a NIM-3 nerve integrity monitor during otologic surgery. **Study Design:** Prospective series. **Methods:** Each of 55 otologic cases was monitored in a standard manner with the NIM-3 facial nerve monitor and the alerts were recorded. After each case, the file was downloaded and the alert recordings were transferred to an Excel spreadsheet. The individual stimulation alerts were grouped into events and the frequency was analyzed. **Results:** Monitoring was performed for a total of 8107 minutes and there were an average of 18.4 stimulation events per case. This is an average of 6.9 stimulation events recorded every hour of surgery. No case had a facial nerve injury and most events were false alarms. **Conclusions:** The facial nerve monitor might be causing alarm fatigue. The alarm sounds frequently and most alerts are not associated with injury to the facial nerve. A comparison with other alarm systems indicates that the frequency of alerts is high enough with the NIM-3 that it may be a source of alarm fatigue. Other observations associated with monitoring were made as a result of the study.

151. **Influence of Payor Mix on Inpatient vs. Outpatient Mastoidectomy from 1995-2007**  
Alexis Lopez, BA, New York, NY; Anil K. Lalwani, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain and discuss the changing trends in inpatient and ambulatory mastoidectomy.

**Objectives:** Mastoidectomy is a common otolaryngology procedure performed as either inpatient or ambulatory surgery. We investigate the impact of payor mix on the frequency of statewide inpatient vs. outpatient mastoidectomy from 1995-2007. **Study Design:** Retrospective analysis of a statewide inpatient and ambulatory surgery database from 1995-2007. **Methods:** All cases of inpatient and ambulatory mastoidectomy in the database were identified. In addition, age group of the patients, gender, health service area (HSA) in which the surgery was performed, payor status, and associated ICD-9 diagnosis codes were also extracted. **Results:** Between 1995-2007, 23,161 mastoidectomies were performed with 68% performed in the ambulatory setting. The mean age was 37 years; males (55%) and those aged 20-44 years (35%) comprised the majority of cases. The most common ICD-9 codes were for conductive hearing loss, otitis media, chronic mastoiditis, and cholesteatoma. Although a majority (50%) of cases was performed in HSA 7, 40% of inpatient and 56%

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of ambulatory cases were performed in other HSAs. There was a significant increase in ambulatory cases over time: from 30% in 1995 to 80% in 2007. Simultaneously, there was a shift in payor mix from 1995 to 2007; 36% of inpatient and 21.5% of ambulatory cases were paid for by Medicare or Medicaid. **Conclusions:** Between 1995-2007, there has been a dramatic increase in mastoidectomy being performed in the ambulatory setting. The shift in the site of surgery may be related to a change in payor mix with an increasing proportion of government insurance.

## 152. Postoperative CSF Fistulae and the Translabyrinthine Approach for Acoustic Neuroma Resection

Beth N. McNulty, MD, Farmington Hills, MI; Dennis I. Bojrab, MD, Farmington Hills, MI; Michael J. Larouere, MD, Farmington Hills, MI; Eric W. Sargent, MD, Farmington Hills, MI; Seilesh C. Babu, MD, Farmington Hills, MI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify risk factors for postoperative cerebrospinal fluid (CSF) leak after translabyrinthine craniotomy for the removal of vestibular schwannoma. They will also better understand perioperative techniques that may prevent its occurrence.

**Objectives:** To determine the rate of cerebrospinal fluid (CSF) leak after translabyrinthine craniotomy for the removal of vestibular schwannoma. Secondly, to assess associated risk factors and techniques in the perioperative management that may prevent its occurrence. **Study Design:** Retrospective chart review. **Methods:** Patients presenting to our institute who underwent translabyrinthine craniotomy for removal of vestibular schwannoma from January 2009 to October 2014 were eligible for inclusion. The main outcome variables were postoperative CSF leak, age, gender, BMI, and the need for additional surgeries or medical interventions. **Results:** 82 patients, of 4 different surgeons, met inclusion criteria. A female to male ratio of 1.7 was observed. Five patients developed a postoperative CSF fistula (6%). Advanced age was the only associated risk factor,  $p=.048$ . There was no significant difference in BMI between the two groups. None of the CSF fistulae patients developed meningitis. All five were readmitted, but there was no significant difference in length of stay between the two groups. 4/5 failed conservative management, requiring lumbar drain placement and wound exploration with closure of the fistula. **Conclusions:** CSF leak is a rare postoperative complication in the translabyrinthine approach for resection of vestibular schwannoma. Advanced age was the only associated risk factor. Perioperative diuretics and placement of a lumbar drain is not necessary for the prevention of CSF leak. Removing the incus and packing the middle ear, eustachian tube, and mastoid defect are critical steps in preventing postoperative CSF leak.

## 153. Speech Recognition with High Frequency Directed Audio

Ritvik P. Mehta, MD, La Jolla, CA; Sara L. Mattson, AuD, La Jolla, CA; Brian A. Kappus, PhD, San Diego, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss a novel, ultrasonic sound delivery technology; and 2) demonstrate the benefit of high frequency directed audio over conventional speakers in subjects with hearing loss.

**Objectives:** 1) To assess whether a second generation HyperSound® Audio System (HSS), using ultrasound technology, improves speech recognition compared to a conventional acoustic speaker in subjects with mild to severe hearing loss; and 2) to assess whether tuning the HyperSound system (HSS-tuned) to each subject's hearing loss results in further gain in speech recognition. **Study Design:** Single blind, randomized crossover study. **Methods:** Patients: Nine adult patients with mild to severe hearing loss with pure-tone average (PTA) of  $> 30$  dB and word discrimination scores of  $< 80\%$  in both ears. Intervention(s): Subjects completed the AzBio Sentences test and the Consonant-Nucleus-Consonant (CNC) word test for each speaker type as well the tuned HyperSound system (HSS-tuned). The AzBio and CNC word tests were conducted in quiet at 70 dB. The AzBio was also conducted in noise at +10 SNR.

**Results:** Significant gains in speech understanding were observed using the HSS-tuned speaker versus both the conventional speaker and HSS without tuning for all test conditions at 70 dB. The mean AZBio scores for the HSS-tuned vs conventional speakers showed an average improvement in scores of 20% ( $p=0.015$ ) in quiet, and 8.3% in noise ( $p=0.046$ ). The CNC whole word test scores improved by an average of 23.8% ( $p=0.017$ ) and CNC phoneme test scores improved by an average of 20.6% ( $p=0.021$ ). **Conclusions:** The second generation HSS system demonstrates highly significant improvement in speech recognition over conventional speakers in those with mild to severe hearing loss. Tuning the HSS system to the subject's hearing loss (HSS-tuned) demonstrates significant additional benefit in speech recognition across all test conditions.

## 154. Operative Techniques for BAHA Implantation

Joshua S. Mintz, BS, Galveston, TX; Mark W. Steehler, MD, Erie, PA; Matthew K. Steehler, MD, Corpus Christi, TX; Sean P. Larner, DO, Erie, PA; Sidney P. Lipman, MD, Erie, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain and compare bone anchored hearing aid (BAHA) implantation techniques.

**Objectives:** To analyze and compare how bone anchored hearing aid (BAHA) implantation techniques compare in terms of operative time, duration between surgery and first use of the BAHA, and overall complication rates. **Study Design:** Retrospective review. **Methods:** A retrospective review was conducted on all patients receiving a BAHA implant at a hybrid academic/private practice program from August 2008 to October 2014 (N=90). Data gathered included patient demographics, BAHA device specifications, operative time, operative techniques, and complication rates. Statistical analysis of the data included analysis of variance (ANOVA), Tukey pairwise comparisons (TPC), and paired T-test (TT). **Results:** The N of the study was 90. The cohort was divided into six subgroups based on operative technique: dermatome, single vertical incision, biopsy punch through, single vertical incision/biopsy punch through technique (PTT), U-shaped flap, and transcutaneous (attract implantation) (TCAI). The N of each subgroup was 6, 25, 6, 15, 23, and 13, respectively. ANOVA showed significant differences ( $p < 0.05$ ) between groups in operative time and complications based on technique. ANOVA showed no significant statistical differences between time to fitting and complications based on abutment length. Subsequent TPC tests showed significant statistical differences ( $p < 0.05$ ) in complications based on technique between the TAI and PTT. TPC test also showed significant statistical differences ( $p < 0.05$ ) in operative times between TAI and PTT; as well as PTT and Dermatome. Abutment techniques and attract techniques were compared with TT and significant statistical differences ( $P < 0.05$ ) were found in number of complications, operating room time, and time to fitting. **Conclusions:** There were significant differences in outcomes between operative techniques for BAHA implantation. Based on statistical analysis of this data, the BAHA attract technique consumes greater operative time but has less complications and less time to fitting than abutment procedures. The BAHA attract is a promising new development in otolaryngology.

## 155. Spontaneous Cochlear Hemorrhage in an Otherwise Healthy Patient: A Case Report

Margaret L. Naunheim, MD, San Francisco, CA; Marika D. Russell, MD, San Francisco, CA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe spontaneous unilateral cochlear hemorrhage (presentation, imaging characteristics, hearing prognosis and known causes) with the understanding that there need not be preceding trauma or an underlying blood dyscrasia.

**Objectives:** 1) Describe a case of spontaneous unilateral cochlear hemorrhage in an otherwise healthy 34 year old female with no history of preceding trauma and no evidence of a blood dyscrasia; 2) investigate current knowledge of cochlear hemorrhage through literature review (known causes, imaging characteristics, and hearing loss prognosis). **Study Design:** Case report and literature review. **Methods:** Case report of a 34 year old otherwise female with unilateral spontaneous cochlear hemorrhage and a review of the literature previously describing this rare event. **Results:** We describe the case of a 34 year old female who presented to otolaryngology clinic with a profound right sided sensorineural hearing loss. She reported an acute loss of hearing with associated nausea, vomiting and vertigo; she denied any preceding trauma, noise exposure, or upper respiratory infection. The patient also denied any easy bruising, prolonged bleeding, or clotting complications. Audiogram showed profound sensorineural hearing loss in right ear and normal hearing on the left. An unenhanced MRI showed intrinsic T1 hyperintensity in the basal turn of the cochlea, indicative of cochlear hemorrhage. We review the existing reports of cochlear hemorrhage in the literature and discuss our field's current understanding of this event. Previously identified causes of cochlear hemorrhage include sickle cell disease, leukemia, trauma (both accidental and iatrogenic) and anticoagulation therapy. To our knowledge, no cases of spontaneous cochlear hemorrhage have yet been reported. **Conclusions:** Cases of cochlear hemorrhage are rare events that result in permanent hearing loss. Most often, this injury follows a traumatic event, though blood dyscrasias have also been implicated. We present a case showing that this unfortunate event can occur outside the setting of trauma or an underlying blood disorder.

## 156. Intratympanic Steroids for Meniere's Disease: A Meta-Analysis

Adrian A. Ong, MD, Charleston, SC; Andrew Kyle, BS, Charleston, SC; Shaun A. Nguyen, MD MA, Charleston, SC; Ted A. Meyer, MD PhD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the role of intratympanic steroids in the treatment of Meniere's disease.

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**Objectives:** To quantify the long term efficacy of intratympanic steroids in controlling vertigo and maintaining hearing in Meniere's disease. **Study Design:** Meta-analysis of published data. **Methods:** The PubMed-NCBI and Scopus databases were searched for articles on the use of intratympanic steroids (ITS). Included studies had to report data using the 1985 or 1995 American Academy of Otolaryngology-Head and Neck Foundation (AAO-HNS) guidelines, designed as a prospective cohort or randomized control trial, published in the English language, and have minimum of 18 months of followup. Endpoints were vertigo control and hearing preservation using AAO-HNS guidelines for audiometric data, including pure tone average (PTA) and speech discrimination scores (SDS). **Results:** Five articles with 138 patients met inclusion criteria and had extractable data, including two randomized control trials and three prospective cohort studies. ITS achieved complete vertigo control in 45.6% (95% CI, 27.5%-64.4%) patients and substantial vertigo control in 23.3% (95% CI, 15.8%-32.3%) patients. A > 10 dB improvement was attained in 23.2% (95% CI, 12.9%-35.6%) of patients. There was no significant change in PTA and SDS >18 months after ITS therapy. **Conclusions:** ITS can be considered as an option for patients with intractable Meniere's disease. The studies included in this meta-analysis have a heterogeneous ITS protocol and further research must be done to determine the most effective timing and dosage for ITS therapy.

## 157. A Population Based Analysis of Melanoma of the External Ear

Tapan D. Patel, MD, Newark, NJ; Oliver Y. Chin, BA, Newark, NJ; Soly Baredes, MD FACS, Newark, NJ; Jean Anderson Eloy, MD FACS, Newark, NJ; Yu-lan Mary Ying, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the demographic, clinicopathologic, incidence and survival characteristics of external ear melanoma.

**Objectives:** Malignant melanoma accounts for nearly 75% of all skin cancer deaths, and the incidence is on the rise in the United States. The relative paucity of external ear melanoma (EEM) cases has provided little long term data regarding the clinical behavior of this melanoma variant. This study analyzes the demographic, clinicopathologic, incidence and survival characteristics of EEM. **Study Design:** Retrospective analysis. **Methods:** The SEER database was queried for EEM cases from 1973 to 2012 (8,982 cases). Data analyzed included patient demographics, incidence trends, and survival outcomes. **Results:** External ear melanoma occurred most frequently in the sixth and seventh decades of life. Mean age at diagnosis was 65.5 ( $\pm$ 16.8) years. However, the incidence of EEM in adolescents and young adults (ages 15-39 years) has increased by 111.9% from 1973 to 2012. There was a strong male predilection with a male-to-female ratio of 6.40:1. There was a predilection towards whites among the US population with white-to-black incidence rate ratio of 723:1. The most common histologic subtype was malignant melanoma, NOS (46.8%), followed by superficial spreading melanoma (21.4%), and lentigo maligna melanoma (17.9%). The majority of cases were localized at the time of presentation (88.0%), with rare distant metastasis (1.9%). The most common treatment modality was surgery alone (97.6%), followed by surgery with radiotherapy (2.3%). Survival analysis showed excellent 10 year disease specific survival (DSS) (84.8%). Lentigo maligna melanoma had the best 10 year DSS (91.2%), followed by superficial spreading melanoma (87.7%) ( $p < 0.0001$ ). Ten year disease specific survival was better among those treated with surgery alone (90.7%), than those treated with surgery with radiotherapy (37.1%) ( $p < 0.0001$ ). **Conclusions:** This study represents the largest cohort of EEM. It has an excellent survival outcome with surgery being the treatment of choice.

## 158. Solitary Plasmacytoma of the Petrous Apex: A Case Report and Review of Literature

Tyler S. Quist, BS, Salt Lake City, UT; Cheryl A. Palmer, MD, Salt Lake City, UT; Joel D. MacDonald, MD, Salt Lake City, UT; Richard K. Gurgel, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the clinical presentation, imaging, pathologic examination, and treatment of solitary plasmacytomas of the skull base.

**Objectives:** To describe the clinical presentation, imaging, pathologic examination, and treatment of solitary plasmacytomas of the skull base. **Study Design:** Retrospective case review. **Methods:** Patient information as well as reported literature regarding solitary plasmacytomas of the petrous apex and skull base were reviewed. **Results:** A 60 year old man presented with a several month history of sudden right sensorineural hearing loss, tinnitus, disequilibrium, and jaw pain. His physical exam was unremarkable for cranial neuropathy, other than asymmetric right hearing loss. Pure tone average (PTA) and speech discrimination score (SDS) of the right ear were 70 dB and 0%, respectively. Computed tomography (CT) scan revealed a lytic bony lesion of the right petrous apex that had eroded into the cochlea. Magnetic resonance imaging (MRI) revealed homogenous enhancing mass with dural tails, suggestive of meningioma, and the patient underwent resection of the mass via middle fossa approach. Postoperative pathological diagnosis revealed a

lambda light chain restricted plasmacytoma of the petrous apex. The patient underwent extensive work up which ruled out the presence of multiple myeloma or multifocal pathology and underwent postoperative radiotherapy for treatment. **Conclusions:** Solitary plasmacytomas of the petrous apex and skull base are rare, especially in the absence of multiple myeloma. Patients may present with cranial neuropathy or systemic neurological deficits. Following CT and MRI evaluation, pathological examination is crucial for proper diagnosis of solitary plasmacytomas of the bone. Localized radiotherapy is the definitive treatment of choice.

159. **A Rare Case of Recurrent Osteoid Osteoma of the Temporal Bone with Concomitant Cholesteatoma**  
Saranya Reghunathan, MD, Tucson, AZ; Erynne A. Faucett, MD, Tucson, AZ; Abraham Jacob, MD, Tucson, AZ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to have improved grasp of the natural history of osteoid osteomas of the temporal bone and the structures at risk with their ongoing growth. In addition, participants will have improved understanding of how the pathophysiology of mesotympanic osteoid osteoma with growth into the external auditory canal lends itself to development of concomitant cholesteatoma. This case is especially interesting as the initial resection of the osteoid osteoma required sacrifice of the facial nerve with subsequent sural nerve grafting. This case study will compare different types of facial nerve reconstruction and its significance in reoperation for temporal bone osteoid osteomas.

**Objectives:** Understand the risk of cholesteatoma development in recurrent osteoid osteoma. **Study Design:** Case report with additional review of literature. **Methods:** Patient chart analysis and literature review. **Results:** This is the case of a 63 year old woman who presented with a recurrent left mesotympanum tumor. She has a known history of left mesotympanum osteoid osteoma first resected in 2007 via middle fossa craniotomy. Her most recent MRI suggested tumor growth by 4mm in the last year. Interestingly, she underwent resection of part of her facial nerve during the 2007 operation that was treated with a sural nerve interposition graft. Upon reoperation, recurrence of left mesotympanum osteoid osteoma within the lateral skull base was confirmed. However, new cholesteatoma material was intermixed with the bony tumor. Tumor and cholesteatoma obstructed the external auditory canal and middle ear space. Ultimately, via trans-tympanic approach to the skull base, both osteoid osteoma and cholesteatoma were cleanly resected without any evidence of recurrence to date. **Conclusions:** There have been few reported cases of osteoid osteoma of the temporal bone with only one reported cases of osteoid osteoma of the temporal bone with concomitant cholesteatoma. However, there are no cases of recurrent osteoid osteoma with subsequent development of cholesteatoma due to trapped ear canal and tympanic membrane skin occurring from her osteoma. This is also the first case that discusses facial nerve involvement of osteoid osteoma requiring facial nerve resection with subsequent nerve grafting and preservation of facial nerve function.

160. **Computed Tomography Imaging of the Vestibular Aqueduct in Ménière s Disease Using Poschl Reconstructions**  
Sheela Saidha, BA, Washington, DC; Peter L. Nguy, BS, Washington, DC; Ann K. Jay, MD, Washington, DC; Hung Jeffrey Kim, MD, Washington, DC; Michael Hoa, MD, Washington, DC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the size of the vestibular aqueduct (VA) in Ménière's disease to controls using high resolution computed tomography (CT) in both axial and Poschl planes.

**Objectives:** To analyze the size of the vestibular aqueduct (VA) in patients with Ménière's disease using high resolution computed tomography (CT) in both axial and Poschl planes. **Study Design:** Retrospective CT study and chart review. **Methods:** Temporal bone CT scans from patients with Ménière's disease were utilized to assess the dimensions of the vestibular aqueduct in both axial and Poschl planes. Ten patients with definite unilateral Ménière's disease were compared to a control group of 30 patients without disease. Each ear was treated as an independent subject. Axial (parallel to axis of cochlea on sagittal view) and Poschl reformats were constructed for VA dimension assessment. **Results:** In the axial plane, the Ménière's group exhibited statistically significant ( $p < 0.001$ ) smaller VA dimensions including mean VA length, distance from the proximal edge of the VA to the posterior petrous surface, and width of the external aperture. We report no statistically significant difference in the midpoint width of the VA ( $p = 0.31$ ). In the Poschl plane, the Ménière's group exhibited statistically significant ( $p < 0.05$ ) VA dimensions including mean VA length and width of the external aperture. No statistically significant difference in the mean VA length ( $p = 0.08$ ) or the midpoint width of the VA ( $p = 0.36$ ). **Conclusions:** VA dimensions in Ménière's patients were smaller than that of non-Ménière's patients. Visualization of the VA in the Poschl plane appears to capture the entire length of the vestibular aqueduct allowing for easier dimensional assessment of the

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VA including assessment of the VA width.

**161. A Case of Abnormal Impedance Fluctuations in a Patient with Autoimmune Mediated Inner Ear (AIED) Disease following Cochlear Implantation**

Ruwaa Samarrai, New York, NY; Jaclyn B. Spitzer, PhD, New York, NY; Anil K. Lalwani, MD, New York, NY; Avital E. Westreich, BA, Montclair, NJ; Weiyang Lu, Livingston, NJ; Lawrence R. Lustig, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to better understand how abnormal impedance fluctuations can occur in cochlear implant patients with AIED.

**Objectives:** To describe a challenging case of a patient with AIED who underwent cochlear implantation and subsequently developed abnormal impedance fluctuations. **Study Design:** This is a retrospective case study. **Methods:** Patient cochlear implant impedance data was collected from the implant manufacture database over a period of 5 years post-implantation and compared to 3 non-AIED patients over a similar time period in order to identify unique fluctuation patterns in the AIED patient. Similar cochlear implant designs and processing strategies were used for all patients. **Results:** Irrespective of time period or electrode chosen, there appear to be significant fluctuations (greater than 2 standard deviations) in the AIED patient when values are compared to non-AIED patients with the same implant and over a similar time period. **Conclusions:** This case documents greater impedance fluctuations in a patient with AIED as compared to a control group of non-AIED patients. We hypothesize that these impedance fluctuations stem from pathobiology of immune mediated hearing loss in the cochlea and (predict?) that these fluctuations would reduce in response to steroids.

**162. Associations between Patient Reported Handicap Scores for Dizziness, Hearing Loss, and Tinnitus**

John A. Stafford, BS, New York, NY; John S. Nemer, BS, New York, NY; Damiano Zanotto, PhD, New York, NY; Francesco Caruana, New York, NY; Sunil K. Agrawal, PhD, New York, NY; Anil K. Lalwani, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the relationship between subjective handicap scores of dizziness, hearing, and tinnitus among older otolaryngology clinic patients.

**Objectives:** Dizziness, hearing loss, and tinnitus are three common chief complaints described by patients to otolaryngologists each year. Here we aim to explore the relationship between patient complaints of both tinnitus and hearing loss and the severity of dizziness handicap reported. We further aim to identify any relationship between patient reported handicap severity and factors of age and gender. **Study Design:** Cross-sectional study. **Methods:** Patients age  $\geq 60$  years presenting to otology clinic were selected for participation. Non-ambulatory patients were excluded. A total of 62 subjects (26 male) completed each of the following standardized questionnaires for hearing loss, dizziness, and tinnitus, respectively: Hearing Handicap Inventory Screening Form (HHI-S), Dizziness Handicap Inventory Screening Form (DHI-S), and Tinnitus Handicap Inventory Screening Form (THI-S). **Results:** Average scores for HHI-S, DHI-S, and THI-S were 12.0, 5.7, and 4.5, respectively. There was no significant relationship between patient age and each of the 3 handicap scores ( $p > 0.1$ ); however, women were found to score significantly higher than men on HHI-S, with averages of 14.4 and 8.6, respectively ( $p = 0.022$ ). Increased HHI-S and THI-S scores were both found to be independently correlated with increased DHI-S score ( $p < 0.01$ ). No significant relationship was identified between THI-S and HHI-S scores. **Conclusions:** Increased tinnitus and hearing handicaps were associated with greater severity of dizziness handicap, while no association was identified between tinnitus and hearing loss handicap. Age was not identified as a predictive factor for handicap severity, but female subjects reported higher hearing handicaps. Given the small sample size, further investigation into this topic is warranted.

**163. Malignant Otitis Externa Caused by Atypical Pathogens: A Report of Two Cases with Atypical Clinical Courses**

Daniel A. Strigenz, MD, Columbus, OH; Edward E. Dodson, MD, Columbus, OH; Christina T. Liscynesky, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the diagnostic and therapeutic challenges in treating chronic malignant otitis externa, demonstrate knowledge of a wide range of pathogens that may be potential etiologies of this infection, and consider the treatment and prognostic implications of these varied etiologic agents.

**Objectives:** Attendees will recognize the diagnostic and therapeutic challenges in treating chronic malignant otitis externa and will consider a wider range of pathogens as potential etiologies of this infection. **Study Design:** Case report of two independent cases of adult patients who presented with chronic malignant otitis externa characterized by an atypical clinical course and underlying microbial etiology. **Methods:** The patients' hospital records including microbiology and pathology were reviewed. A review of relevant otolaryngology, infectious disease, and microbiology literature was conducted. **Results:** Malignant otitis externa is an aggressive infectious process of the external auditory canal, which may progress to involve adjacent structures including the skull base. It typically occurs in patients with underlying immunodeficiency and is most commonly caused by pseudomonas aeruginosa. In these reports, we describe two patients with chronic malignant otitis externa initially managed with serial office debridements. Cultures repeatedly grew bacterial species from the corynebacterium genus and the patients were treated with oral and intravenous culture directed antibiotics. Despite the severity of bony necrosis seen on serial examinations, neither patient developed significant otalgia, cranial nerve deficits, or intracranial complications. Both patients eventually underwent operative debridement and have shown evidence of improvement at postoperative examinations. **Conclusions:** In each case described, the patients demonstrated an unusual clinical course and underlying etiology for malignant otitis externa. We hypothesize that the unusual causative agent in these cases led to a more indolent disease course, which may alter treatment strategies and portend a more favorable prognosis compared to a classic pseudomonas infection.

**164. The Utility of the MAUDE Database for Osseointegrated Auditory Implants (OAI)**  
Alex J. Tampio, BS, Richmond, VA; Daniel H. Coelho, MD, Richmond, VA

**Educational Objective:** Understand the limitations of the MAUDE, a centralized federal database, and highlight the need for more accurate and uniform reporting of OAI complications.

**Objectives:** To determine the utility of MAUDE in studying OAI related complications. **Study Design:** Retrospective review of public data stored in MAUDE. **Methods:** The MAUDE database was accessed on January 1, 2015 with all searches between January 1, 1996 and January 1, 2015. All reports were classified into 1 or more of six categories - implant, abutment, processor, skin, surgery, and other. Subcategories were generated to prevent overgeneralization. Other variables recorded included date of report, number of complications per report, manufacturer, and time from complication to report. **Results:** Over the study period there were 269 complications listed from 238 reports divided into the following categories: implant related (n=145), abutment related (n=16), processor related (n=13), skin and soft tissue related (n=79), surgery related (n=10), and other (n=6). No demographic data were available. There were no discernible trends from the data, and when compared to published literature, MAUDE data appears to under or misrepresent complications. **Conclusions:** The MAUDE database is limited in its design, and given fairly disparate reporting quality may not be ideally suited for quantifying risks of OAIs. These findings suggest the necessity for a substantially improved central registry for otologic implants and highlight the need for further research to investigate the root causes of their associated complications.

**165. Hearing Preservation after Penetrating Cochlear Injury**  
George S. Tarasidis, MD, Salt Lake City, UT; Richard H. Wiggins, MD, Salt Lake City, UT;  
Richard K. Gurgel, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to explain the basic principles of management of a penetrating cochlear injury.

**Objectives:** To share results and recommendations for the management of a unique case of penetrating traumatic cochlear injury. **Study Design:** Case report. **Methods:** A single patient underwent early repair of a penetrating cochlear injury and tympanoplasty after a projectile from a nail gun led to a traumatic cochleostomy with a narrow miss of both the facial nerve and intracranial carotid artery. **Results:** Postoperatively the patient's audiogram identified a down-sloping hearing loss worse in the high frequencies, a PTA of 47.5dB for air conduction and 35dB for bone conduction with a Word Recognition Score of 76%. **Conclusions:** Hearing loss from an acute penetrating cochlear injury can be mitigated with early repair, by minimizing inner ear trauma, and with the judicious use of steroids to treat post-traumatic labyrinthitis.

**166. Sudden Sensorineural Hearing Loss following Outside Constricting Force of the Neck**  
Rhett S. Thomson, BA, Salt Lake City, UT; Kevin F. Wilson, MD, Salt Lake City, UT

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

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tions of sudden sensorineural hearing loss.

**Objectives:** To explain and investigate a rare etiology of sudden sensorineural hearing loss. **Study Design:** Retrospective case study and review of literature. **Methods:** Pertinent clinical data involving sudden sensorineural hearing loss was extracted and examined. Literature review was conducted using PubMed to evaluate similar etiologies of sudden sensorineural hearing loss. Patient data was compared to the literature on the topic. **Results:** A 15 year old patient was placed in a forceful jujitsu headlock and subsequently experienced left sided sudden sensorineural hearing loss. Audiogram showed bone conduction and air conduction averages of 66.25 dB and 81.25 dB, respectively. MRI and physical exam showed no abnormalities. A literature review revealed no reported cases of constriction of the neck leading to this pathology, prompting the reporting of this case. The patient was treated with high dose oral prednisone for two weeks and recovered fully. **Conclusions:** Various etiologies have been described to cause sudden sensorineural hearing loss. This case of an outside constricting force on the neck leading to sudden sensorineural hearing loss can add insight to a limited body of literature on the topic.

## 167. Stapedius Tendon Lengths: Clinical and Academic Implications

Norman Wendell Todd, MD MPH, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the lengths of typical stapedius tendons, their bilateral symmetry, their relation with the small mastoid indicator of childhood otitis media, and the potential for an ossicular prosthesis to impinge on the pyramidal process.

**Objectives:** The length of the exposed stapedius tendon has both practical clinical and academic aspects. Clinically, the exposed tendon may be so short (with the pyramidal process so close to the stapes) that an ossicular replacement binds to the pyramidal process compromising hearing. Scientifically, describing the length in clinically normal temporal bones and describing bilateral symmetry and the relation to mastoid size may have ontogenic implications. **Study Design:** Post-mortem anatomic dissection of 41 adult crania without clinical otitis media. **Methods:** Viewing with an operative microscope, tendon lengths were measured with a fenestrometer type instrument. Mastoid sizes were determined radiographically. **Results:** Lengths ranged from 0.5 to 1.75 mm for right, and 0.5 to 1.5 mm for left ears; median 1.0 mm for both right and left. Bilateral symmetry for stapedius tendon length and for mastoid size was found:  $r_s = .51$  and  $.68$ , respectively, each  $P < .001$ . No association with mastoid size was suggested. **Conclusions:** Lengths of exposed stapedius tendons in clinically normal ears are surprisingly wide ranging (0.5 to 1.75 mm). Shorter lengths may predispose an ossicular replacement to bind to the pyramidal process compromising hearing. Statistically significant right-left symmetry of lengths was found.

## 168. Cochlear Erosion and Fistula in a Child Arising from Tympanic Membrane Retraction onto the Promontory

Jennifer A. Villwock, MD, Syracuse, NY; Ronald J. Schroeder, MD, Syracuse, NY; Charles I. Woods, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should better understand the pathophysiology of tympanic membrane (TM) retraction/cholesteatoma, that the difference between inert retracted TM and erosive cholesteatoma may not always be clinically apparent, and be familiar with cochlear erosion and fistula as a potential complication.

**Objectives:** Cochlear erosion is a rare complication of chronic ear disease and typically associated with cholesteatoma. We report the first case of cochlear erosion/fistula formation in a 5 year old in the setting of isolated severe tympanic membrane retraction and no frank cholesteatoma. We include audiologic and operative findings and review of the relevant literature. **Study Design:** Case report and literature review. **Methods:** A case of cochlear fistula in a 5 year old is described and the recent literature reviewed. **Results:** A 5 year old female presented with severe right tympanic membrane (TM) retraction hearing loss. Microscopic exam revealed retraction of the TM onto the promontory but no keratinaceous debris within the retracted area. Tympanoplasty and middle ear exploration was undertaken. Dissection of the TM from the promontory revealed cochlear erosion through both the bony and membranous portions. No fluid was encountered. Cartilage tympanoplasty with resection of the retracted and atelectatic drum was completed. Future hearing restoration options may include cochlear implant. **Conclusions:** Promontory cochlear erosion and fistula formation from severe TM retraction in the absence of cholesteatoma in a child has not been previously reported. The dense bone of the promontory offers resistance to such erosion, making cochlear fistula rare. Our case highlights the transition from inert retracted TM

to destructive cholesteatoma matrix is not always clinically apparent and that even in the absence of overt cholesteatoma, erosive complications may occur.

## Pediatrics

### 169. Enrollment in a Multidisciplinary Aerodigestive Clinic Decreases Length of Hospital Stay for Children with Special Health Care Needs

Swathi Appachi, MD, Cleveland, OH; Paul Krakovitz, MD FACS, Cleveland, OH; John C. Carl, MD, Cleveland, OH; Anne Banas, CNP, Cleveland, OH; Lisa Feinberg, MD, Cleveland, OH; Doug Henry, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss how enrollment in a multidisciplinary aerodigestive clinic improves outcomes and decreases costs for children with special health care needs by decreasing length of hospital stay.

**Objectives:** Children with special healthcare needs (CSHCN) utilize healthcare services more and therefore incur higher healthcare expenditures compared to other children. Previous studies have demonstrated that a medical home with coordinated care for CSHCN provides improved healthcare outcomes. This study aimed to elucidate if enrollment in a multidisciplinary aerodigestive clinic with comprehensive and coordinated care improved outcomes and reduced healthcare costs by decreasing admissions and inpatient days. **Study Design:** A retrospective chart review of 121 children who were enrolled in a pediatric multidisciplinary clinic at a tertiary care center was performed. **Methods:** Admissions data prior to and after enrollment were examined and the Wilcoxon signed rank test was performed to determine if there was a significant difference in admissions and inpatient days before and after enrollment. **Results:** Care in this clinic was coordinated between otolaryngology, gastroenterology, pulmonology, physical medicine and rehabilitation, speech pathology, and social work. Patients had a variety of comorbidities including prematurity, cerebral palsy, hypoxic ischemic encephalopathy, DiGeorge syndrome, VATERL syndrome, gastroesophageal reflux, and subglottic stenosis. No significant difference in number of admissions was seen with enrollment in the clinic ( $-0.30 \pm 2.16$  admissions,  $P=0.15$ ). However, there was a significant decrease of  $28.37 \pm 62.69$  inpatient days following enrollment ( $P<0.001$ ). When examining admissions for aerodigestive reasons alone, there was a similar significant decrease of  $22.66 \pm 58.95$  hospital days ( $P=0.008$ ). **Conclusions:** Enrollment in a multidisciplinary aerodigestive clinic significantly decreased inpatient days for CSHCN. These findings demonstrate that coordinated specialty care improves healthcare outcomes by decreasing hospital days and by lowering healthcare expenditures from a systems based perspective.

### 170. Pediatric Malignancies of the Facial Skeleton

Jacob S. Brady, BA, Newark, NJ; Emily Marchiano, BA, Newark, NJ; Tapan D. Patel, BS, Newark, NJ; Jean A. Eloy, MD, Newark, NJ; Soly Baredes, MD, Newark, NJ; Richard C. Park, MD, Newark, NJ

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the distribution of pediatric tumors of the head and neck skeleton and skull and evaluate the efficacy of their various treatment modalities.

**Objectives:** To analyze the demographics, survival, and treatment efficacy of pediatric tumors of the facial skeleton. **Study Design:** Retrospective study of cases from the US National Cancer Institute's Surveillance, Epidemiology, and End Results database. Pediatric patients between the ages of 0 and 18 who were diagnosed with a malignant tumor of either the bones of skull and face and associated joints or mandible from 1973 to 2012 were identified. **Methods:** Sex, race, age, histologic grade, survival years post-treatment, and cause of death were analyzed. Demographic information, 5 year disease specific survival (DSS), Log-Wilcox significance, and Kaplan-Maier curves were generated. **Results:** In total, 286 patients were included in the analysis. The average age of diagnosis was 15.92 ( $\pm 5.30$ ) with a slight inclination towards males with a male-to-female ratio of 1.36:1. Whites were the most commonly affected race (75.52%). Malignant mandible tumors account for 28.76% of the cohort ( $n=82$ ). The most common pathology was Ewing's sarcoma, which accounted for 19.23% of the cohort ( $n=55$ ). Among patients with known histologic data ( $n=107$ ), 57.01% were AJCC stage III or IV. Overall 5 year disease specific survival was 80.69%. When stratified by treatment modality, 5 year DSS was 88.22% for surgery alone, 65.34% for radiation alone, and 72.56% for surgery with adjuvant radiotherapy ( $p=0.0007$ ). **Conclusions:** This study represents the largest cohort of pediatric malignant tumors of the facial skeleton and skull. The most common and most effective treatment is surgery alone, which showed significant improvement in 5 year DSS.

# Posters

171. **Benign Paroxysmal Positioning Vertigo (BPPV) in Children and Adolescents with Post-Concussive Syndrome**  
Jacob R. Brodsky, MD, Boston, MA; Brandon A. Cusick, MBA, Boston, MA; Guangwei Zhou, ScD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to recognize the role of BPPV in children with dizziness following concussion.

**Objectives:** Dizziness is the second most common symptom of post-concussive syndrome. Benign paroxysmal positioning vertigo (BPPV) is an easily treatable cause of dizziness that can result from minor head injury, but is rarely described in children. Our objective was to evaluate the incidence of BPPV in children and adolescents presenting with persistent dizziness following concussion and to determine the timeliness of its diagnosis and management. **Study Design:** Retrospective review. **Methods:** We retrospectively reviewed the medical records of children and adolescents seen at a pediatric vestibular clinic and at a pediatric multidisciplinary concussion clinic over a 2 year period that presented with symptoms of persistent dizziness following concussion. Records of patients diagnosed with BPPV were further reviewed to determine features of presentation, timing of diagnosis, additional testing performed, and efficacy of treatment. **Results:** Fifteen patients (21.4%) were diagnosed with BPPV out of the 70 patients seen for dizziness in the setting of post-concussive syndrome. The diagnosis was made at a mean of 18.4 weeks (range 4.3 - 52) following the initial injury. Treatment with canalith repositioning maneuvers resulted in complete resolution of dizziness in 8 patients (53%), improvement in dizziness in 6 patients (40%), and no change in dizziness in 1 patient (7%). **Conclusions:** BPPV is a common and easily treatable cause of dizziness in children and adolescents with post-concussive syndrome. The diagnosis is often not made until months after the injury resulting in significant delay of appropriate treatment. Increased awareness of this condition among pediatric providers would lead to earlier diagnosis and treatment.

172. **Bradycardia following Intraoperative Administration of Dexmedetomidine during Tonsillectomy**  
Benjamin D. Bush, MD, Columbus, OH; Lin Chen, BA, Columbus, OH; Jennifer N. Cooper, MS PhD, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH; Joseph D. Tobias, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that dexmedetomidine use in tonsillectomy was associated with higher rates of postoperative bradycardia that does not require further cardiology workup.

**Objectives:** Intraoperative use of dexmedetomidine has increased in tonsillectomy due to its lack of respiratory depression compared to opioids and maintenance of the airway reflex. With increased use of dexmedetomidine at our institution, we have also noticed an increase in post-tonsillectomy bradycardia. We seek to determine whether intraoperative dexmedetomidine use in tonsillectomy is associated with postoperative bradycardia and if so, whether the bradycardia requires cardiology workup. **Study Design:** Retrospective cohort study. **Methods:** Medical charts of pediatric patients who underwent tonsillectomy or adenotonsillectomy at our institution were reviewed. Children with history of cardiac pathology or beta blocker use, as well as patients who were not admitted for inpatient monitoring, were excluded from the study. **Results:** 1084 patients were originally included in the study. Only 945 patients qualified for the study based on exclusion criteria. Of the 372 patients who received dexmedetomidine, 32 patients experienced post-tonsillectomy bradycardia (32/372=8.9%) within 24 hours of surgery. Of the 573 patients who did not receive dexmedetomidine, 34 patients experienced post-tonsillectomy bradycardia (34/573=6.1%). For the dexmedetomidine postop bradycardia group, 2 of 32 patients underwent EKG that did not reveal underlying cardiac pathology. For the non-dexmedetomidine postop bradycardia group, 2 of 34 patients underwent EKG that did not reveal cardiac pathology. No patients with postop bradycardia in either group required other cardiology interventions or followup. **Conclusions:** Post-tonsillectomy bradycardia is associated with intraoperative use of dexmedetomidine in the pediatric population. The bradycardia is transient and clinically insignificant, and therefore, obviates the need for additional cardiology interventions and followup.

- 173. Use of the Myocutaneous Pectoralis Major Flap in the Management of Complications in Pediatric Laryngotracheal Reconstruction**  
John M. Carter, MD, Chicago, IL; Jessica Van Beek King, MD, Chicago, IL; Julia F. Corcoran, MD, Chicago, IL; Dana M. Thompson, MD, Chicago, IL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand that in rare and challenging wound healing scenarios after pediatric laryngotracheal reconstruction a myocutaneous pectoralis major flap is a viable option.

**Objectives:** To demonstrate the potential utility of the myocutaneous pectoralis major flap in the management of complications in pediatric laryngotracheal reconstruction. **Study Design:** Case presentation. **Methods:** Review of a single case presentation. **Results:** Demonstration of a case of postoperative wound infection after a two stage laryngotracheal reconstruction in a five year old female. The patient had an exposed anterior costal cartilage graft after a wound infection. The wound was unsuccessfully managed with local wound care and an attempted fistula closure with a local sternocleidomastoid flap. The graft site was covered and wound was successfully closed with a myocutaneous pectoralis major flap. **Conclusions:** The myocutaneous pectoralis major flap is a viable option for repair in rare and challenging wound healing scenarios after pediatric laryngotracheal reconstruction.

- 174. Role of Adenoidectomy in Chronic Nasal Obstruction after Intranasal Steroid Therapy Failure**  
Peter J. Ciolek, MD, Cleveland, OH; Allen Xu, BS, Cleveland, OH; Katie R. Geelan-Hansen, MD, Cleveland, OH; Samantha Anne, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the efficacy of adenoidectomy in relieving symptoms of chronic nasal obstruction in children that fail intranasal steroid therapy.

**Objectives:** There is scant literature that addresses chronic nasal obstruction refractory to medical therapy and no studies that have evaluated the role of adenoidectomy in this setting. The objective of this study is to identify the characteristics of children that fail intranasal steroids for treatment of chronic nasal obstruction and to assess effectiveness of adenoidectomy in this subset of patients. **Study Design:** Retrospective chart review. **Methods:** All records were reviewed of patients ages 0-18 from 2011-2015 that underwent adenoidectomy for chronic nasal obstruction following treatment failure with intranasal steroids. Demographics, symptoms, treatment course, and operative data were collected. Adenoid size was graded by senior author based on volume filling the nasopharynx, endoscopically in clinic and/or by direct visualization in surgery. **Results:** Seventy-four cases were identified. Average age at time of presentation was 3.6 years. 25.7% of patients had known asthma, 16.2% had documented environmental allergies, and 20.3% were being treated with systemic antihistamines. The most common preoperative symptoms were mouth breathing (82.4%), nasal congestion (81.1%), snoring (71.6%), and rhinorrhea (37.8%). Average adenoid size was 78% preoperatively and 68% at the time of surgery. Symptoms improved dramatically postoperatively, with mouth breathing noted in 6.67% of patients, nasal congestion in 9.46%, snoring in 6.67%, and rhinorrhea in 9.46%. 98% of patients experienced overall improvement or resolution of their symptoms following adenoidectomy. **Conclusions:** This study demonstrates high incidence of allergy and asthma in children that fail intranasal steroid therapy in treatment of chronic nasal obstruction. Adenoidectomy is a highly effective intervention this subset of patients.

- 175. Rates of Tube Complications and Replacements in Syndromic vs Non-Syndromic Pediatric Patients**  
Conor M. Devine, MD, Cleveland, OH; Grace Wu, MD, Syracuse, NY; Katie Geelan-Hansen, MD, Cleveland, OH; Samantha Anne, MD, Cleveland, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the rates of complications experienced by both syndromic and non-syndromic pediatric patients following tympanostomy tubes and discuss the significance of these findings.

**Objectives:** Previous studies have estimated the rates of complications related to tympanostomy tube placement range anywhere from 10-30%. To our knowledge there are no studies that have examined rates of complications and replacement of tubes in syndromic (S) versus non-syndromic (NS) patients. The objectives of this study were to determine the rates of complications and need for replacement of tubes in syndromic children in comparison to non-syndromic pediatric patients. **Study Design:** Retrospective chart review. **Methods:** Charts of all pediatric patients who underwent tympanostomy tube insertion from 2012-2014 by a board certified pediatric otolaryngologist at a tertiary care pediatric hospital

# Posters

were reviewed. We examined demographic data, surgical data, postoperative complications and followup. **Results:** 264 patients who underwent tympanostomy tube placement during the study period met inclusion criteria - 66 syndromic and 198 non-syndromic. The three most common complications - otorrhea (S-13; NS-44), granulation tissue (S-4; NS-12), and tube blockage (S-6; NS-10) - were examined individually. There was no statistically significant difference between the two groups in incidence of these complications. In total, 20 syndromic patients experienced complications related to the tympanostomy tubes versus 69 in non-syndromic patients. This was not a statistically significant difference ( $p = 0.49$ ). Likewise, the rate of repeat tympanostomy tube placement between the two groups was not statistically significant (S-21 versus NS-54,  $p=0.498$ ). **Conclusions:** Although higher incidence of complications and need for tube replacements were expected in syndromic patients, this study reveals no significant difference in comparison to non-syndromic patients.

## 176. The Role of the Otolaryngologist in the Pediatric Head and Neck Burn Population, a Retrospective Analysis

Shumon I. Dhar, MD, Syracuse, NY; Anthony J. Mortelliti, MD, Syracuse, NY; Grace Wu, MD, Syracuse, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be aware of the common clinical presentations seen in the pediatric head and neck burn patients as well understand our role as otolaryngologists in their care.

**Objectives:** To characterize our institution's pediatric head and neck burn population and to ascertain the role of the otolaryngologist in the care of these children. **Study Design:** A retrospective analysis. **Methods:** Chart review of 101 consecutive pediatric burn patients from 2012-2014 at a tertiary care center. **Results:** 17 children out of the 101 that presented to the burn service had at least second degree perioral, facial, anterior neck, or chest burns, with a mean age of 9.1 years old. 65% of the patients had flame injuries and 35% had scald injuries. Two patients required intubation for airway distress. The otolaryngology service was consulted for airway assessment in only 4 children on admission. All the flexible fiberoptic nasopharyngolaryngoscopic exams revealed no evidence of airway obstruction or inflammation except for one patient who was already intubated by emergency staff after ingesting scalding liquid. All of the patients that required intubation for impending airway obstruction had already had their airway secured without an otolaryngology consultation. However, we were consulted for one child with inhalational injury for myringotomies prior to hyperbaric oxygen therapy. **Conclusions:** In our experience, the principal burn health care providers in a tertiary hospital were well equipped to assess and secure the airway of children. The role of the otolaryngologist, in terms of assessment of the airway never resulted in an escalation of airway interventions. However, in one intubated patient, our assessment did result in a more cautious extubation plan. Thus, as otolaryngologists, our role appears to be more valuable in secondary airway assessment.

## 177. A Systematic Review of Adenotonsillectomy Outcomes in Patients with Down Syndrome and Obstructive Sleep Apnea

Zachary Farhood, MD, Charleston, SC; Adrian A. Ong, MD, Charleston, SC; Shaun A. Nguyen, MD MA CPI, Charleston, SC; David R. White, MD, Charleston, SC

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) recognize the effects of adenotonsillectomy on obstructive sleep apnea in the Down syndrome population; and 2) recognize the need for further research in this area to determine optimal management.

**Objectives:** To describe the objective measures and benefits of adenotonsillectomy (AT) for the treatment of obstructive sleep apnea (OSA) in patients with Down syndrome (DS). **Study Design:** Systematic review using PubMed, Scopus, Ovid, EBSCO, Cochrane, and EMBASE databases. **Methods:** A systematic review of the medical literature was conducted to identify articles reporting objective outcomes following AT for OSA treatment in DS patients. Two reviewers screened titles, abstracts, and full text articles, and the references of the included full texts were screened for additional articles. Articles were critically appraised to assess level of evidence and bias and the results of articles were summarized. **Results:** Six articles were identified, including 1 randomized controlled trial, 1 prospective cohort study, and 4 retrospective chart reviews. All articles showed benefit from AT in the treatment of DS patients with OSA, but subjects frequently had persistence of OSA. **Conclusions:** There is relatively little objective data in the literature addressing AT efficacy in treating OSA in DS patients. Furthermore, that data is highly heterogeneous. DS patients show objective improvement in sleep parameters following AT for OSA, however this benefit is not as great as in non-syndromic patients. AT should be suggested as a first line treatment for DS children with OSA, keeping in mind that monotherapy may be insufficient for

this specific population. Future studies utilizing objective measures are required to further quantify the effect in this patient population.

**178. Diagnosis, Management, Outcomes and Cost of Treating Acute Cervical Lymphadenitis in Children**

Sean P. Holmes, MS-4, Orlando, FL; Kenneth A. Alexander, MD PhD, Orlando, FL;  
Kevin Sykes, PhD MPH, Kansas City, KS; Craig M. Johnson, DO, Orlando, FL; Daniel J.  
Podberesky, MD, Orlando, FL; Julie L. Wei, MD, Orlando, FL

**Educational Objective:** At the conclusion of this presentation, the participants should be able to characterize the diagnosis and management of pediatric cervical lymphadenitis at a regional children's hospital. Additionally, should be able to compare length of hospital stay and also hospital charges between the two different treatment groups.

**Objectives:** Our study aims to characterize the diagnosis and management of acute cervical lymphadenitis at a regional children's hospital and also to compare outcomes between two separate treatment groups. **Study Design:** Retrospective summary of all patients treated at a regional children's hospital from October 2013-December 2014. **Methods:** Data was collected through patient chart review and was analyzed. **Results:** Seventy patients (39 males), median age 5.5 years (range 6 months to 17 years) were reviewed. Admission occurred in 38 patients (54.3%). 42.9% underwent ultrasound and 27.1% underwent CT neck. Patients that were admitted had higher WBC s (median=15.2, range=5.8 to 36.4) vs. non-admitted (median=7.6, range=3.8 to 15.8;p<0.001), higher ESR (admitted, median=45, range=5 to 121 vs. non-admitted, median=8.5 range=3 to 34;p=0.05). Those who were admitted received ultrasound more often (p=0.001), same for CT (p<0.001). For the admission group, half received otolaryngology consultation. Overall, 25% underwent surgical incision and drainage (I&D). Aerobic, anaerobic, AFB cultures were obtained in 96.7%, 61%, and 32% of cases, respectively. Cultures were positive in 47.4% of aerobic and 5.6 % for each of anaerobic and AFB. Those undergoing I&D were more likely to have CT scan (p=0.028) and abscess on CT (p=0.02). Methicillin sensitive staph aureus was most common organism identified (44.4%, half of isolates were clindamycin resistant) followed by methicillin resistant staph aureus (33.3%, all were clindamycin sensitive). The median length of stay (LOS) was 1.5 days (range:1-13days). Within conservative treatment group, 9.6% of patients required readmission. Median charge of hospitalization for patients admitted with cervical lymphadenitis was \$15,154.50. **Conclusions:** Abscess or phlegmon identification on US or CT and leukocytosis predict admission for acute cervical lymphadenitis. ENT consultation and early I&D minimizes LOS and readmissions.

**179. Can Birth Trauma Cause Vocal Fold Immobility? A Systematic Review and Pooled Analysis**

Jad R. Jabbour, MD MPH, Milwaukee, WI; David J. Bougie, HSD, Milwaukee, WI; Thomas C.  
Robey, MD, Milwaukee, WI

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the present understanding of birth trauma related vocal fold immobility (BTVFI) and analyze whether or not BTVFI is a discrete entity from idiopathic congenital vocal fold immobility.

**Objectives:** To describe the present understanding of birth trauma related vocal fold immobility (BTVFI) and quantitatively compare BTVFI with idiopathic congenital vocal fold immobility (ICVFI) to determine if BTVFI is a discrete entity. **Study Design:** Systematic review and pooled analysis. **Methods:** A systematic review of the PubMed and Ovid databases from 1946 to July, 2015, was performed. English language, observational or experimental studies involving infants diagnosed by laryngoscopy with ICVFI or BTVFI were included. BTVFI diagnoses were based on determination by each study's authors that immobility occurred secondary to traumatic birth. Data from these studies was pooled with our institution's VFI database, and the resultant ICVFI and BTVFI cohorts were compared regarding baseline characteristics and outcomes of immobility. **Results:** The search returned 288 articles, 24 of which met inclusion criteria. Of series reviewing all cause infant vocal fold immobility (VFI), 88.9% identified BTVFI as a distinct etiology, though several different definitions of birth trauma and mechanisms of BTVFI were proposed. Subjects from these 24 studies combined with our institution's database yielded a total of 113 BTVFI and 188 ICVFI patients. BTVFI patients compared to ICVFI patients had a higher proportion of unilateral immobility (63.7% vs 22.9%, p<0.001) and rate of resolution (80.4% vs 62.4%, p=0.02). **Conclusions:** While the definition and mechanism of BTVFI warrant further investigation, these quantitative findings suggest that it is a distinct entity from ICVFI, with a unique presentation and natural history. This highlights the importance of birth history in infants with otherwise unexplained VFI, and offers vital information for counseling regarding patients with presumed BTVFI.

# Posters

## 180. Assessment of the Streptococcus Milleri Group on Adenoid Tissues

Jerin K. Joseph, BS, Gainesville, FL; Patrick J. Antonelli, MD, Gainesville, FL; William O. Collins, MD, Gainesville, FL; Rodrigo C. Silva, MD, Gainesville, FL; Carolyn O. Dirain, PhD, Gainesville, FL

**Educational Objective:** At the conclusion of this presentation, the participants will learn if the *S. milleri* group is more predominant in adenoid tissues from patients with recurrent acute otitis media (RAOM) or chronic otitis media with effusion (COME) compared to patients with obstructive sleep apnea (OSA).

**Objectives:** The streptococcus milleri group is a subgroup of viridans streptococci that includes *S. anginosus*, *S. intermedius*, and *S. constellatus*. The *S. milleri* group is commonly found in the upper aerodigestive tract and has been implicated in the exacerbation of a variety of serious infections. The objective of this study was to determine if the *S. milleri* group constitutes a greater microbial burden in adenoid tissues from patients with recurrent acute otitis media (RAOM) or chronic otitis media with effusion (COME) compared to patients with obstructive sleep apnea (OSA). **Study Design:** Controlled, ex vivo. **Methods:** Human adenoids were obtained from children undergoing adenoidectomy for RAOM (n=7), COME (n=5), or OSA (n=16). Specimens were processed for total deoxyribonucleic acid (DNA) isolation. All specimens were analyzed by real time polymerase chain reaction for the quantification of the *S. milleri* group and total bacterial load. **Results:** All adenoid specimens had evidence of microbes with levels that were not different between the three groups (p=0.20). DNA levels of *S. anginosus* and *S. intermedius/S. constellatus* were not different in adenoids from RAOM patients as compared to those with OSA. In contrast, adenoids from patients with COME displayed higher DNA levels of *S. anginosus* (p=0.005) and *S. intermedius/S. constellatus* (p= 0.02) compared to those with RAOM or OSA. **Conclusions:** The microbial load of the *S. milleri* group appears to be higher in patients with COME. The role of the *S. milleri* group in the pathogenesis of COME warrants further exploration.

## 181. Return to System within 30 days of Discharge following Pediatric Tonsillectomy and Adenotonsillectomy

Kaelyn A. Krook, MD, Atlanta, GA; Samir S. Sarda, BS, Atlanta, GA; Joshua J. Chern, MD PhD, Atlanta, GA; Roy R. Rajan, MD, Atlanta, GA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to identify factors associated with admission/return to system following adenotonsillectomy.

**Objectives:** Hospital returns and readmissions after discharge have been a growing measure of quality and cost control. Tonsillectomies with or without adenoidectomy occur commonly in the pediatric population and, as a result, account for a significant portion of pediatric healthcare resources. The procedure(s) have documented safety in the outpatient setting, but can be associated with significant morbidity and associated return to the hospital. This study examines the rates of readmission and reoperation following pediatric tonsillectomy with or without adenoidectomy in a high volume hospital system to further clarify associated factors. **Study Design:** A retrospective cohort study of children undergoing tonsillectomy with or without adenoidectomy between January 1, 2010 and December 31, 2013 was done at a single institution with multiple hospitals. Clinical events within the 30 days following discharge were reviewed. **Methods:** The following events of interest were analyzed for risk factor associations using multivariate logistic regression: return to the emergency department (ED), all cause readmission, otolaryngology readmissions and related reoperations. **Results:** Of the 10,969 adenotonsillectomies, the rate of all cause readmission was 2.0% (n=193). Of the 193 readmissions, 69 were associated with an operation with 63 being performed by an otolaryngologist. Of these operations, two were unrelated to the index procedure, resulting in 61 related reoperations (reoperation rate = 0.6%). In addition, 7 patients underwent control of bleeding and were discharged home afterward. The remaining 124 readmissions were nonsurgical, and only 81 were admitted to the otolaryngology service for issues related to the index procedure. There was significant variability in readmission rate between the hospitals. Patients were more likely to return to the ED and be readmitted if their native language was not English (odds ratio= 1.70, p value= 0.025), and if the length of stay during their index visit was greater than or equal to 2 days (odds ratio = 2.46, p value= 0.001). **Conclusions:** The all cause readmission rate within 30 days of discharge following either adenotonsillectomy or tonsillectomy alone was 2.0%, there was 0.6% rate (68/10,969) of related reoperation due to oropharyngeal bleeding. Language barriers and staying in the hospital 2 days or longer seem to be risk factors for returning to the hospital and being admitted. Determining the preventability of readmissions warrants further investigation into both site specific practice patterns and into the clinical factors that influence post-surgical admissions immediately after outpatient tonsillectomy.

182. **Diagnosing Tongue Base Obstruction in Infants with Pierre-Robin Sequence: Is Sleep Endoscopy Superior to Awake Endoscopy?**  
Jake J. Lee, BS, Pittsburgh, PA; Noel Jabbour, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the diagnostic utility between awake endoscopy and sleep endoscopy for detecting base of tongue obstruction in infants with Pierre-Robin sequence.

**Objectives:** To investigate whether awake endoscopy can diagnose base of tongue obstruction as reliably as sleep endoscopy in infants with Pierre-Robin sequence. **Study Design:** Systematic review of case control studies. **Methods:** A retrospective review of 141 infants with PRS managed between 2005 and 2015 was conducted. Thirty-five underwent both bedside awake flexible fiberoptic nasopharyngolaryngoscopy and drug induced sleep endoscopy in the operating room. Base of tongue collapse was considered pathologically obstructed if described as moderate or severe or classified as Yellen grade 2 or 3. Sensitivity, specificity, and positive likelihood ratio of awake endoscopy findings were calculated with 95% confidence intervals (CI). McNemar's test was also utilized to examine inter-test differences. **Results:** Awake endoscopy was performed at a median age of 5.5 days (range 0 to 61), and drug induced sleep endoscopy was performed at a median age of 21 days (range 0 to 216). Awake endoscopy had 50.0% sensitivity (CI 27.2-72.8%) and 86.7% specificity (CI 59.5-98.3%) for detecting base of tongue obstruction compared to drug induced sleep endoscopy; false negative rate was 28.6% (N=10). Positive likelihood ratio was 3.75 (CI 0.96-14.65). Compared to awake endoscopy, sleep endoscopy demonstrated significantly more cases of base of tongue obstruction ( $p = 0.039$ ). **Conclusions:** Bedside awake endoscopy has low sensitivity for detecting base of tongue collapse in infants with Pierre-Robin sequence. Due to the substantial number of false negatives, awake endoscopy may not be a reliable diagnostic modality for ruling out tongue base obstruction in this susceptible population. Drug induced sleep endoscopy may be indicated in high risk patients in order to avoid missing the diagnosis of upper airway obstruction.

183. **Systematic Review of Surgery for Persistent Pediatric Tracheocutaneous Fistula (TCF)**  
Sean M. Lewis, MD, Brooklyn, NY; Hamid Arjomandi, MD, Brooklyn, NY; Richard M. Rosenfeld, MD MPH, Brooklyn, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the treatment outcomes and adverse event rates for primary closure compared to simple excision with healing by secondary intention for persistent TCF in children.

**Objectives:** To compare the treatment outcomes and adverse event rates for primary closure compared to simple excision with healing by secondary intention for persistent TCF in children. **Study Design:** Systematic review. **Methods:** Systematic review using PRISMA reporting standards. Medline, Embase, Cochrane library, and reference sections were used to identify articles. Inclusion criteria were case series or comparative studies of surgery for persistent TCF in children under age 18 years. Exclusion criteria were age 18 years or older, duplicate patient series, case series less than 2 patients, or case reports. Data were pooled using random effects meta-analysis to estimate incidence rates and comparative effectiveness. **Results:** The initial data search identified 104 articles, 20 were included in full text review, 14 in the final data set after eligibility assessment by two independent reviewers. There were 413 patients treated with excision with primary closure and 233 patients treated with excision with closure by secondary intention. Pooled success rates were 95.7% with primary closure (95% CI, 93.1-97.4%) and 92.7% with secondary intention (95%, 88.4-95.4%). Subcutaneous emphysema or urgent airway problems were uncommon, occurring in 3.8 and 3.6% of patients, respectively. Five studies had data suitable for comparative meta-analysis, which showed no differences by closure technique for treatment success ( $p=0.480$ ), overall complications ( $p=0.551$ ), need for revision surgery ( $p=0.624$ ), or the incidence of subcutaneous emphysema or pneumothorax ( $p=0.512$ ), urgent airway problems ( $p=0.126$ ), wound infection ( $p=1.00$ ), or wound dehiscence or fistula ( $p=0.818$ ). **Conclusions:** There are no differences in the rates of success or complications with surgical closure of TCF in children, whether performed by primary closure or by secondary intention. Both techniques have high success rates with a low incidence of serious complications.

# Posters

## 184. Does Brodsky Classification of Tonsil Size Predict Degree of Lateral Pharyngeal Wall Obstruction Seen in Pediatric Patients Undergoing Sleep Endoscopy?

Craig Miller, MD, Seattle, WA; Patricia L. Purcell, MD MPH, Seattle, WA; John Dahl, MD PhD, Indianapolis, IN; Kaalan Johnson, MD, Seattle, WA; David Horn, MD, Seattle, WA; Sanjay Parikh, MD, Seattle, WA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to evaluate the utility of drug induced sleep endoscopy as an adjunct for identification of airway obstruction contribution to sleep disordered breathing.

**Objectives:** To determine whether degree of lateral pharyngeal wall (LPW) obstruction on pediatric drug induced sleep endoscopy (DISE) correlates with pre-procedure Brodsky tonsillar hypertrophy score on physical examination. **Study Design:** Retrospective review of 140 patients who underwent DISE at a single pediatric tertiary care center over a four year period. **Methods:** Inclusion criteria were documentation of Brodsky score on preoperative physical examination. Exclusion criteria were previous tonsillectomy. LPW obstruction was graded for each patient from 0 (no obstruction) to 3 (severe obstruction) using the validated Chan-Parikh (C-P) score, a pediatric scoring system for DISE. Data were analyzed using multivariate linear regression controlling for age at time of DISE and presence of comorbid conditions. **Results:** Eighty patients met criteria for analysis. Median age at DISE was 6.1 years. A moderate positive correlation was calculated between Brodsky score and C-P LPW score, Spearman correlation coefficient 0.57,  $p < 0.001$ . Linear regression modeling determined that for every one point increase in tonsil score, there was a 0.75 point increase in C-P LPW score (95% CI [0.45, 1]). Sensitivity analysis did not detect a difference in correlation between children with syndromic comorbid conditions and children who were otherwise in good health. **Conclusions:** This study detected a moderate degree of correlation between Brodsky and LPW score. The majority of children with a Brodsky score of 1 did not demonstrate any LPW obstruction, and several children who did not have tonsillar hypertrophy demonstrated severe obstruction. This is further evidence that DISE serves as a useful method for evaluating airway obstruction contributing to sleep disordered breathing.

## 185. Characterization of Sleep Architecture in Down Syndrome Patients Pre and Post Airway Surgery

Mark M. Mims, MD, Pittsburgh, PA; Prasad J. Thottam, DO, Pittsburgh, PA; Dennis J. Kitsko, MD, Pittsburgh, PA; Amber D. Shaffer, PhD, Pittsburgh, PA; Sukgi G. Choi, MD, Pittsburgh, PA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the sleep architecture patterns of Down syndrome patients with non-Down syndrome patients as well as explain the effect of airway surgery on the sleep architecture of Down syndrome patients.

**Objectives:** To define obstructive sleep architecture (SA) patterns in Down syndrome (DS) children and postoperative changes in SA. **Study Design:** Retrospective review. **Methods:** 45 pediatric DS patients who underwent airway surgery between 2003 and 2014 at a tertiary children's hospital for obstructive sleep apnea (OSA) were reviewed. Respiratory parameters and SA were compared to non-DS pediatric normative data and postoperative changes were assessed using t-tests and Wilcoxon signed rank test. **Results:** 22 patients were male. 30 patients underwent tonsillectomy and adenoidectomy, 4 adenoidectomy, 10 tonsillectomy, and 1 base of tongue reduction. For SA, patients were divided into two groups based on age (<6 years and  $\geq 6$  years). Percent total sleep time in each stage was compared to previously published age matched normative SA data (control). Preoperatively, all DS children spent less time in REM and N1 ( $p < 0.02$ ) when compared to control. DS children <6 spent more time in N2 than control ( $p < 0.0001$ ). DS children  $\geq 6$  spent more time than control in N3 ( $p = 0.003$ ). Postoperatively, all DS children spent more time than control in N2 ( $p < 0.02$ ) and less time in REM ( $p < 0.001$ ) and N1 ( $p < 0.002$ ). Postoperative SA in DS children did not differ from preoperative SA except for an increase in time spent in N1 ( $p = 0.007$ ). Surgery did reduce median AHI ( $p = 0.004$ ), OAH1 ( $p = 0.006$ ), hypopneas ( $p = 0.005$ ), apneas ( $p = 0.0001$ ), and central apneas ( $p = 0.02$ ), and increased the lowest oxygen saturation ( $p = 0.03$ ). **Conclusions:** DS is a unique population with different SA patterns than the general pediatric population. Airway surgery has little impact on their SA.

**186. Velopharyngeal Insufficiency and Success Rate of Adenotonsillectomy in Prader-Willi and Trisomy 21 Patients**

Reema K. Padia, MD, Salt Lake City, UT; Harlan R. Muntz, MD, Salt Lake City, UT; Kathleen D. Pfeffer, MD, Salt Lake City, UT; Jeremy D. Meier, MD, Salt Lake City, UT

**Educational Objective:** At the conclusion of this presentation, the participants should be able to compare the success rates of adenotonsillectomy for Prader-Willi patients and trisomy 21 patients and also discuss how to best address these patients' obstructive sleep apnea while minimizing the complication of velopharyngeal insufficiency.

**Objectives:** Adenotonsillectomy (T&A) is a common procedure performed to address obstructive sleep apnea (OSA) in Prader-Willi (PW) and trisomy 21 (T21) patients. This study evaluates the rate of velopharyngeal insufficiency (VPI) after T&A and success rate of T&A for each group. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review was performed on ICD-9 coded PW and T21 patients between 2005 and 2015 who underwent T&A for OSA. The frequency of VPI after T&A, improvement in OAHl, and persistent OSA after T&A were determined for each group. **Results:** The study cohort included 22 PW patients and 44 T21 patients who had undergone T&A. 18% (N=4) of the PW patients had postoperative VPI requiring a corrective surgical procedure, while there were no patients within the T21 cohort who had identified VPI ( $p<0.05$ ). In those patients that had a postoperative polysomnogram, the mean decrease in OAHl of the PW and T21 patients measured 8.4 and 4.7 points, respectively ( $p=0.3$ ). 54% of the PW patients and 76% of the T21 patients that had a followup polysomnogram demonstrated persistent severe OSA postoperatively. **Conclusions:** This study demonstrated a relatively high rate of VPI after T&A in children with PW, particularly when compared to another at risk cohort of children with T21. While the OAHl decreased after T&A in both groups, a significant number of children with PW or T21 had persistent severe OSA. Further investigation into the optimal management of OSA, while preventing treatment complications such as VPI, is needed for children with these high risk conditions.

**187. Neonatal Columellar Necrosis: Tailoring Repair Based on Changes in Nasal Form over Time**

Anju K. Patel, MD, Boston, MA; Megan E. Kassick, BS, Boston, MA; Andrew R. Scott, MD, Boston, MA

**Educational Objective:** At the conclusion of this presentation, the participants should be able to 1) discuss etiologies of neonatal columellar necrosis; and 2) describe variants of columellar necrosis.

**Objectives:** 1) To review the complication of columellar necrosis due to nasal continuous positive airway pressure (CPAP) use in the neonatal period; 2) to describe the manifestations of neonatal columellar necrosis over different age groups and demonstrate morphological variants; and 3) to describe different repair techniques for neonatal columellar necrosis based on variant type. **Study Design:** Retrospective case series. **Methods:** Pediatric patients who presented to a tertiary care center from 2011-2014 with findings consistent with neonatal columellar necrosis were identified through a photographic database. Deformity features were categorized into four areas: medial crural footplate erosion (MCFE), caudal septum buckling (CSB), loss of tip support (LTS), and external nasal valve collapse (ENVC). Preoperative presentation, surgical interventions, and postoperative outcomes were assessed. **Results:** Six patients were identified (age range: 50 days to 12 years). Acquired nasal deformity with or without nasal obstruction was the primary symptom in all patients. All six patients had MCFE; three with CSB, two with ENVC, and two with LTS. The two oldest patients underwent surgery tailored to the nature of deformity. A patient with MCFE, ENVC, and LTS underwent open repair using auricular cartilage columellar strut and onlay grafts in a gullwing fashion. A patient with MCFE and CSB underwent endonasal repair with a caudal extension graft. **Conclusions:** This case series highlights the immediate and delayed presentation of neonatal nasal CPAP induced columellar necrosis and the evolution of this deformity over time. Auricular cartilage grafting may be an effective technique for nasal reconstruction that allows for early repair without affecting midface growth.

**188. Expanded Polysomnographic Outcomes following Adenotonsillectomy in Patients with Down Syndrome**

John D. Prosser, MD, Augusta, GA; Oscar M. Rodriguez, MD, Jackson, MS; Sally R. Shott, MD, Cincinnati, OH; Narong N. Simakajornboon, MD, Cincinnati, OH; Stacey L. Ishman, MD, Cincinnati, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the expected polysomnographic outcomes following adenotonsillectomy in patients with Down syndrome.

# Posters

**Objectives:** Our aim was to evaluate polysomnographic (PSG) outcomes following adenotonsillectomy in patients with Down syndrome (DS). Patients with DS commonly have obstructive sleep apnea. Adenotonsillectomy is primary treatment for OSA, however there is limited data regarding the effects of surgery on PSG parameters. **Study Design:** Retrospective case series. **Methods:** We included all patients with DS who underwent polysomnography before and after adenotonsillectomy at a tertiary care center from 2003-2013. Non-parametric analysis of variables was carried out. **Results:** There were 74 patients who met inclusion criteria. The mean age at surgery was  $5.1 \pm 3.1$  years and 40.5% were female. The mean apnea-hypopnea index (AHI) was  $10.0 \pm 14.3$  events/hour before surgery and  $4.58 \pm 5.1$  after surgery. The median overall AHI improvement was 2.85 events/hour [range -26.5-114] ( $p < 0.0001$ ) and obstructive index improved 2.85 events/hour [range -26.6-114] ( $p < 0.0001$ ). The mean oxygen nadir improved from 84% to 89% ( $p = 0.001$ ). The mean time with  $\text{CO}_2 > 50\text{mmHg}$  improved from 19.9 to 14.0 minutes but was not significant ( $p = 0.09$ ). There were no significant changes in the central index, apnea index (OA+MA/time) or percentage of rapid eye movement (REM) sleep. After surgery, the AHI was  $< 5$  events/hour in 72% and  $< 1$  in 7% of patients. **Conclusions:** Adenotonsillectomy improved AHI, the obstructive index and saturation nadir in patients with DS, however persistent abnormalities were common. This reinforces the recommendation that repeat PSG is indicated following adenotonsillectomy in patients with DS and OSA.

## 189. Dysgnathia Complex: A Case Report with Review of the Literature

Stephanie E. Teng, MD, New York, NY; Sonya Marcus, MD, New York, NY; Scott M. Rickert, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to describe the etiology of this craniofacial anomaly and the challenges and considerations that must be taken in the management of the upper airway.

**Objectives:** Describe the etiology of this craniofacial anomaly and the challenges and considerations that must be taken in the management of the upper airway. **Study Design:** Case report with review of the literature. **Methods:** Our case refers to a 5 year old boy born at 31 weeks via caesarean section. Mandibular agenesis was first identified during prenatal ultrasound. Computed tomography (CT) revealed a horseshoe shaped bone representing a diminutive mandible or hyoid bone, as well as left choanal stenosis and right choanal atresia. Chromosome analysis and microarray were normal. Direct laryngoscopy and bronchoscopy were performed which revealed a narrowed oropharynx with a shelf of tissue posteriorly and a laryngeal inlet with no discernable opening. No anatomic variations of the distal trachea or bronchi were noted. The child is tracheostomy and PEG dependent. To date he has undergone multiple surgeries for treatment of his microstomia (4 mm) and agnathia including insertion of a submental tissue expander, construction of mandible with a rib graft, and multiple rhomboid flaps. **Results:** Dysgnathia complex involves disrupted development of the first pharyngeal arch during weeks 4-7 of gestation. Historically, prognosis is extremely poor and those that survive beyond 2 months represent  $< 5\%$  of the documented cases. However, due to advancements in prenatal diagnosis and post-delivery management the prognosis is increasingly optimistic. **Conclusions:** Tracheotomy is currently the definitive airway management for these patients. However, with a greater understanding of the anatomic variations present in these patients other treatment options can be explored.

## 190. The Use of Steroids in the Management of Chronic Airway Foreign Bodies: A Case Report and Review of Literature

Stephanie E. Teng, MD, New York, NY; Sonya Marcus, MD, New York, NY; Scott M. Rickert, MD, New York, NY

**Educational Objective:** At the conclusion of this presentation, the participants should be able to understand the role of steroids in the management of chronic airway foreign bodies.

**Objectives:** Chronic airway foreign bodies are retrieved using techniques ranging from bronchoscopy to partial pneumonectomy. Inflammation and granulation tissue contribute to the difficulty in extracting chronic airway foreign bodies, yet there is no literature regarding the efficacy of steroids in the management of these patients. We present a patient in which administration of steroids enabled successful removal of multiple previously irretrievable chronic airway foreign bodies. **Study Design:** Case report with review of the literature. **Methods:** We report the case of a trach dependent 12 year old boy with recurrent pneumonias secondary to retained foreign bodies. He aspirated two teeth during an apneic event three years prior; their presence was confirmed on computerized tomography (CT) scan. During his most recent hospital admission flexible bronchoscopy revealed two teeth surrounded by granulation tissue causing 80-90% bronchial obstruction. Because the teeth could not be removed, he was started on antibiotics and Solu-Medrol. A subsequent flex-

ible bronchoscopy days later was again unsuccessful but showed improvement in the granulation tissue. Thus, steroids were continued for 7 more days. At that time, rigid bronchoscopy was performed and showed minimal granulation tissue remaining. The teeth were easily removed with optical forceps. **Results:** Chronic airway foreign bodies can be difficult to extract given the local inflammation and granulation tissue that can develop. In this case, steroids were instrumental in the removal of previously irretrievable chronic airway foreign bodies. **Conclusions:** Steroids may be an essential adjunct treatment in the management of chronic airway foreign bodies and may prevent more invasive procedures.

191. **The Effect of Perioperative Dexamethasone Dosing on Post-Tonsillectomy Hemorrhage Risk**  
Yin Yiu, MD, Columbus, OH; Justin B. Mahida, MD, Columbus, OH; Jennifer N. Cooper, PhD, Columbus, OH; Nicole M. Elsey, MD, Columbus, OH; Tyler B. Merrill, BA, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH

**Educational Objective:** At the conclusion of this presentation, the participants should be able to discuss the merits and controversies of dexamethasone use in the care of the pediatric post-tonsillectomy patient, particularly regarding its effect on secondary hemorrhage risk.

**Objectives:** Dexamethasone is currently recommended for routine prophylaxis against postoperative nausea and vomiting after tonsillectomy procedures. However, some studies have raised concern that dexamethasone use may lead to higher rates of post-tonsillectomy hemorrhage (PTH). Our objective is to determine whether higher doses of dexamethasone administered perioperatively during tonsillectomy procedures are associated with an increased risk of secondary PTH. **Study Design:** Retrospective case control study. **Methods:** We conducted a retrospective review of 9843 patients who underwent tonsillectomy or adenotonsillectomy and received dexamethasone at our institution from January 2010 to October 2014. We compared the dose of dexamethasone administered to patients who did and did not develop secondary PTH using Mann Whitney U tests. Multivariable logistic regression models were used to evaluate the association between dexamethasone dose and PTH after adjustment for confounding demographic and clinical characteristics. **Results:** A total of 280 (2.8%) patients developed secondary PTH. Patients who developed PTH tended to be older (median (interquartile range) 7 (4-11) vs. 5 (3-8) years),  $p < 0.001$ ) and had undergone tonsillectomy more often for chronic tonsillitis or adenoiditis but less often for tonsillar or adenotonsillar hypertrophy or sleep disturbances. Dexamethasone dose was significantly lower on average in patients with PTH (median (interquartile range) 0.19 (0.14, 0.23) mg/kg vs. 0.21 (0.17, 0.30),  $p < 0.001$ ). Multivariable modeling demonstrated that the dose of dexamethasone was not significantly associated with PTH after adjustment for age. **Conclusions:** There does not appear to be a dose related increase in the risk of PTH for patients receiving dexamethasone during tonsillectomy procedures.



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