114th Annual Meeting
Sheraton Chicago Hotel & Towers
Chicago, Illinois
April 29-30, 2011

About the Triological Society

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

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

Mission Statement

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

Goals

- To disseminate the latest basic and evidence based clinical research findings pertaining to the diagnosis, treatment and prevention of the full spectrum of disorders of the head and neck and related structures in pursuit of improved patient care.
- To provide a forum for the international exchange of ideas and knowledge in otolaryngology-head and neck surgery and related fields of medicine and science.
- To provide for physician professional development through support of teaching and peer reviewed research.
- To encourage the highest ethical and professional standards in the delivery of patient care by otolaryngologists-head and neck surgeons.
- To promote academic excellence by requiring peer recommendations and an acceptable mentored thesis for admission to membership.
- To ensure that all educational activities comply with ACCME requirements.
- To ensure the continuation of the noble legacy of the Triological Society by mentoring young otolaryngologists to become scholars and leaders.

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

Educational Objectives for Program

At the end of this activity, participants will be able to:

- Discuss the diagnosis and anatomic evaluation of patients with sleep apnea;
- Understand the treatment options for sleep apnea;
- Describe the appropriate multimodality treatment protocols for head and neck cancer;
- Assess the multiple causes of refractory sinusitis and discuss multimodality effective treatment options;
- Understand the role of transoral robotic surgery in malignant and benign disease;
- Discuss the management of the airway in laryngeal trauma.

Accreditation Statement

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

AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of 11 *AMA PRA Category 1 Credits™.* Physicians should claim only the credit commensurate with the extent of their participation in the activity.

American College of Surgeons
Division of Education

Exhibits/Commercial Support

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 and commercial support are in compliance with the Accreditation Council for Continuing Medical Education (ACCME) revised Standards for Commercial Support.

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

Program Evaluation and CME Certificates

Participant comments on program evaluation forms assist Program Advisory Committees in determining the direction of future educational activities. We appreciate your input and request that you complete a program evaluation in exchange for a certificate of attendance. Records are maintained in the Administrative Office of the Society and maintained by the American College of Surgeons for Fellows of the College. Requests may be made by sending a self-addressed envelope to:

Triological Society

13930 Gold Circle, Suite 103 • Omaha, NE 68144 • 402-346-5500

Program Planning and Advisory Committee

American College of Surgeons
CME JOINT SPONSORSHIP PROGRAM

American College of Surgeons
Division of Education

Faculty Disclosure Information
Triological Society 114th Annual Meeting
April 29-30, 2011
Chicago, Illinois

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. 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**. A "commercial interest" is defined as any proprietary entity producing health care goods or services consumed by, or used on patients. The ACCME does not consider providers of clinical service directly to patients to be commercial interests. "Relevant" financial relationships are financial transactions (in any amount) occurring within the past 12 months that may create a conflict of interest.

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

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

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

SPEAKERS / MODERATORS/ CHAIRS / DISCUSSANTS	NOTHING TO DISCLOSE	DISCLOSURE (As it pertains to the content of the presentation)
Samer Al-khudari, MD	X	
Ashley E. Balaker, MD	X	
Soly Baredes, MD	X	
Jennifer L. Bergeron, MD	X	
Gerald S. Berke, MD	X	
Jimmy J. Brown, MD	X	
Craig A. Buchman, MD		Advanced Bionics Corp (consulting fee - consultant); Anspach Corp (consulting fee - consultant); Cochlear Corp (consulting fee - consultant); MedEL Corp (consulting fee - consultant)
Eugenia Chu, MD	X	
Janet Chung, MD	X	
Robert H. Deeb, MD	X	
Robert L. Ferris, MD PhD FACS	X	
Keith D. Forwith, PhD MD		Intersect ENT (contracted research - PI)
Marc J. Gibber, MD	X	
Paul W. Gidley, MD	X	
M. Boyd Gillespie, MD MSc		Karl Storz (honorarium - helped teach course in salivary endoscopy arranged by Karl Storz)
Andres N. Godoy, MD	X	
Stacey L. Halum, MD	X	
Marlan R. Hansen, MD	X	
Luke D. Harris, MD	X	
Christian P. Hasney, MD	X	

FACULTY DISCLOSURE LIST

Yasuyuki H. Hinohira, MD PhD	X	
Harukazu Hiraumi, MD PhD	X	
Theresa A.M. Holler, MD	X	
Amy K. Hsu, MD	X	
Bradley J. Hubbard, BSc MD	X	
Stacey L. Ishman, MD MPH		First Line Medical (honorarium - contractor)
Adrian L. James, DM FRCS	X	
Jonas T. Johnson, MD	X	
Ashutosh Kacker, MD	X	
Shin-ichi Kanemaru, MD PhD	X	
David W. Kennedy, MD	X	
Robert C. Kern, MD	X	
Joseph A. Knowles, MD	X	
Tsuyoshi Kojima, MD	X	
Stilianos E. Kountakis, MD PhD		Merck (honorarium - speaker)
Linda N. Lee, MD	X	
Yuan Lin, PhD	X	
Mohammad U. Malik, MD	X	
Pavan S. Mallur, MD	X	
Edward D. McCoul, MD MPH	X	
Saral Mehra, MD MBA	X	
Abie H. Mendelsohn, MD	X	
Ralph B. Metson, MD	X	
Alan G. Micco, MD		Alcon Laboratories (honorarium - speaker
Ron B. Mitchell, MD	X	
Brian A. Nussenbaum, MD	X	
Steven Michael Olsen, MD	X	
Michael Orestes, MD	X	
Noah P. Parker, MD	X	
Lorne S. Parnes, MD	X	
Harold C. Pillsbury, MD	X	
Ryan P. Reddy, MD	X	
John S. Rhee, MD MPH	X	
Lord Bernard Ribeiro Kt CBE FRCS FACS (Hon.)	X	
Yvonne L. Richardson, MD	X	
Jeremy D. Richmon, MD	X	
Scott Rickert, MD	X	
Scott M. Rickert, MD	X	
Pamela C. Roehm, MD PhD	X	
Brian W. Rotenberg, MD MPH FRCSC	X	
Jeffrey L. Schmidt, MD	X	
Samuel H. Selesnick, MD		Medtronic ENT (royalty agreement)
Brent A. Senior, MD		Brainlab (honorarium - consultant); ENTrigue (honorarium - consultant/stockholder); Olympus Gyrus (honorarium - consultant)
Clough Shelton, MD		Cochlear Corp (research grant - researcher); Synthes Corp (research grant through AO Foundation - researcher)
Timothy L. Smith, MD MPH		ENTrigue (consulting fee - consultant); Intersect (consulting fee - consultant); NIH grant (salary support - PI)
Lucian Sulica, MD	X	
Erica Robb Thaler, MD	X	
Dana M. Thompson, MD	X	
Rohan R. Walvekar, MD	X	
Marilene Wang, MD	X	
Edward M. Weaver, MD MPH	X	
D. Bradley Welling, MD PhD	X	

FACULTY DISCLOSURE LIST

Jacob L. Wester, BS	X	
B. Tucker Woodson, MD		Inspire Medical (research - PI; honorarium - consultant); Johnson & Johnson Resmed (honorarium - consultant); Medtronic (honorarium - consultant; royalty - patent); Siesta (honorarium - consultant)
Arthur W. Wu, MD	X	
Kathleen L. Yaremchuk, MD	X	
PLANNING COMMITTEE	**NOTHING TO DISCLOSE**	**DISCLOSURE (All commercial relationships)**
Elliot Abemayor, MD	X	
Patrick J. Antonelli, MD		Alcon Laboratories (honorarium, grant support - advisory board, researcher); Foresight Biotherapeutics (honorarium - advisory board); Kimberly Clark Corporation (grant support - researcher); Medtronic (grant support, consulting fees - researcher, consultant); OtoMedicine (grant support - researcher); Sharklet Technologies LLC (stock - advisory board); WebMD (honorarium - writer)
Soly Baredes, MD	X	
Gerald S. Berke, MD	X	
Jimmy J. Brown, MD	X	
Andrew N. Goldberg, MD MSCE		ApniCure (stock options - consultant); Siesta Medical (stock options - consultant)
John S. Rhee, MD MPH	X	
Samuel H. Selesnick, MD		Medtronic ENT (royalty agreement - instrument development)
Timothy L. Smith, MD MPH		ENTrigue (fee - consultant); Intersect (fee - consultant)
Michael G. Stewart, MD		Merck (honorarium - speaker); Thieme Publishers (royalties - book author)
Lucian Sulica, MD	X	
Erica Robb Thaler, MD	X	
Dana M. Thompson, MD	X	
Marilene Wang, MD	X	
D. Bradley Welling, MD PhD	X	
Kathleen L. Yaremchuk, MD	X	

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Guest of Honor
Harold C. Pillsbury III, MD FACS

Harold C. Pillsbury, III, MD FACS, is the Chair of the UNC Department of Otolaryngology/Head and Neck Surgery, as well as the Thomas J. Dark Distinguished Professor of Otolaryngology/Head and Neck Surgery.

A native of Baltimore, Maryland, Dr. Pillsbury earned his B.A. and M.D. degrees from George Washington University in Washington, DC (1970 and 1972, respectively). He completed his residency training in Otolaryngology/Head and Neck Surgery at the University of North Carolina School of Medicine in 1976. Following six years at the Yale University School of Medicine, he joined the UNC faculty in 1982 as an Associate Professor. He served as Chief of the Division of Otolaryngology/Head and Neck Surgery from 1983 to 2001.

Dr. Pillsbury has completed an eighteen year term on the American Board of Otolaryngology where he served as Exam Chair and President. He is also past President of the American Academy of Otolaryngology-Head and Neck Surgery, The American Laryngological Association, The Society of University Otolaryngologists, and the Triological Society. He is also past CME coordinator and Vice-President of the Southern Section Triological Society. He is the President-Elect of the American Academy of Otolaryngic Allergy.

Dr. Pillsbury has written and/or contributed to over 270 publications and over 45 textbooks. He has also given over 326 presentations nationally and internationally. He has been the primary investigator or co-investigator on over 21 grants. His special field of interest is neurotology and, most especially, cochlear implantation.

Presidential Citation Awardee
Elliot Abemayor, MD PhD FACS

After receiving his MD/PhD from the University of Pennsylvania, Dr. Abemayor completed a surgical internship at the New England Deaconess Medical Center at Harvard, followed by Otolaryngology Head and Neck residency at UCLA. Thereafter, he was invited by Dr. Paul Ward to join the UCLA Division of Head and Neck Surgery as a full time faculty member in 1985.

Dr. Abemayor's passion for teaching medical students, residents, and fellows training in Head and Neck Oncology has been recognized throughout his tenure. He was the Residency Director from 1996 to 2006 and has been the recipient of the UCLA Division of Head and Neck Surgery full time faculty award on many occasions. He is Co-PI on several NIH-funded grants which fund the UCLA Oral Oncology Laboratories. This collaborative effort is actively investigating the use of salivary biomarkers for early detection and characterization of head and neck tumors. Currently, the laboratory is using micro technology to develop a portable machine which will be available at nonacademic medical centers.

He has published well over 130 papers in peer-reviewed journals and has authored or co-authored many book chapters and one textbook.

He has been the recipient of many national awards, and has labored tirelessly in the service of all our societies including but not limited to the AAO-HNS, AHNS, ALA , SUO, and Triological. He's been able to do this while maintaining a busy referral-based academic Head and Neck surgical practice.

In addition to being an avid runner, now demoted jogger, Dr. Abemayor is passionate about book collecting on a non-Kindle basis. His wonderfully patient wife and partner has accepted the strains of yet another pile of new acquisitions. And thanks to his wonderful family, Dr. Abemayor has learned to embrace a life of Cheerios, Legos, homemade cookies and cupcakes.

Presidential Citation Awardee
Patrick E. Brookhouser, MD FACS

Patrick E. Brookhouser, MD FACS, is Executive Vice President and Director of Health Care Programs for Boys Town, in addition to being Founding Director of Boys Town National Research Hospital in Omaha. Since opening in 1977, the Hospital has provided care and treatment to more than 300,000 patients from across the USA and a number of foreign countries. Dr. Brookhouser is President and CEO of the Lied Learning and Technology Center for Childhood Deafness and Vision Disorders in Omaha and for over a quarter century served as Father Edward J. Flanagan Professor and Chair of Otolaryngology and Human Communication at Creighton University School of Medicine.

An advocate for both medical education and research, Dr. Brookhouser's national leadership roles have included: Chair of the Residency Review Committee for Otolaryngology, a Director of the American Board of Otolaryngology, membership on the National Advisory Councils for both the National Institute on Deafness and Other Communication Disorders and the National Institute for Child Health and Human Development, and President of both the Triological Society and the American Society of Pediatric Otolaryngology. Dr. Brookhouser is Executive Secretary of the Triological Society and is a Member of the Editorial Executive Committee for the Laryngoscope.

An Iowa native, Dr. Brookhouser received his Bachelor of Science Degree (summa cum laude) from Creighton University and was awarded his Doctor of Medicine Degree by Johns Hopkins University School of Medicine. He completed residency training in Otolaryngology-Head and Neck Surgery at the Johns Hopkins Hospital. He is a Fellow of the American College of Surgeons, as well as a member of Alpha Sigma Nu, the national Jesuit Honor Society and the medical honor society Alpha Omega Alpha. He was also honored by induction into the Johns Hopkins Society of Scholars and by the Distinguished Alumnus Award given by the Johns Hopkins University Alumni Association.

Pat and his wife of 45 years, the late Judith (Baker) Brookhouser, have three grown children, Patrick, Jr. and twins Deborah and David, as well as two grandchildren all living in Omaha. Dr. Brookhouser is married to Maria (Sauer) Brookhouser and they reside in Omaha.

Presidential Citation Awardee
Thomas C. Calcaterra, MD, FACS

A native of Detroit, Michigan, Dr. Calcaterra attended the University of Michigan for undergraduate and medical school, receiving his M.D. in 1962. He completed a general surgery internship at UCLA, one year of general surgery residency training at the Veterans Administration in Los Angeles, and Otolaryngology residency at Washington University School of Medicine in 1969. Dr. Calcaterra served as a Flight Medical Officer in the United States Air Force from 1963-1965.

He is formerly a Professor of Surgery/Division of Head and Neck Surgery at UCLA Medical Medical Center. Dr. Calcaterra developed a national, and international, reputation as a meticulous head and neck surgeon with a special interest in partial laryngeal surgery, for which he contributed a number of seminal manuscripts. In addition, Dr. Calcaterra was one of the first surgeons to study post laryngectomy shunts and fistulas to improve communication, following total laryngectomy. He continues to maintain numerous close friendships with colleagues throughout the otolaryngology and medical community. He has recently founded an endowed chair in his name at UCLA, in Head and Neck Surgery.

Dr. Calcaterra served on the editorial board and/or review panels for numerous Otolaryngology journals, including *The Laryngoscope, Otolaryngology-Head and Neck Surgery, Annals of Otology, Rhinology & Laryngology, Head and Neck, and Cancer.* He has published extensively, contributing more than 250 papers and textbooks.

He was Principal Investigator or Co-Investigator on nearly 25 research grants from the National Cancer Institute, Public Health Service, UCLA, as well as numerous private foundations and organizations.

Dr. Calcaterra is a member of numerous professional societies including The Triological Society, American College of Surgeons, AAO-HNSF, American Academy of Facial Plastic & Reconstructive Surgery, American Broncho-Esophagological Association, American Society for Head and Neck Surgery, American Laryngological Society and the American Rhinologic Society.

Presidential Citation Awardee

Paul A. Levine, MD

Born in Brooklyn, New York, on November 4, 1947, Paul A. Levine, MD received a Bachelor of Science degree in Biology from Rensselaer Polytechnic Institute in 1969, his M.D. from Albany Medical College in 1973, and completed his internship and otolaryngology-head and neck surgery surgical residency at Yale in 1977. After a year fellowship at Stanford in head and neck, maxillofacial, and facial plastic and reconstructive surgery completed in 1978, Dr. Levine remained on the Stanford faculty as an assistant professor in the Division of Otolaryngology-Head and Neck Surgery as well as the associate chief for the Division at Santa Clara Valley Medical Center. In 1984, he joined the Department of Otolaryngology-Head and Neck Surgery at the University of Virginia as an associate professor and vice chair, became a tenured professor in 1987, and was named chairman of the department at UVA in 1997, a position he stills holds.

Dr. Levine has contributed over 140 publications to the specialty during his career and has been very active in institutional and national committees in and outside the specialty throughout his career. He was an early proponent of plate fixation for mandible fractures, and he has become recognized for his expertise in treating sinonasal malignancies, especially esthesioneuroblastoma and sinonasal undifferentiated carcinoma, as well as experience in performing craniofacial resections and sparing of the eye when treating these malignancies. A nationally and internally recognized academic head and neck cancer surgeon, Dr. Levine has served as a member of all the major societies in the field and as a leader of many. He has served as the past president of the American Broncho-Esophagological Association, chairman of the Advanced Training Council of the American Head and Neck Society as well as the President of the AHNS. He has been a director of the American Board of Otolaryngology, completing his 12 year term in 2010, and served as its treasurer for four years. He completed his term as Southern Section Vice President of the Triological Society in 2007 and currently serves as the editor of Archives of Otolaryngology-Head and Neck Surgery as well as an editorial board member of JAMA.

Special Honored Guest

Paul H. Ward, MD FACS

Born in Lawrence, Indiana, Dr. Ward received his MD from Johns Hopkins University School of Medicine in 1957, was an intern at Henry Ford Hospital in Detroit, Michigan, completed his otolaryngology residency training at the University of Chicago in 1964, and subsequently was a Special Fellow and Career Research Development Awardee at the University of Chicago. Prior to attending Anderson College, where he graduated in 1953, Dr. Ward served in the United States Army Medical Corps, both in the Mediterranean and in the Korean War from 1946 to 1950.

Dr. Ward is Professor Emeritus, Division of Otolaryngology-Head and Neck Surgery at the UCLA School of Medicine where he served as Professor and Chief from 1968 through 1991. He served NINCDS/NIH as Chair of a Communicative Science Research Study Section, panel on Communicative Disorders Long Range Strategies, and as a Consultant to the NIH Director of Neurological Diseases and Stroke.

His career included serving as consulting editor, board of editors, and senior editorial advisor for numerous otolaryngology journals including *Annals of Plastic Surgery in Otolaryngology, Head and Neck Surgery*, *Annals*

of Otology, Rhinology and Laryngology, Journal of Otolaryngology-Head and Neck Surgery, *American Journal of Otolaryngology*, among other publications.

Dr. Ward has served as President or officer of numerous otolaryngology societies, including The Triological Society, The American Broncho-Esophagological Association, The American Laryngological Association, American Society for Head and Neck Surgery, American Academy of Otolaryngology-Head and Neck Surgery, American Board of Otolaryngology, and was also a Board Member and Regent of the American College of Surgeons. In 1977, Dr. Joseph Ogura, during the 33rd Wherry Memorial Lecture, recognized Paul Ward as a pioneer and Chief of the first Division of Head and Neck Surgery in this country.

Joseph H. Ogura Lecturer

The Lord Ribeiro Kt. CBE

Lord Ribeiro has worked to modernize surgical training and introduced a new surgical curriculum in the UK. In 2008, he joined the leadership of the American College of Surgeons in presenting testimony on work hours to the Institute of Medicine on the National Academy of Sciences panel on Optimizing Graduate Medical Trainee (Resident) Hours and Work Schedules to Improve Patient Safety.

Bernard Ribeiro graduated with MBBS from the Middlesex Hospital Medical School in 1967 and five years later was awarded the Fellowship of the Royal College of Surgeons of England. In 1979 he was appointed to Basildon Hospital as a consultant general surgeon with a special interest in urology and colorectal surgery. He pioneered the use of invasive 'keyhole' surgery in Basildon and established the Basildon & Thurrock University Hospitals NHS Foundation Trust's advanced laparoscopic unit. An examiner in surgery at undergraduate and post-graduate level, he contributed to the Trust, achieving university status in 2002, and to the Trust's successful bid for the Essex Cardio-thoracic Centre at Basildon, which opened in 2007.

From 2005 to 2008, he was the President of the Royal College of Surgeons and in April, 2008 he retired from his post at Basildon University Hospital. In 2004 he was awarded the CBE for his services to medicine during a career that has spanned over 40 years. In 2008, Bernard Ribeiro was awarded the Honorary Degree of Doctor of Science of Anglia Ruskin University and made an Honorary Fellow of the American College of Surgeons. In December 2008 he was appointed Knight Bachelor. He was elevated to the peerage in the style of The Lord Ribeiro of Achimota in the Republic of Ghana and of Ovington in the County of Hampshire in December 2010.

New Fellows to Be Inducted

Mona M. Abaza, MD . . . . . .Aurora, CO
Jose E. Barrera, MD FACS . . . . . .San Antonio, TX
Joel H. Blumin, MD FACS . . . . . .Milwaukee, WI
Carol R. Bradford, MD FACS . . . . . .Ann Arbor, MI
Kay W. Chang, MD . . . . . .Stanford, CA
Sukgi S. Choi, MD . . . . . .Washington, DC
Peter D. Costantino, MD FACS . . . . . .New York, NY
Colin L.W. Driscoll, MD . . . . . .Rochester, MN
Robert L. Ferris, MD PhD FACS . . . . . .Pittsburgh, PA
L. Arick Forrest, MD . . . . . .Dublin, OH
Stacey L. Halum, MD . . . . . .Indianapolis, IN
Norman D. Hogikyan, MD FACS . . . . . .Ann Arbor, MI
Eric H. Holbrook, MD . . . . . .Boston, MA
Abraham Jacob, MD . . . . . .Columbus, OH
Eric J. Kezirian, MD . . . . . .San Francisco, CA
Darius Kohan, MD . . . . . .New York, NY
Ronald B. Kuppersmith, MD FACS . . . . . .College Station, TX

Richard A. Lebowitz, MD FACS . . . . . .New York, NY
Todd A. Loehrl, MD . . . . . .Milwaukee, WI
Jennifer L. Maw, MD . . . . . .San Jose, CA
John S. May, MD FACS . . . . . .Winston Salem, NC
Brian A. Neff, MD . . . . . .Rochester, MN
Adam D. Rubin, MD . . . . . .St. Clair Shores, MI
Nina L. Shapiro, MD FACS . . . . . .Los Angeles, CA
Paul F. Shea, MD . . . . . .Memphis, TN
Maie A. St. John, MD . . . . . .Los Angeles, CA
Sherard A. Tatum, MD FACS . . . . . .Syracuse, NY
Ravindra Uppaluri, MD FACS . . . . . .Saint Louis, MO
Julie L. Wei, MD . . . . . .Kansas City, KS
Gregory J. Wiet, MD FACS . . . . . .Columbus, OH

Thesis Award Winners

Harris P. Mosher Award

Robert L. Ferris, MD PhD FACS, Pittsburgh, PA

Rapid Molecular Detection of Metastatic Head and Neck Squamous Cell Carcinoma as an Intraoperative Adjunct to Sentinel Lymph Node Biopsy

Edmund Prince Fowler Award

Stacey L. Halum, MD, Indianapolis, IN

Neurotrophic Factor-Secreting Autologous Muscle Stem Cell Therapies for the Treatment of Laryngeal Denervation Injury

Honorable Mention for Clinical Research

Carol R. Bradford, MD FACS, Ann Arbor, MI

Biomarkers in Advanced Larynx Cancer

Gregory J. Wiet, MD FACS, Columbus, OH

Virtual Temporal Bone Dissection System: Development and Testing

Honorable Mention for Basic Research

Norman D. Hogikyan, MD FACS, Ann Arbor, MI

Spontaneous Laryngeal Reinnervation Following Recurrent Laryngeal Nerve (RLN) Injury: Evidence for Superior Laryngeal Nerve Source, Central Nervous System Plasticity and RLN Regeneration

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

Inflammatory Mediators Drive Metastasis and Drug Resistance in Head & Neck Squamous Cell Carcinoma (HNSCC)

With Distinction

Julie L. Wei, MD, Kansas City, KS

Safety and Efficacy of Once Daily Intranasal Gentamicin Irrigation Compared to Isotonic Saline in the Treatment of Pediatric Chronic Rhinosinusitis

Harris P. Mosher Award Citation

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

This honor was created to perpetuate the ideals of the great teacher for whom it was named and to bestow upon a worthy recipient the responsibility of furthering the highest standards of perfection in the study, teaching and practice of Otolaryngology.

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

Recipients

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

Harris P. Mosher 1867-1954

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

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

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

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

Edmund Prince Fowler Award Citation

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

This honor was created to perpetuate the ideals of the great teacher for whom it was named and to bestow upon a worthy recipient the responsibility of furthering the highest standards of perfection in the study, teaching and practice of Otolaryngology.

In witness whereof the Society has caused this certificate to be signed and its seal affixed on the ____ day of _____, Two Thousand and Eleven.

Recipients

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

Edmund Prince Fowler 1872-1966

It says something about the intellectual wealth of the Triological Society that Edmund Prince Fowler, Sr., MD, succeeded Max Goldstein, MD, as president in 1932. Both were giants in otology, prolific authors and advocates for the hard of hearing. In honor of Dr. Fowler's contributions to otolaryngology, the Society established The Edmund Prince Fowler Award in 1971, given each year for the best thesis in basic research. After earning his MD from Columbia University, Dr. Fowler joined the Manhattan Eye and Ear Hospital and became a clinical professor at Columbia University in 1933. He was a decorated colonel of World War I. He was president of the American Otological Society in 1937, recipient of the first Award of Merit from that society in 1952 and founder of the first hearing center in the United States (in New York City). To the legacy of the prodigious researcher and "Dean of Audiology", as he was called, we attribute the invention of the modern clinical audiometer. He tested many patients and soon became aware of the fact that some patients with severe or unilateral losses had suprathreshold hearing values, a condition he coined as "recruitment". This clinical finding resulted in the Alternate Binaural Loudness Balance test, the first to separate cochlear from retrocochlear losses.

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

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

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

TRIOLOGICAL SOCIETY
114th ANNUAL MEETING PROGRAM
FRIDAY, APRIL 29, 2011

Chicago VIII - X

7:00 Business Meeting (Fellows Only)
New Fellow Induction Ceremonies and Reception

8:00 WELCOME/OPENING REMARKS BY PRESIDENT
Gerald S. Berke, MD*, Professor and Chief, Division of Head and Neck Surgery, UCLA School of Medicine, Los Angeles, CA

INTRODUCTION AND AWARDING OF PRESIDENTIAL CITATIONS
Elliot Abemayor, MD*, Los Angeles, CA
Patrick E. Brookhouser, MD*, Omaha, NE
Thomas C. Calcaterra, MD*, Los Angeles, CA
Paul A. Levine, MD*, Charlottesville, VA

INTRODUCTION OF SPECIAL HONORED GUEST
Paul H. Ward, MD*, Pauma Valley, CA

8:15 INTRODUCTION OF GUEST OF HONOR
GUEST OF HONOR PRESENTATION
Principles Which Have Most Influenced My Career
Harold C. Pillsbury, MD*, Chapel Hill, NC
Thomas J. Dark Distinguished Professor and Chair, Department of Otolaryngology/Head and Neck Surgery, University of North Carolina at Chapel Hill, Chapel Hill, NC

8:25 PRESIDENT'S ADDRESS
Scientific Attributes of a Researcher and Member of the Triological Society
Gerald S. Berke, MD*, Los Angeles, CA

8:35 INTRODUCTION OF OGURA LECTURER
JOSEPH H. OGURA, MD LECTURE
The Impact of Reduced Duty Hours on Surgical Training and Patient Care in the UK
Lord Bernard Ribeiro Kt CBE FRCS FACS (Hon.)
Past President of the Royal College of Surgeons and Member of the House of Lords
Alresford, Hampshire, UK

9:25 Discussion/Q&A

9:30 MOSHER AWARD FOR TRIOLOGICAL THESIS
Rapid Molecular Detection of Metastatic Head and Neck Squamous Cell Carcinoma as an Intraoperative Adjunct to Sentinel Lymph Node Biopsy
Robert L. Ferris, MD PhD FACS, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the role of nodal staging and sentinel node biopsy in early oral carcinoma.

*** Denotes Fellow**

Objectives: Clinical staging of early head and neck squamous cell carcinoma (SCCHN) is often inaccurate, leading to elective neck dissection to detect the 30% of patients with micrometastatic disease. Sentinel node biopsy (SNB) accurately stages the regional lymphatics, but intraoperative pathology is only moderately sensitive and final pathology takes several days to complete. To facilitate immediate neck dissection where necessary, we have identified several promising marker genes of SCCHN metastasis and developed a rapid, accurate and automated quantitative real time PCR (qRT-PCR) assay for intraoperative use. **Study Design:** Prospective tissue collection, retrospective pathologic correlation with qRT-PCR. **Methods:** From a 40 gene marker screen, we quantified expression of 11 potential tumor genes using a test set of primary tumors (n=32), metastatic (n=19), and benign (n=10) lymph nodes. Eight patients' paired primary tumor and metastatic nodes were included. A validation set of 442 grossly tumor-negative nodes was evaluated for expression of the most promising markers, comparing metastasis detection by qRT-PCR with pathologic analysis (H&E and immunohistochemistry). A novel multiplexed, automated, single tube qRT-PCR assay was used to analyze over 100 lymph nodes using a two marker, 35 minute assay to determine its negative predictive value (NPV). **Results:** Based on expression of 11 tumor associated genes from the marker screen, the two most promising markers of SCCHN metastasis in the test set, pemphigus vulgaris antigen (*PVA*) and tumor associated calcium signal transducer 1 (*TACSTD1*), also known as epithelial cell adhesion molecule (*EpCAM*), were selected. Development of a multiplexed qRT-PCR assay for the detection of metastasis compared favorably with pathologic analysis in the additional 442 node set. A rapid, multiplexed assay using *PVA* and *TACSTD1*demonstrated excellent reproducibility, linearity, and accuracy (~96% NPV) for identifying positive (n=40) and negative (n=62) nodes in a validation subset. **Conclusions:** Detection of metastatic SCCHN using multiplexed qRT-PCR can be rapid, accurate, and automated, and may enable SNB to be used for intraoperative decision making. PCR amplification of tumor marker genes is an effective method of intraoperative molecular staging of SCCHN, and could more appropriately guide application of neck dissection in pN+ SCCHN patients, sparing 60-70% of pN0 patients from unnecessary neck dissection. This technique may also be used for identifying residual neck disease post-treatment, using outpatient fine needle aspiration (FNA) biopsy specimens.

9:38 FOWLER AWARD FOR TRIOLOGICAL THESIS
Neurotrophic Factor-Secreting Autologous Muscle Stem Cell Therapies for the Treatment of Laryngeal Denervation Injury
Stacey L. Halum, MD, Indianapolis, IN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the potential role of neurotrophic factor secreting muscle stem cells in directing reinnervation and preventing synkinesis after recurrent laryngeal nerve injuries.

Objectives: Persistent vocal fold immobility after recurrent laryngeal nerve (RLN) injury is often associated with aberrant reinnervation. It may be possible to restore vocal fold motion if the spontaneous reinnervation that ensues after RLN injury could be selectively enhanced to certain laryngeal muscles while antagonistic reinnervation is inhibited. We hypothesized that a neurotrophic factor (NF) with the potential to enhance RLN recovery can be identified using muscle stem cell (MSC) survival assays and vagus motoneuron outgrowth testing. Furthermore, we hypothesized that therapeutic delivery of identified NF via autologous MSC vectors can be used to selectively enhance reinnervation to selected laryngeal muscles after RLN injury, and, when antagonistic reinnervation (synkinesis) is simultaneously inhibited, vocal fold motion may be restored. **Study Design:** Basic science investigations involving primary cell cultures, gene cloning/transfer, and animal experiments. **Methods:** MSC survival assays were used to test multiple individual NFs *in vitro*, and identify the NF with the greatest survival promoting effects. Motoneuron outgrowth assays were then done to assess the trophic effects of the identified NF on cranial nerve (CN) X-derived motoneurons in vitro. Therapeutic NF was cloned into a lentiviral vector, and muscle stem cells were transduced to secrete NF. Finally, 60 rats underwent left RLN transection injury, and at 3 weeks received injections of either MSCs (n=24), MSCs secreting NF (n=24), or saline (n=12) into the left thyroarytenoid (TA) muscle complex; half of the animals in the MSC groups simultaneously received left posterior cricoarytenoid (PCA) injections of vincristine (VNC) while half the animals received saline. Outcomes were assessed at 2 months and 4 months after RLN injury. **Results:** Ciliary derived neurotrophic factor (CNTF) had the greatest survival-promoting effect on MSCs in culture. Addition of CNTF (50 ng/mL) to CN X motoneuron cultures resulted in significantly longer maximal neurites and more branching than controls. Finally, in the animal model at two months after RLN injury, laryngeal electromyogra-

phy (LEMG) of the CNTF-secreting MSC groups demonstrated enhanced reinnervation to the TA complex (based on recruitment ratings), with VNC treatment resulting in limited PCA reinnervation. By four months, the LEMG findings of study and control groups demonstrated similar reinnervation patterns in all animals. However, immunohistochemistry demonstrated enhanced reinnervation in the TA muscles that had received CNTF secreting MSC injections. On videolaryngoscopy, adductor "twitches" congruent with LEMG firing pattern could be detected in multiple animals within the MSC and CNTF-secreting MSC treated groups, but not in the saline controls. RT-PCR at four months demonstrated persistently increased CNTF expression from the TA muscle in the CNTF-secreting MSC treated group relative to the MSC and saline groups. RT-PCR also demonstrated certain endogenous NFs (IGF-1 and BDNF) to be upregulated in the CNTF-secreting MSC treated TA muscles. **Conclusions:** In an animal model, CNTF secreting MSCs are a promising therapy to enhance reinnervation to select muscles after RLN injury. While this model focused on enhancing TA reinnervation as proof of concept, it may ultimately lead to a minimally invasive approach for enhancing PCA reinnervation in cases of bilateral vocal fold paralysis, or as an adjunctive therapy for surgical reinnervation procedures or laryngeal transplantation.

9:46 Discussion/Q&A

♦ **9:50 - 10:15 Break with Exhibitors - View Posters** ♦

General & Pediatrics

Moderator: Dana M. Thompson, MD*, Rochester, MN

10:15 Outcomes Following Resection of Cervicofacial Atypical Mycobacterial Infections in Children
Noah P. Parker, MD, Minneapolis, MN; Andrew R. Scott, MD, Boston, MA; Robert J. Tibesar, MD, Minneapolis, MN; Timothy A. Lander, MD, Minneapolis, MN; Marsha J. Finkelstein, MS, Minneapolis, MN; James D. Sidman, MD*, Minneapolis, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to better identify patients presenting with atypical mycobacterial infections, understand the risks of surgical resection, and predict outcomes following surgery.

Objectives: To examine outcomes following resection of cervicofacial atypical mycobacterial infections (AMI) in children. To identify predictors of poorer outcomes. **Study Design:** Retrospective chart review. **Methods:** Eight independent variables (age at surgery, sex, duration of symptoms, presence of violaceous skin changes or skin breakdown, type of procedure, use of facial nerve monitoring (NM), and use of skin resection with cervicofacial advancement reconstruction) and 4 outcomes measures (facial nerve paresis, facial nerve paralysis, poor scarring, and recurrence) were utilized for statistical analysis. **Results:** Twenty-eight patients (16-female, 12-male, 30.1 months-average age) presented with painless masses averaging 9.4 weeks in duration. Presentations included violaceous skin changes in 61% and skin breakdown in 14%. Surgical procedures included parotidectomy +/- selective lymphadenectomy (78.6%) or lymphadenectomy alone (21.4%), as well as NM in 57.1% and skin resection and reconstruction in 53.6%. Outcomes measures included facial nerve paresis (9/27 (33.3%)), facial nerve paralysis (2/27 (7.4%)), poor scarring (4/27 (14.8%)), and recurrence (3/27 (11.1%)). Statistical analysis identified older age at surgery as a risk factor for poor scarring (median-36 months, range-29-156 weeks versus median-23 months, range-12 - 39 months (p=0.003)). For every 1 month increase in age, the odds of poor scarring are 1.2 times as likely to occur. No other independent variables were predictive of poorer outcomes. **Conclusions:** We report low, but not insignificant rates of nerve injury, poor scarring, and recurrence following resection of cervicofacial AMI in children. Older children are at greater risk of poor scarring. Complete data acquisition is limited by patient followup.

10:23 Characterization of Retentive Capacity of the Subpericranial Pocket, with Implications for Cochlear Implant Fixation

Bradley J. Hubbard, BSc MD, Toronto, ON Canada; Daniel D.E. Wong, MSc, Toronto, ON Canada; Karen A. Gordon, PhD CCC-A Reg CASLPO, Toronto, ON Canada; Blake C. Papsin, MD MSc FRCS FACS FAAP*, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of various methods of device fixation for cochlear implants, the limitations of depending on the subpericranial pocket, and the impact of fixation choice on implant position and roll force.

Objectives: To quantify the retentive capacity (RC) of the subpericranial pocket (SpP) in children undergoing cochlear implantation (CI) and to model the impact of suture fixation on position and force applied to the device. **Study Design:** Analysis of prospectively assembled data. **Methods:** 51 patients (83 devices) underwent CI (32 bilateral, 19 unilateral). Intraoperatively, a force gauge measured displacement force on a dummy implant placed in the subpericranial pocket. Angle of head roll from the neutral position until device contacted the surface was measured in a model wherein children lay on a flat surface. A model calculated expected force applied to the implant when contact occurred and calculated differences in device position with suture fixation (up position) and with SpP fixation (back position). **Results:** RC of the SpP is not correlated with age ($r=0.01$, $p<0.93$) and is highly variable. Average RC was 5.09 +/- 2.74 N/kg. Unsecured devices in a SpP have a more posterior (back) position with roll force exceeding 4 N/kg. Measured head roll was 54.5+/-5.5 degrees in the "up" position and reduction in head roll of 8 degrees was calculated in the "back" position, implying increased likelihood of applying roll force to the device. **Conclusions:** RC of the SpP is variable among children, and based on the models described may be insufficient to resist device migration in the absence of additional fixation.

10:31 Perioperative Anesthesia Complications in Pediatric Adenotonsillectomy

Michael Orestes, MD, Washington, DC; Lina Lander, ScD, Omaha, NE; Susan T. Verghese, MD, Washington, DC; Rahul K. Shah, MD*, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the most common airway complications in the perioperative period during pediatric adenotonsillectomy, risk factors for such, and how to manage these issues.

Objectives: To describe the rate and significance of airway complications in pediatric adenotonsillectomy. **Study Design:** Retrospective case control. **Methods:** A chart review of patients that underwent adenotonsillectomy between 2006 and 2010 was performed. Perioperative complications, patient characteristics, and surgeon and anesthesia technique were recorded. **Results:** A total of 403 charts were reviewed. Eight cases (2%) of laryngospasm were identified: one was preoperative, five in the operating room post-extubation, and two in the recovery area. Three were given succinylcholine and reintubated; the other cases were managed conservatively. Mean age of patients with laryngospasm was 5.3 years (SD 4.7, 1.9-15.8 years). There were twelve cases (3%) of bronchospasm; all were treated with nebulized albuterol. Mean age of patients with bronchospasm was 6.1 years (SD 4.9, 1.8-14.1 years). Overall, seventeen patients required antiemetics (4.2%), twenty-five albuterol (6.2%), and four racemic epinephrine (1%). Compared to the children without airway complications, there was no difference in their age, weight, ASA status, length of surgery, need for admission, and anesthesia technique in those that had laryngospasm. Patients with bronchospasm, compared to the patients without complications, had faster surgeries ($p < .05$), were more likely to have underlying asthma ($p < .05$), and more likely to be admitted ($p < .05$). There were no unexpected admissions or other morbidities. **Conclusions:** The rate of laryngospasm (2%) and bronchospasm (3%) is lower than reported in the literature, reflecting refinements in anesthesia and surgical technique. Knowledge of patients vulnerable to these complications will allow for optimal anesthesia technique in high risk patients.

10:39 Discussion/Q&A

Concurrent Session I

Chicago VIII - X

Panel

10:39 - 11:10 **Controversies in Otology and Neurotology**
Moderator: **Samuel H. Selesnick, MD*, New York, NY**
Panelists: D. Bradley Welling, MD PhD*, Columbus, OH
Clough Shelton, MD*, Salt Lake City, UT
Lorne S. Parnes, MD*, London, ON Canada
Alan G. Micco, MD*, Chicago, IL

Invited Lectures

11:10 Organ Preservation in Head and Neck Cancer
Jonas T. Johnson, MD*, Pittsburgh, PA

11:35 Sialendoscopy: State of the Art
M. Boyd Gillespie, MD MSc, Charleston, SC

♦ **Noon - 1:00 Lunch with Exhibitors - View Posters** ♦

Concurrent Session II

Chicago VI - VII

Panel

10:39 - 11:15 **Sleep Medicine: State of the Art**
Moderator: **Kathleen L. Yaremchuk, MD*, Detroit, MI**
Panelists:
Sleep Apnea Outcomes Assessment
Edward M. Weaver, MD MPH, Seattle, WA
Evaluation of the Upper Airway in OSA
B. Tucker Woodson, MD*, Milwaukee, WI
New Directions for OSA Surgery
Erica Robb Thaler, MD*, Philadelphia, PA
Indications for PSG in Children and Outcomes after T&A
Ron B. Mitchell, MD*, St. Louis, MO

PANEL

11:20 - 12:00 Difficult Sinus Cases (Not Just Surgery)
Moderator: Marilene Wang, MD*, Los Angeles, CA
Panelists: Ashutosh Kacker, MD*, New York, NY
Stilianos E. Kountakis, MD PhD*, Augusta, GA
Robert C. Kern, MD*, Chicago, IL
Ralph B. Metson, MD*, Boston, MA
Timothy L. Smith, MD MPH*, Portland, OR

♦ **Noon - 1:00 Lunch with Exhibitors - View Posters** ♦

AFTERNOON SCIENTIFIC SESSION

OTOLOGY

CHICAGO VIII - X

Moderator: Marlan R. Hansen, MD*, Iowa City, IA

1:00 Unilateral Multichannel Cochlear Implant Results in Significant Improvement in Quality of Life
Janet Chung, MD, Toronto, ON Canada; Kristelle Chueng, MD, Toronto, ON Canada; David B. Shipp, MA, Toronto, ON Canada; Joseph Chen, MD FRCSC, Toronto, ON Canada; Julian M. Nedzelski, MD FRCSC*, Toronto, ON Canada; Vincent Lin, MD FRCSC, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the domains of the Short Form-36 survey (SF-36) found to significantly improve after cochlear implantation. The participants should also understand the importance of patient age when considering health related quality of life after cochlear implantation.

Objectives: To investigate the effects of unilateral multichannel cochlear implant surgery on health related quality of life, and to determine if there is an age related impact of cochlear implantation on these effects. **Study Design:** Retrospective study. **Methods:** The Short Form-36 survey (SF-36) was administered to determine the health related quality of life of 283 age stratified patients before and after cochlear implant surgery. The mean followup time was 2.23 years. Pre- to post-cochlear implantation changes in health related quality of life was determined by the SF-36 questionnaire. **Results:** There were significant increases in pre- and post-cochlear implantation scores for five of the eight SF-36 survey domains: vitality, physical role functioning, mental health, emotional role functioning and social functioning. Significant differences were found between age groups in the domains of social functioning, emotion role functioning and mental health. **Conclusions:** Cochlear implant surgery significantly improves health related quality of life as categorically stratified by the SF-36 questionnaire. These improvements were most evident in the mental health, emotional and social functioning, and physical functioning at work questions of the survey. Cochlear implant recipients younger than 45 years of age perceive a greater improvement in their level of energy, mental health and social function compared to those of age greater than 45.

1:08 A Minimally Invasive Approach to Cochlear Implantation Using a Microendoscope
Harukazu Hiraumi, MD PhD, Kyoto, Japan; Norio Yamamoto, MD PhD, Kyoto, Japan; Tatsunori Sakamoto, MD PhD, Kyoto, Japan; Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that the cochlear implantation surgery under a microendoscope was safely accomplished with small fenestration in the mastoid cortex.

Objectives: To examine the safety of a microendoscopic procedure for cochlear implantation. **Study Design:** Case series study. **Methods:** We performed cochlear implantation surgery on four human temporal bones using a commercially available microendoscope designed for the nasolacrimal duct (0.9 mm in outer diameter, 50 mm in length; FiberTech, Tokyo, Japan) and evaluated the safety of the procedure. **Results:** With a microendoscope, the facial recess was opened and electrodes were inserted into the cochlea with a mastoidectomy size range of 5 * 4 to 7 * 7 mm. For three of the temporal bones, the surgery was conducted without any damage to the surrounding structures. For one temporal bone, in which we skipped the identification of the incus, the chorda tympanic nerve was sacrificed. **Conclusions:** The microendoscope allowed cochlear implantation surgery to be performed with a minimally sized mastoidectomy.

1:16 Comparison of Characteristics of Osteoblasts Cultured from Stapes of Patients with Otosclerosis to Normal Osteoblasts

Yvonne L. Richardson, MD, Farmington, CT; Kourosh Parham, MD PhD, Farmington, CT; John F. Kveton, MD*, New Haven, CT; John Flynn, , Farmington, CT; Gerald Leonard, MD, Farmington, CT; Gloria Gronowicz, PhD, Farmington, CT

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the differences in the characteristics of otosclerotic osteoblasts and normal osteoblasts.

Objectives: Osteoblasts play a central role in pathophysiology of diseases of bone remodeling. Otosclerosis is one such disease. We hypothesize that if osteoblasts are a key mediator of otosclerosis, then functional properties of otosclerotic osteoblasts in vitro should differ from those of normal osteoblasts. **Study Design:** Laboratory study involving cell cultures of clinical specimens. **Methods:** Cell cultures were grown from stapes removed from patients with otosclerosis and compared to cell cultures from normal stapes and human peripheral bone matched for age and sex. Specimens were cultured in DMEM-F-12 with 10% FBS and 1% penicillin/streptomycin. Staining for alkaline phosphatase, a marker for osteoblast differentiation, verified the osteoblast-like identity of the cells. Once cells reached confluence, 10,000 cells/cm2 were replated for subsequent assays. **Results:** For adhesion studies, cells were trypsinized and replated at the same density. Cells were assayed after 4 hours of culture. Attachment of otosclerotic stapes osteoblasts (OSO) was significantly higher than normal stapes osteoblasts (NSO) and normal peripheral osteoblasts (NPO). For proliferation, at 72 hours of culture, tritiated thymidine uptake for OSOs was significantly lower than NSOs and NPOs. Proliferation and adhesion characteristics of NSO and NPOs showed no significant differences. **Conclusions:** Osteoblasts cultured from stapes and peripheral bone in non-otosclerotic patients show similar properties but otosclerotic osteoblasts have adhesion and proliferation characteristics that clearly distinguish them from normal osteoblasts. These differences implicate the osteoblast as a key cellular mediator of otosclerosis. A high yield approach to understanding the pathophysiology of otosclerosis may be to investigate osteoblastic molecular markers that underlie these characteristics.

1:24 Cochlear Implantation in Children with Labyrinthine Anomalies and Cochlear Nerve Deficiency: Implications for Auditory Brainstem Implantation

Craig A. Buchman, MD*, Chapel Hill, NC; Holly F.B. Teagle, AuD, Chapel Hill, NC; Patricia A. Roush, AuD, Chapel Hill, NC; Lisa Dimaria, AuD, Chapel Hill, NC; Jennifer Woodard, AuD, Chapel Hill, NC; Oliver F. Adunka, MD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the differences in outcomes among various inner ear malformations treated with cochlear implantation.

Objectives: To detail the outcomes of a large population of children with either inner ear malformations and/or cochlear nerve deficiency (CND) that have received a cochlear implant. **Study Design:** Retrospective case review from a tertiary academic medical center between 1993-2010. **Methods:** The medical and audiological records of 77 children with radiographic evidence of either inner ear malformations and/or CND that received cochlear implants at the study institution were reviewed. Preoperative imaging characteristics, intraoperative findings, postoperative complications, mapping parameters and performance were assessed. Comparisons among the different malformation groups were undertaken. **Results:** Cochlear implantation among children with inner ear malformations and CND is safe. Between group comparisons revealed clear differences in sound

awareness, speech perception abilities and the mapping parameters necessary to create these results. Specifically, children with mild to moderate malformations detected speech with typical charge level requirements and often obtain good open set word recognition. Those with more severe malformations and/or CND require substantially great charge levels to detect sound and may perceive very limited or no open set understanding despite these stimulation parameters. **Conclusions:** Children with mild to moderate malformations have an excellent prognosis for the development of open set speech perception with cochlear implants. On the contrary, children with severe malformations and/or CND may have greatly elevated charge requirements for attaining sound detection alone. These children's prognosis for obtaining open set speech understanding is more limited. These findings have real implications for considering alternative forms of intervention such as auditory brainstem implantation and/or supplementation with visually based communication strategies.

1:32 Cultured Vestibular Ganglion Neurons Demonstrate Latent Herpes Simplex Type I Infection and Reactivation: A Model System for the Study of Vestibular Neuritis

Pamela C. Roehm, MD PhD, New York, NY; Vladimir Camarena, MD PhD, New York, NY; James Gardner, BA, New York, NY; Angus C. Wilson, PhD, New York, NY; Ian J. Mohr, PhD, New York, NY; Moses V. Chao, PhD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the herpes simplex life cycle, compare differences between the lytic and latent infection by this virus, and understand the potential role of herpes simplex type I reactivation in the etiology of vestibular neuritis.

Objectives: Vestibular neuritis is a common cause of both acute and chronic vestibular dysfunction. We sought to determine whether HSV-1 reactivation is a plausible etiologic agent of vestibular neuritis. **Study Design:** Basic/translational study on an animal derived cell culture system. **Methods:** Rat vestibular ganglion neurons (VGNs) were harvested and cultured. At day in vitro (DIV) 4 cultures were infected with chimeric HSV1 harboring a US-11/green fluorescent protein to establish lytic infection. Progress of infection was monitored with fluorescent microscopy and confirmed with plaque assays. To establish latent infection, cultures were pretreated with acyclovir for 2 days prior to and 4 days following infection. Cultures were treated with trichostatin A (TSA) at DIV 8 to trigger reactivation. Presence of latently infected cells was confirmed with reverse transcription polymerase chain reaction for viral products and by RNA FISH for the latency associated transcript (LAT). Reactivation was confirmed with plaque assays and fluorescent microscopy. **Results:** VGN cultures could be lytically infected with HSV1, yielding a productive infection as measured by spread of GFP fluorescence in infected cultures and by plaque assay. VGN cultures could also be latently infected. Within our latently infected cultures, reactivation rates with TSA were 46% by 6 days following application, while the baseline reactivation rate was 5%. **Conclusions:** We have demonstrated that VGNs can be both lytically and latently infected with HSV-1, and that latently infected VGNs can be reactivated using TSA. This demonstrates that reactivation of latent HSV-1 infection in the vestibular ganglion is a plausible etiologic mechanism of vestibular neuritis.

1:40 The Oncology of Otology: Practice, Pitfalls, and Pearls

Paul W. Gidley, MD*, Houston, TX; Christopher R. Thompson, MD, San Antonio, TX; Dianna B. Roberts, PhD, Houston, TX; Franco Demonte, MD, Houston, TX; Ehab Y. Hanna, MD, Houston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the otologic surgical approaches to cancers of the ear canal and temporal bone.

Objectives: To describe the surgical approaches and outcomes of patients with malignancy affecting the ear canal and temporal bone. **Study Design:** Retrospective review. **Methods:** The charts of 158 patients were reviewed for demographic information, tumor staging, treatment performed, and clinical outcomes. **Results:** Between 1999 and 2009, 158 patients required otologic surgery for cancer involving the ear canal (25 patients), external ear with ear canal involvement (26), periauricular skin (40), parotid gland (40), temporal bone (13), and lateral skull base (13). Surgery involved an otologic approach for each patient: mastoidectomy (28.5%), lateral temporal bone resection (TBR) (58.9%), subtotal TBR (2.5%), total TBR (3.2%), transtemporal approach (TTA) to the jugular foramen (8.2%), TTA to the middle fossa (5.7%), TTA to the infratemporal fossa in (3.2%).

Tumors confined to the cartilaginous ear canal were managed with wide local excision of canal skin and cartilage, 9 patients (5.7%). A combination of approaches was performed in 32 patients (20.2%). Overall survival was 71.6% at 3 years; and disease free survival was 70.1% at 3 years. Patients with disease limited to the ear canal had significantly better overall survival than skull base primaries (p = 0.02989), periauricular skin (p = 0.00138), or temporal bone tumors (p = 0.02598). **Conclusions:** Otologic surgery has a significant role in managing tumors that involve the ear canal, temporal bone and lateral skull base. The choice of surgical approach depends on the location and extent of tumor. The speciality of otologic oncologist is emerging as a defined area of practice.

1:48 The Impact of Virtual Reality Simulation for Enhancing the Surgical Competency in Otolaryngology

Mohammad U. Malik, MD, Baltimore, MD; David A. Diaz Voss Varela, MD, Baltimore, MD; Howard W. Francis, MD, Baltimore, MD; John P. Carey, MD, Baltimore, MD; John K. Niparko, MD*, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to have a clear understanding that a virtual reality mastoidectomy simulator can potentially help reduce the learning curve for acquiring essential mastoidectomy surgical skills.

Objectives: The objective of this study was to evaluate the resident's skills comparing two groups. The group trained on the mastoidectomy simulator would be compared to those trained in the traditional bone lab. The resident's performance would be evaluated by using a validated assessment tool. **Study Design:** Prospective cohort design. **Methods:** Residents were randomly divided into two groups. One group utilized both the virtual reality simulator and the temporal bone lab while the other group utilized only the temporal bone lab to acquire mastoidectomy skills before employing them in the OR. Both groups were followed prospectively in time and were evaluated at the end of each mastoidectomy case using a validated assessment tool. The results were then compared and analyzed. **Results:** Our results show that the group trained on a virtual reality temporal bone simulator demonstrated better scores as compared to the other group trained on traditional temporal bone lab when assessed by our previously validated mastoidectomy skills assessment tool. **Conclusions:** Virtual reality mastoidectomy simulation appears to be a promising strategy to enhance surgical competency for attaining mastoidectomy skills. Using a simulator in a residency program will add value to an already validated teaching method.

1:56 Innovative Regenerative Treatment for the Tympanic Membrane Perforation

Shin-ichi Kanemaru, MD PhD, Osaka, Japan; Hiroo Umeda, MD PhD, Shizuoka, Japan; Yoshiharu Kitani, MD, Kyoto, Japan; Satoshi Ohno, MD, Kyoto, Japan; Tsuyoshi Kojima, MD, Kyoto, Japan; Tastuo Nakamura, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to know how to regenerate the tympanic membrane without conventional surgical therapy. This new tissue engineered treatment will change the former concept of the otological surgery.

Objectives: To establish the new treatment for regeneration of the tympanic membrane (TM) without conventional tympanoplasty or myringoplasty. **Study Design:** Randomized control trials. **Methods:** 114 chronic TM perforations from 101 patients (Age: 10-89, M=41, F=60) were randomly selected from outpatients with TM perforation. Patients were classified into three groups based on the size of the TM perforation: below 1/3 as grade I (n=21), from 1/3 to 2/3 as grade II (n=53) and over 2/3 as grade III (n=40). Materials used for the TM repair were a gelatin sponge with/without b-FGF and fibrin glue. After creating a mechanical disruption of the edge of the TM perforation, a gelatin sponge was immersed in b-FGF or saline placed over the perforation. Fibrin glue was dripped over the sponge. The effectiveness of this therapy was evaluated 3 weeks after treatment. The above treatment was repeated up to 4 times for cases in which complete closure of the TM perforation was not achieved after one round of treatment. **Results:** Complete closure of the TM perforation was achieved in over 96% in b-FGF group and 10% in control group of the patients within 4 treatment cycles. The average hearing levels of all patients with successful TM repair was improved. No serious sequelae were observed in any patient. **Conclusions:** This study demonstrates that a combination of gelatin sponge, b-FGF and fibrin glue

enables to regenerate the TM without conventional operative procedures. This innovative regenerative therapy is an easy, safe, cost effective and noninvasive outpatient treatment.

2:04 Classifications of Tympanic Membrane Retraction Do Not Correlate with Hearing Loss

Adrian L. James, DM FRCS*, Toronto, ON Canada; Blake C. Papsin, MD FRCSC*, Toronto, ON Canada; Neil A. Bailie, PhD FRCS, Belfast, Ulster UK; Keith G. Trimble, MPhil FRCS, Belfast, Ulster UK; Neil K. Chadha, MD FRCS, Vancouver, BC Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the limitations of staging systems for tympanic membrane retraction, including poor reliability and poor correlation with hearing loss.

Objectives: To compare different staging systems for tympanic membrane (TM) retraction with hearing level in children at risk of retraction from cleft palate. **Study Design:** Prospective cross-sectional study. **Methods:** 118 TMs of children with cleft palate (mean age 13.0 years) were photographed endoscopically and audiograms completed. TM retraction was assessed independently in a blinded fashion on two separate occasions by 5 observers using the Sade, Tos and Erasmus staging systems. Results were compared with a new multicomponent system. Intra- and inter-observer kappa scores were calculated for each staging system. The mode value for each system was compared with hearing threshold for each TM. TMs with middle ear effusion or tympanostomy tubes were excluded. **Results:** 73 ear drums (62%) were rated as having pars tensa and/or flaccid retraction. Moderate intra-observer reliability (kappa = 0.5) was noted for the new staging system. Other staging systems showed only fair reliability (kappa = 0.3 - 0.4). Conductive hearing loss (4 tone average ABG >25dB HL) was present in 11 ears (15%), but did not correlate with any staging system (nonsignificant multiple logistical regression). TM retraction on to the promontory increased hearing threshold more than retraction on to, or even erosion of, the incus (p = 0.01; t-test). **Conclusions:** Tympanic membrane retraction is common in children with cleft palate. Hearing loss is a clinically important consequence, but only occurs in a minority of cases. Current staging systems have only fair reliability and poor correlation with hearing loss. Modification of retraction assessment to improve validity is discussed.

2:12 Kurz Titanium Ossiculoplasty in Pediatric Ossicular Reconstruction

Theresa A.M. Holler, MD, Toronto, ON Canada, Neil K. Chada, MD FRCS, Vancouver, BC Canada, Rebecca E. Zener, BSc, Toronto, ON Canada, Blake C. Papsin, MD FRCSC*, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the advantages of titanium ossicular prostheses versus other available alternatives in pediatric ossicular reconstruction, to discuss and compare hearing outcomes for children undergoing ossicular reconstruction, and to discuss complications from ossicular reconstruction.

Objectives: To assess the efficacy of ossiculoplasty procedures performed using the Kurz titanium ossicular prosthesis (KURZ TTP-VARIAC System) in pediatric patients. **Study Design:** Prospective cohort study design. **Methods:** All patients undergoing ossiculoplasty using the Kurz titanium ossicular prosthesis were followed prospectively. Audiometric testing was obtained preoperatively, at 6 weeks postoperatively and at 6 month intervals thereafter. The four frequency pure tone averages (PTA) were determined for air conduction (AC) and bone conduction (BC) and used to calculate air bone gaps (ABG). Pre- and postoperative AC and ABG measures were compared to determine degree of improvement. Audiometric results between cohorts receiving partial versus total ossicular reconstruction prostheses (PORP vs. TORP) were also compared. **Results:** Thirty-three children aged 7 to 17 years were included in this study (28 TORPs, 5 PORPs), with a mean followup of 10 months (range 2-18 months). The mean postoperative ABG was 42.6 dB, with a mean improvement of 16.2 dB (p = 0.0037). The mean postoperative AC threshold was 48.6 dB, with a mean improvement of 15 dB (p= 0.0055). Although there were greater improvements in ABG in the PORP cohort than the TORP cohort, this did not reach statistical significance (p=0.4157). There were no significant differences between very early postoperative thresholds (6 weeks) and those measured at 6 months for both AC and ABG (p=0.4149 and p=0.8454, respectively). The improvements in hearing results appear to be maintained to 18 months postop. **Conclusions:** Kurz titanium prostheses offer a safe and effective method of ossic-

ular reconstruction in pediatric patients. The hearing improvements achieved in the early postoperative period appear to be maintained over time. Longer term followup is still needed in this population.

2:20 Discussion/Q&A

Laryngology

Moderator: Lucian Sulica, MD*, New York, NY

2:25 The Safety and Efficacy of Carboxymethyl Cellulose (CMC) Injection in the Treatment of Glottic Insufficiency

Pavan S. Mallur, MD, Pittsburgh, PA; Clark A. Rosen, MD*, Pittsburgh, PA; Milan R. Amin, MD, New York, NY; Gregory N. Postma, MD, Augusta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to determine if carboxymethyl cellulose injection is a safe and effective treatment modality for glottic insufficiency.

Objectives: No studies to date have examined the clinical safety and efficacy of CMC for vocal fold injection. The current study is the first to investigate the voice outcomes and complications of CMC vocal fold injection for glottic insufficiency. **Study Design:** Multi-center, retrospective review. **Methods:** All patients who underwent CMC vocal fold injection from three independent sites in a one year period were reviewed. Voice outcomes in the form of voice handicap index 10 (VHI-10) as well as complications from CMC injection were recorded. **Results:** 49 patients with VHI-10 results from 1 to 8 weeks after CMC injection were evaluated in the time period. Twenty patients were treated for vocal fold immobility, while 24 patients underwent treatment for atrophy or paresis as a trial injection. Overall improvement in voice was seen, as evident by a mean decrease in VHI-10 of 4.98. Thirty-five patients (71.5%) showed a decrease in VHI-10, 8 patients showed an increase (16.3%), while 6 showed no change (12.2%). Of the patients that showed a decrease in the VHI-10, the mean decrease was 9, and the mean percentage decrease was 33.4%. There were no complications of vocal fold stiffness, inflammatory reaction, or resultant scar in the followup period, which ranged from 13 to 295 days, with a mean of 86.3 days. **Conclusions:** Carboxymethyl cellulose is a viable and efficacious material for the temporary treatment of glottic insufficiency, with minimal risk of permanent adverse voice outcomes.

2:33 Expedient Airway Surgery in the Adult Laryngeal Trauma Patient

Abie H. Mendelsohn, MD, Los Angeles, CA; Doug Sidell, MD, Los Angeles, CA; Gerald S. Berke, 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 demonstrate an appreciation for the importance of prompt surgical management of the laryngeal trauma patient.

Objectives: Laryngeal trauma is an infrequent diagnosis with limited case series published. We therefore sought to analyze surgical management practices which improve patient outcomes. **Study Design:** Cross-sectional population study. **Methods:** Of the 1.9 million trauma incidents from the National Trauma Database (NTDB), 564 adult trauma events were selected ICD-9 codes specific to laryngeal trauma. **Results:** Laryngeal trauma was seen predominately in white (61.5%), middle aged (40.6 years), male (83.7%) patients experiencing blunt (70.7%) laryngeal injury with multi-organ system (92.2%) trauma. There was an overall 17.9% mortality rate. 185 tracheostomies, 53 laryngeal suturing, and 60 laryngeal fracture repairs were performed. Based on logistic regression models controlling for significant factors including severity of total body injury, performance of tracheostomy (OR:24.9, CI:97-6, $p<0.001$) or fracture repair (OR:11.6, CI:115-1, $p=0.037$) was associated with improved mortality rates. While patients who undergo laryngeal surgery demonstrated delays in ICU and hospital discharges, performing tracheostomies within 24 hours of presentation significantly expedited mechanical ventilation weaning (OR=3.7, CI=10-1, $p=0.017$), transfer out of the ICU (OR=5.2, CI=15-2, $p=0.003$), and hospital discharges (OR=1.4, CI=13-1, $p=0.024$). Though sample size limited multivariate modeling, univariate analysis demonstrated fracture repairs performed within 24 hours of presentation decreased

the required time of mechanical ventilation (p=0.025); while laryngeal suturing within 24 hours expedited ICU discharges (p=0.017). **Conclusions:** The NTDB allows study of the largest laryngeal trauma cohort in modern literature. While complexities arise in the treatment of laryngeal traumas, when possible surgical intervention should be timed within 24 hours of presentation to improve the overall hospital course.

2:41 Airway Reconstruction in Wegener's Laryngotracheal Stenosis
Jacob L. Wester, BS, Portland, OR; Daniel R. Clayburgh, MD PhD, Portland, OR; Joshua S. Schindler, MD, Portland, OR; Peter E. Andersen, MD, Portland, OR; Neil D. Gross, MD, Portland, OR

Educational Objective: At the conclusion of this presentation, the participants should be able to evaluate open airway reconstruction for laryngotracheal stenosis (LTS) caused by Wegener's granulomatosis and compare the outcomes with non-autoimmune cases of LTS.

Objectives: Currently, treatment of LTS in Wegener's granulomatosis patients favors a conservative endoscopic approach despite more recent acceptance of open airway reconstruction as definitive treatment in non-autoimmune LTS. However, there is little data reported in patients with Wegener's; thus, we sought to assess outcomes of airway reconstruction in these patients compared to non-autoimmune cases. **Study Design:** Retrospective chart review of LTS cases managed with open airway reconstruction at an academic medical center. **Methods:** Patients who underwent open airway reconstruction for LTS due to Wegener's or non-autoimmune causes were identified from 1995-2010. Clinical, demographic, and procedural data was recorded. Fisher's Exact Test, Mann-Whitney U Test, and McNemar's Test were used to test for significance. **Results:** A total of 53 patients were identified; 8 Wegener's, 45 non-autoimmune, with median followup time of 6.3 and 1.8 years, respectively. Prior to reconstruction, there was no statistical difference between Wegener's and non-autoimmune patients with previous dilations (88% vs. 68%, p=0.41) and tracheostomy dependence (50% vs. 42%, p=0.72). Following reconstruction, 75% Wegener's and 36% non-autoimmune patients required further dilations (p=0.05), with a decannulation rate of 75% and 58% (p=1.0), respectively. **Conclusions:** Open airway reconstruction is infrequently performed in Wegener's patients due to perceived risk of restenosis, and our data shows that these patients have a higher need for continued dilations after reconstruction. However, these patients can be decannulated after reconstruction at a rate similar to patients with non-autoimmune LTS, thus airway reconstruction may be useful for freeing Wegner's patients of tracheostomy dependence.

2:49 Discussion/Q&A

♦ **2:55 - 3:25 Break with Exhibitors - View Posters** ♦

HEAD & NECK

Moderator: Soly Baredes, MD*, Newark, NJ

3:25 Implementation of a Transoral Robotic Surgery Program in an Academic Medical Center
Jeremy D. Richmon, MD, Baltimore, MD; Kavita M. Pattani, MD, Orlando, FL; Nishant Agrawal, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss various strategies to facilitate implementation of a transoral robotic surgery program in an academic medical center.

Objectives: Transoral robotic surgery (TORS) is rapidly being adopted by many head and neck surgeons for treatment of upper aerodigestive tract tumors. Various obstacles exist to efficiently implement this novel surgical technique in a busy academic center. We present our experience to illustrate one approach to initiating

a TORS program. **Study Design:** Prospective cohort study. **Methods:** A clear, stepwise approach to introduce TORS in our hospital was devised prior to scheduling the first case. Upon initiation of the program, various time points and surgical outcomes were measured for all patients undergoing TORS. The first 10 patients were compared with the second 10 patients. **Results:** Nurse education and a mock surgical case were implemented prior to the first TORS operation. All patients underwent TORS for oropharyngeal cancers (T1-T4). Negative margins were obtained in all ablative cases. Room setup time averaged 24 minutes. Robot docking time averaged 38 minutes. Operative time averaged 73 minutes. There was no significant difference between the first and second 10 cases. There was one complication involving a patient who was reintubated in the OR for tongue edema. **Conclusions:** The introduction of a TORS program in an academic medical center can be a complex and daunting undertaking. We demonstrate that with careful planning excellent efficiency and safety can be attained early on.

3:33 Transoral Robotic Surgery for Supraglottic Squamous Cell Carcinoma

Steven Michael Olsen, MD, Rochester, MN; Eric J. Moore, MD*, Rochester, MN; Koch A. Cody, MD PhD, Rochester, MN; Jan L. Kasperbauer, MD*, Rochester, MN; Rebecca R. Laborde, MD, Rochester, MN; Kerry D. Olsen, MD*, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the technical advantages and patient selection criteria for transoral robotic surgery. Participants should also understand the functional outcomes and preliminary oncologic outcomes achievable with this technique.

Objectives: We present our experience with transoral robotic surgery (TORS) for supraglottic squamous cell carcinoma (SCC). Our objectives include: highlighting the technical advantages of this technique, demonstrating achievable functional outcomes, and presenting preliminary oncologic outcomes. **Study Design:** A prospective study was conducted on all patients undergoing TORS for supraglottic SCC with or without adjuvant therapy from March 2007-August 2009. **Methods:** Primary functional outcomes included dysphonia, tracheotomy dependence, and gastrostomy tube (G-tube) dependence. Primary oncologic outcomes were estimated with the Kaplan-Meier method for local control (LC), regional control (RC), distant control (DC), overall control (OC), disease specific survival (DSS), and overall survival (OS). **Results:** Transoral robotic surgery provides the surgeon with unique advantages including improved visualization and dexterity when compared to traditional transoral techniques. Transoral robotic surgery achieved negative margins in all nine patients studied with no perioperative complications. The majority of patients (77%) had advanced stage disease (stage III-IVA). One patient developed a regional recurrence at 9 months and one patient developed a local recurrence at 34 months. No patients died from disease. At last followup, 78% of patients were tracheostomy free and 78% were G-tube free. **Conclusions:** Transoral robotic surgery is a promising modality for resection of SG SCC. TORS achieved functional laryngeal preservation in the majority of patients with no complications. Initial disease control and survival results are promising. Larger, prospective studies with long term followup are needed to validate these results.

3:41 Cervical Metastasis of Germ Cell Tumors: Evaluation, Management, Complications, and Outcomes

Saral Mehra, MD MBA, New York, NY; Jeffrey C. Liu, MD, New York, NY; Joel Sheinfeld, MD, New York, NY; Amit Gupta, MD MPH, New York, NY; Dennis H. Kraus, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the characteristics of patient presentation, surgery, pathology, complications, and followup of patients with cervical metastases of germ cell tumors. This will assist head and neck surgeons in diagnosis, management, and counseling of such patients.

Objectives: Head and neck surgeons can be involved with the management of germ cell tumors (GCT) metastatic to the neck from initial diagnosis through post-chemotherapy management of residual neck masses. This paper reports on 34 consecutive patients with GCT metastatic to the neck. **Study Design:** Retrospective cohort study. **Methods:** A single institutional retrospective analysis of 34 consecutive patients with testicular GCT metastatic to the neck who underwent post-chemotherapy neck surgery between 1991 and 2009 with survival analysis. **Results:** Seventy-four percent of patients had neck mass at initial diagnosis, with 50% of

patients having neck mass as the presenting symptom leading to a diagnosis of GCT. Of the 37 neck procedures, positive nodes were found in 22. No significant relationship between preoperative tumor markers and neck pathology (p=0.35) or survival (p=0.11) was identified. Viable cancer on neck pathology predicted disease specific survival (p=0.01). No patients had permanent nerve injury or chyle leak. Five and ten year overall survival was 79.8%; five and ten year disease specific survival was 82.3%; five and ten year recurrence free survival was 79.8% (median 52 month followup). **Conclusions:** Operative management for patients with metastatic GCT to the neck can achieve long term durable control with limited complications.

3:49 Cancer of Unknown Primary - Are We Making a Difference?

Ashley E. Balaker, MD, Los Angeles, CA; Elliot Abemayor, MD*, Los Angeles, CA; David Elashoff, 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 describe the main factors that influence the treatment outcomes of patients with head and neck cancer of unknown primary.

Objectives: In recent years, patients with cancer of unknown primary (CUP) have been increasingly treated with chemoradiation in lieu of surgery, radiation, or chemotherapy alone. We systematically reviewed the published experience on the treatment outcomes of patients with CUP in order to determine if the treatment modality affected survival outcomes. **Study Design:** Meta-analysis. **Methods:** A comprehensive literature search was performed for articles reporting survival outcomes for CUP in the head and neck published within the last twelve years. **Results:** Eighteen studies with 1,726 patients met the inclusion criteria. All studies reported at least five year survival outcomes. Thirteen of the eighteen studies also reported five year survival based on N stage and six reported five year survival based on presence of extracapsular extension (EC). Overall 5 year survival in the entire group was 48.6%. Five year survival based on N stage was N1 60.8%, all N2 51.1%, N2a 63.6%, N2b 42.5%, N2c 37.5%, and N3 26.3%, with a p-value <0.001 on multivariate analysis. Patients who underwent surgical treatment with either radiation or chemoradiation had a five year survival of 52.4% compared to 46.6% for those treated with chemoradiation alone, however this difference was not statistically significant. Patients with EC had a five year disease specific survival of 56.9% compared to 81.5% for those without EC (p=0.01). **Conclusions:** In patients with CUP survival outcomes are influenced by clinical stage at time of diagnosis and presence of extracapsular extension. No significant five year survival difference was seen between patients treated with chemoradiation alone when compared to patients who also received surgical treatment.

3:57 The Regeneration of Radiation Damaged Salivary Glands Using Adipose Derived Stem Cells

Tsuyoshi Kojima, MD, Kyoto, Japan; Shin-ichi Kanemaru, PhD MD, Kyoto, Japan; Shigeru Hirano, PhD MD, Kyoto, Japan; Ichiro Tateya, PhD MD, Kyoto, Japan; Juichi Ito, PhD MD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that adipose derived stem cells (ADSC) have the potential for restoring the function of salivary glands which have radiation induced damage.

Objectives: Radiotherapy is one of the most effective treatments for head and neck cancer. However, it is unavoidable to develop dry mouth syndrome as the common side effect because not only the tumor but also the normal salivary glands are included in the irradiation field. Previously, we investigated the protective efficacy of basic fibroblast growth factor (bFGF) in radiation damaged salivary glands. In this study, we investigated whether the implantation of ADSC is effective in regeneration of radiation damaged salivary glands or not. **Study Design:** Prospective animal experiment with control. **Methods:** ADSC (500,000 cells derived from green fluorescent protein mice) were administered to submandibular glands of C57BL/6 mice in group I (n=14), 2 months after irradiation (10Gy). Phosphate buffered saline was administered to mice in group II (n=14) as control. The morphology of submandibular glands and saliva flow rate were assessed at 1 and 2 months after the treatment, and the polymerase chain reaction was performed to determine the response of irradiated submandibular glands for ADSC. **Results:** Saliva flow rate of group I was restored in comparison with that of group II. Although the damage of acinar cells was detected in both groups, the proliferation of blood vessels in submandibular gland tissue was observed in group I more than in group II. **Conclusions:** Our study indicates that

ADSC has the potential for restoring salivary gland dysfunction after irradiation. The restoration of blood flow in submandibular gland tissue may contribute to this effect of ADSC.

4:05 Discussion/Q&A

Moderator: Jimmy J. Brown, MD*, Augusta, GA

4:13 Pectoralis Major Flap in Salvage Total Laryngectomy: A Ten Year Experience
Christian P. Hasney, MD, New Orleans, LA; Brian A. Moore, MD, New Orleans, LA; Ronald G. Amedee, MD*, New Orleans, LA; R. Brent Butcher, MD, New Orleans, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the appropriate utilization of the pectoralis major flap in decreasing wound related complications following salvage total laryngectomy.

Objectives: Since the advent of concurrent chemoradiation therapy for the management of advanced laryngeal carcinoma, delayed wound healing and pharyngocutaneous fistula formation frequently complicate salvage laryngectomy. Numerous multi-institutional chemoradiation trials document increased fistula or wound complications. Several reports and extensive anecdotal experience suggest that fortifying the neopharyngeal closure with vascularized tissue may decrease the rate of fistulization. Considering this apparent discrepancy, we present our experience utilizing myofascial and myocutaneous pectoralis major flaps in the setting of salvage total laryngectomy. **Study Design:** Retrospective chart review of all patients undergoing salvage total laryngectomy after definitive radiation or chemoradiation between 2000 and 2010 at a single tertiary care head and neck center. **Methods:** All patients undergoing salvage total laryngectomy between 2000 and 2010 were identified and divided based on the addition of a pectoralis major flap to the pharyngeal closure. Patients were stratified by preoperative treatment with radiation alone versus concurrent chemoradiation. Data was collected on patient demographics, tumor staging and location, radiation dosimetry, time from radiation conclusion to salvage laryngectomy, postoperative complications, namely wound breakdown and fistula formation, additional procedures or interventions, length of hospitalization, and time to oral intake. **Results:** Our results suggest a decrease in wound related complications and fistula formation when the pectoralis major flap is utilized in the setting of salvage total laryngectomy. **Conclusions:** Utilization of the pectoralis major flap results in decreased rates of wound breakdown and fistula formation. Consideration should be given to incorporating regional or distant vascularized tissue in cases of total laryngectomy performed following external beam radiotherapy.

4:21 p38 and Snail Are Critical for Downregulation of E-Cadherin during EMT in HNSCC
Yuan Lin, PhD, Los Angeles, CA; Guanyu Wang, MD PhD, Los Angeles, CA; Jie Luo, BS, Los Angeles, CA; Chi Lai, MD, Los Angeles, CA; David Elashoff, 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 understand a new pathway of metastasis regulation in HNSCC. This newly defined pathway has important implications for targeted chemoprevention and therapy.

Objectives: Understanding the molecular mechanisms that mediate HNSCC metastasis may enable identification of novel therapeutic targets. We recently reported the role of the E-cadherin transcriptional repressor, Snail, in the inflammation induced promotion of EMT in HNSCC. Herein we demonstrate that inflammatory mediators also upregulate p38, thus further defining the cycle by which inflammation promotes tumor progression. **Study Design:** A molecular biology study. **Methods:** Real time quantitative reverse transcriptase polymerase chain reaction (RT-PCR), Western blot analysis, and 3-D spheroid culture were used to determine how inflammation affects p38 and EMT. **Results:** p38 kinase inhibitor treated, and p38 shRNA HNSCC cell lines demonstrated a significant upregulation in E-cadherin mRNA and a decrease in the mRNA expression of the transcriptional repressor Snail. p38 shRNA HNSCC cell lines show a less invasive phenotype in a spheroid model. An inverse relationship between p38 and E-cadherin was demonstrated in situ by immunohistochemical staining of human HNSCC tissue sections. p38 is required for the robust IL-1B induced E-cadherin downregulation and Snail upregulation. IL-1B increases p-p38 and has a more rapid and robust effect on p38 in Snail

overexpressing cell lines. **Conclusions:** In gastrulation, it is a Snail independent pathway in which p38 is required in the primitive streak to downregulate E-cadherin expression at the posttranscriptional level. Herein we provide the first report that p38 and p38IP are required for the Snail induced E-cadherin downregulation and cell invasion in HNSCC. A Snail-p38 feedback loop jointly downregulates E-cadherin and drives a potent EMT in HNSCC. This newly defined pathway has important implications for targeted chemoprevention and therapy.

4:29 A Cost Effective Analysis of PET-CT Surveillance versus Upfront Neck Dissection for Management of the Post-Chemoradiotherapy Neck for N2 Disease

Rohan R. Walvekar, MD, New Orleans, LA; Amy Rabalais, MD, New Orleans, LA; Jonas T. Johnson, MD*, Pittsburgh, PA; Kenneth Smith, MD PhD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the cost impact of PET-CT imaging versus upfront neck dissection for a specific clinical scenario i.e., management of post-chemoradiotherapy neck for N2 neck disease.

Objectives: To study the cost effectiveness of PET-CT for the management of the post-chemoradiation neck. **Study Design:** Cost effectiveness analysis. **Methods:** A hypothetical clinical scenario consisting of a patient with oropharyngeal cancer with N2 neck disease treated with definitive CRT was studied. This patient would have a controlled primary cancer with a clinically negative neck post-treatment. The post-treatment management would include an option for either serial PET-CT imaging or an upfront neck dissection and surveillance with either physical examination, CT, or PET-CT. An algorithm was created for each of these strategies. Followup was structured to be every three months for a duration of one year after treatment completion. A total of four followup encounters were accounted for in our algorithm with imaging and interventions as designated for each strategy with incidences and probabilities from peer reviewed literature. Standardized costs were obtained using national databases. A cost effectiveness analysis was performed to populate costs of each strategy, effectiveness values, and incremental cost effectiveness ratio (ICER). **Results:** Based on our assumptions and current literature, the neck dissection strategies have a 99.2% effectiveness rate in controlling the neck, compared to 98.6% with PET-CT surveillance. This calculates to an incremental cost effectiveness ratio of $3,854,397. This means that if the neck dissection strategies were employed, one would spend an extra $3,854,397 per patient cured in comparison to the PET-CT surveillance algorithm. **Conclusions:** Our results strongly support the use of PET-CT imaging as the most cost effective strategy for surveillance of the patient with a controlled primary tumor and a clinically negative neck for the first year after completion of definitive CRT.

4:37 Treatment Effects of rhBMP-2 on Invasiveness of Oral Carcinoma Cell Lines

Brian A. Nussenbaum, MD*, St. Louis, MO; Stanislav O. Zakharkin, PhD, St. Louis, MO; Paul H. Krebsbach, DDS PhD, Ann Arbor, MI; Natalia A. Kokorina, MD, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) describe the adverse biological effect on invasiveness of rhBMP-2 in human oral carcinoma cell lines in vitro; 2) understand that this adverse effect is dependent on the baseline gene expression of BMP-2; and 3) understand that these potential untoward effects need to be studied further before considering adjunctive use of rhBMP-2 in oral cancer patients requiring bone reconstruction.

Objectives: To determine if recombinant human bone morphogenetic protein-2 (rhBMP-2) has biological effects on the invasiveness of human oral squamous cell carcinoma (OSCCA) cell lines. **Study Design:** Laboratory investigation using six human OSCCA cell lines, with three cell lines having baseline gene expression of BMP-2 and three cell lines without baseline gene expression of BMP-2. **Methods:** The invasiveness of each cell line was measured using a matrigel invasion assay with or without stimulation by rhBMP-2. A tumor metastasis quantitative PCR array was used to establish whether observed findings from the invasion assay correlated to changes in gene expression. **Results:** There was a significant increase in tumor cell invasion in response to rhBMP-2 in all BMP-2 positive cell lines but no change in the cell lines that did not express the BMP-2 gene. Quantitative PCR revealed that changes in gene expression were distinctly different based on the baseline gene expression of BMP-2 and favored a more metastatic genotype in the BMP-2 positive cells.

Conclusions: Recombinant human BMP-2 has an adverse biological effect on invasiveness of human OSCCA cell lines in vitro. This adverse effect is dependent on the baseline gene expression of BMP-2. Changes in expression of genes involved with tumor metastasis correlated to the invasion assay findings. These data raise concern for the safe application of rhBMP-2 for reconstruction of bone defects in oral cancer patients.

4:45 Small Molecule Inhibition of PI3K-AKT Pathway Reduces Cervical Metastasis in Orthotopic Squamous Cell Tongue Tumor Model

Joseph A. Knowles, MD, Birmingham, AL; Blake Golden, MD, Birmingham, AL; William Lancaster, BS, Birmingham, AL; Eben Rosenthal, MD*, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role of the AKT pathway in tumor metastasis and understand its utility as a potential therapeutic reagent.

Objectives: Activated phosphoinositide 3-kinase and its downstream target AKT/PKB are important signaling molecules and key survival factors involved in the control of cell proliferation, apoptosis and oncogenesis. MK-2206 is an orally active, allosteric inhibitor of AKT; a key component of the phosphatidylinositol-3 kinase pathway. Our objective of this study is to assess the potential of MK-2206 to decrease cervical metastasis in an orthotopic tongue tumor model. **Study Design:** This is a pre-clinical animal study using an orthotopic tongue tumor model to assess cervical metastasis. **Methods:** Luciferase expressing SCC-1 cells were implanted in the tongues of immunodeficient mice. Animals were divided by luminescent count into two equal groups (n=10) and dosed with 120 mg/kg MK-2206 or vehicle alone. Neck dissections were performed to determine the presence of cervical metastasis by luciferase expression. Tongue tumors were sectioned and stained for MMP-1 expression as a histological marker of metastasis. **Results:** Average luminescent counts in primary tumors was significantly lower in treatment group vs control ($p = 0.05$). Treatment with MK-2206 was sufficient to reduce rate of metastasis from 75% in control mice to 10% in treated mice ($p = 0.04$). Survival was 70% in control group vs 100% in treatment. Immunohistochemical analysis of tongue tumors showed increased expression of MMP-1 in control tumors vs. treatment (22% vs 6%, $p = 0.03$). **Conclusions:** AKT inhibition by MK-2206 is sufficient to reduce tumor size and cervical metastasis in an orthotopic tongue tumor model. Reduction of MMP-1 was significant in primary tumors indicating a possible downstream mechanism for observed reduction in metastatic spread.

4:53 Discussion/Q&A

5:30 - 7:00 MEET THE AUTHORS POSTER RECEPTION

SATURDAY, APRIL 30, 2011

CHICAGO VIII - X

7:00 - 7:50 **Business Meeting (Fellows Only)**

7:55 **Announcements**

INVITED LECTURE

8:00 **Workforce Issues in Otolaryngology**
David W. Kennedy, MD*, Philadelphia, PA

GENERAL

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

8:35 **Botulinum Toxin as Safe, Effective Treatment for Recurrent Sialoceles after Parotid Surgery**
Scott M. Rickert, MD, New York, NY; Lesley Childs, MD, New York, NY; Teresa O, MD, New York, NY; Milton Waner, MD, New York, NY; Andrew Blitzer, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the advantages of using botulinum toxin as a treatment for recurrent sialoceles and postop salivary leak. Discussion of the mechanism of botulinum toxin and its safe and effective use will be presented.

Objectives: To demonstrate the efficacy of botulinum toxin as a viable, safe, and noninvasive of recurrent sialoceles. **Study Design:** Prospective study of 5 patients. **Methods:** 5 patients (2 children, 3 adults, age range 2-68) were noted to have recurrent sialoceles or salivary fistula after parotid gland surgery. Initial conservative measures, including pressure dressing, glycopyrrolate, and simple aspiration were unsuccessful. In this study, aspiration of the sialocele was performed with a subsequent induction of 20-30 units of botulinum toxin type A (25 units/ml) into the same potential space. The patients were then followed for recurrence of their sialocele. **Results:** 5 patients had an aspiration of their recurrent sialocele or salivary leak performed with a subsequent injection of botulinum toxin into the same potential space. Average followup was 9.2 months (range 3.2-17.1 months). All patients noted resolution of their sialocele within 2 weeks of their induction of botulinum toxin. There were no complications noted, particularly no noted facial nerve or facial musculature weakness. None of the patients required further aspiration or botulinum toxin injection. This is the largest series and first with children to demonstrate success with botulinum toxin in the treatment of recurrent sialoceles. **Conclusions:** Botulinum toxin is a safe, highly effective and less invasive treatment for recurrent sialoceles when conservative measures have been unsuccessful.

8:43 **Surgery for Obstructive Sleep Apnea Improves Depression and Sleepiness**
Stacey L. Ishman, MD MPH, Baltimore, MD; James D. Benke, BS, Baltimore, MD; Lisa E. Ishii, MD MHS, Baltimore, MD; Christine G. Gourin, MD*, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) explain the effect of sleep surgery on sleepiness; 2) compare depression scores before and after surgery.

Objectives: To determine if surgical treatment of OSA is effective at reducing depression and sleepiness. **Study Design:** Pre-post study. **Methods:** Record review for patients who underwent surgical treatment of OSA between August 2008 and May 2010 and were evaluated for sleepiness and depression before and after surgery using the Epworth Sleepiness Scale (ESS) and the Beck Depression Index (BDI). **Results:** Fourteen

patients, 11 men and 3 women, met study criteria with a mean age of 44.9 years (SD, 7.4) and mean body mass index of 29.3 (SD, 7.4). The mean preoperative respiratory disturbance index (RDI) was 27.5 events/hour (SD, 12.8; range, 9.0-50.8) which decreased to 12.1 (SD 13.0; range, 2.2-48.0; p=0.002). Mean ESS improved from 10.4 (SD, 4.5) to 5.5 (SD, 4.3; p=0.007), while mean BDI scores decreased from 8.2 (SD, 8.4) to 5.0 (SD, 5.5; p=0.10). There were 8 patients with excessive daytime sleepiness (57%) and 4 with depression on screening (29%) before surgery. Surgery for OSA was associated with resolution of sleepiness in 6 patients (75%) and depression in 4 patients (100%); however, 2 patients without depression before surgery developed depressive symptoms after surgery, both of whom only had single level surgery with residual obstruction. There was a significant correlation between change in RDI and BDI change(r=0.70, p=0.016) but none with change in ESS (r=0.30, p=0.37). **Conclusions:** Surgical treatment of OSA resulted in significantly reduced depression and sleepiness scores and reductions in RDI correlated with improvement in depression scores. Further evaluation with larger sample sizes is warranted.

8:51 The Effect of Upper Airway Surgery on CPAP Pressure: A Systematic Review

Ryan P. Reddy, MD, Charleston, SC; Shaun A. Nguyen, MD, Charleston, SC; Marion B. Gillespie, MD, Charleston, SC

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand the role of upper airway surgery in the management and treatment of patients with obstructive sleep apnea.

Objectives: To determine the effect of upper airway surgery (UAS) on continuous positive airway pressure (CPAP) settings in patients with obstructive sleep apnea syndrome (OSA). Secondary objective was determining the effect of UAS on CPAP compliance. **Study Design:** Systematic review and meta-analysis. **Methods:** Three electronic databases (Ovid/Medline, PubMed, & Cochrane library) were searched (through September 7, 2010), as well as reference lists of all obtained articles. Trials that evaluated changes in CPAP settings due to UAS treatment were selected for further review and were included for analysis if they provided CPAP titration settings prior to and following surgery. Nine studies fit the inclusion criteria and a random effects meta-analysis was performed. **Results:** The meta-analysis included 186 adult patients with AHS treated with UAS who had undergone CPAP titration prior to and following surgery. These patients were selected from a study population of 310 (252 males, 47 females, and 11 unidentified) with a mean age of 38.08 years (range: 12.8 - 71 years) and BMI range of 24 - 55. Presurgical and postsurgical CPAP pressure means were 10.3 +/- 0.85 and 8.8 +/- 0.81, respectively, which random effects model calculated as a significant decrease (MD, 1.034; 95% CI, 0.554 to 1.514). There was insufficient data to calculate a meta-analysis on CPAP compliance. **Conclusions:** UAS can significantly decrease CPAP pressures and may treat CPAP pressure related complaints. Additional investigation is needed to determine a direct impact on CPAP compliance.

8:59 Management of Angiotensin Converting Enzyme Inhibitor Induced Angioedema

Samer Al-khudari, MD, Detroit, MI; Michael Loochtan, BA, Toledo, OH; Kathleen Yaremchuk, MD*, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the successful management and treatment of angiotensin converting enzyme inhibitor induced angioedema.

Objectives: To develop a clinical algorithm for management of patients with ACEIA. The relationship between symptoms, exam, and laryngoscopy findings were analyzed to determine their role in management. **Study Design:** Prospective cohort observational study. **Methods:** 39 patients in 1 year with ACEIA were evaluated by otolaryngology and underwent laryngoscopy and followed until disease resolution. The need for airway intervention, disposition for appropriate level of care and other parameters were analyzed as independent variables. **Results:** The mean duration of medication use prior to the episode of ACEIA was greater than 238.7 days. Treatment was initiated within 61.5 minutes of presentation to the ER. Mean duration until resolution of edema was 27 hours. 20 (55%) patients required ICU admission and 6 (16.7 %) required intubation. 14 (38.9%) were monitored and discharged from the ER. Floor of mouth edema was present in 18 (50%) patients, and massive tongue edema was found in 4 (11.6%) patients. Aryepiglottic fold was involved in 14 (38.9%) patients on laryngoscopy. Patients with subjective dyspnea (p=0.01), dysphonia (p=0.001), and dysphagia (p=0.036) were

most likely to require admission to an intensive care unit. The presence of upper lip swelling had a negative correlation with airway edema identifiable on fiberoptic laryngoscopy alone (p=0.011). Subjective or objective voice changes predicted edema present on laryngoscopy (p=0.001). Patients with increased physical exam findings did correlate with edema on laryngoscopy. **Conclusions:** The ability of ACEIA to present in various forms in the head and neck is exemplified in our study. The current management protocol for ACEIA was successful in triaging 36 consecutive patients to the appropriate level of care. History and physical exam findings may predict airway findings and help guide treatment in ACEIA.

9:07 Progress in Female Authorship in Otolaryngology

Jennifer L. Bergeron, MD, Los Angeles, CA; Reason Wilken, Cleveland, OH; Mia E. Miller, MD, Los Angeles, CA; Nina L. Shapiro, MD, Los Angeles, CA; Neil Bhattacharyya, MD FACS*, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the trends of increasing female authorship in the literature of otolaryngology and its subspecialties.

Objectives: To identify contemporary trends in female authorship and publication in the otolaryngology literature. **Study Design:** Retrospective study. **Methods:** All articles published in Annals of Otology, Rhinology and Laryngology, Archives of Otolaryngology-Head and Neck Surgery, The Laryngoscope and Otolaryngology-Head and Neck Surgery in 2008 were reviewed and compared to prior data from 1978, 1988 and 1998. Each published article's authorship panel was examined for the number of authors and each author's sex, educational degree category and the subspecialty area of publication. Year to year comparisons were conducted for the rates and characteristics of female authorship in otolaryngology. **Results:** A total of 634, 789, 1040 and 958 articles from 1978, 1988, 1998 and 2008, respectively were analyzed. From 1998 to 2008, the overall percentage of female authors increased from 12.4% to 20.5% (p<0.001). Similarly, the percentage of articles with a female first author increased from 11.4% to 19.6% (p<0.001). Whereas in prior years pediatric otolaryngology had the highest female first author percentage (range, 6.5-17.9%), in 2008 all subspecialties demonstrated significant increases in female first author percentages: otology 19.1%, general 19.7%, pediatrics 16.9%, head and neck 21.2% and plastics 15.9% (p=0.497). A significant number of female first authors continue to be non-physicians (18.6% in 2008, p<0.001). **Conclusions:** Female authorship has shown significant and steady increases in the otolaryngology literature, particularly in the past decade. All otolaryngology subspecialties are experiencing an increased rate of publication from female otolaryngologists.

9:15 The Utility of Fine Needle Aspiration in the Diagnosis and Management of Follicular Thyroid Neoplasms: One Institution's 10 Year Experience

Robert H. Deeb, MD, Detroit, MI; Saurabh Sharma, BS, Detroit, MI; Osama M. Alassi, MD, Detroit, MI; Tamer A. Ghanem, MD PhD, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to the differential diagnosis of follicular thyroid neoplasms. Additionally participants will be able to compare the various diagnostic modalities and evaluate the utility of fine needle aspiration in diagnosing these neoplasms.

Objectives: The traditional teaching is that histologic specimens are required to accurately differentiate follicular adenoma (FA) from follicular carcinoma (FC). Pathologists at our institution believe that this distinction is possible in the majority of cases from cytologic features alone. We sought to review our experience over the last 10 years in the use of FNA to diagnose follicular thyroid neoplasms. **Study Design:** Retrospective review. **Methods:** We reviewed all patients who had an FNA of a thyroid neoplasm at our institution from 2001 to present. Patients with a result showing FA, FC or follicular neoplasm not otherwise specified (NOS) were included in the study. Patients who underwent surgical excision were further examined to determine if their surgical specimen diagnosis matched that of the FNA. Statistical analyses were performed. **Results:** A total of 139 patients were included in the study. An FNA diagnosis of FA, FC and NOS were made in 65%, 7% and 27% of patients, respectively. Sixty-one percent of patients underwent surgery. FNA diagnosis of FA was confirmed on histological evaluation in 50% of patients. Twenty-six percent of patients with an FNA diagnosis of FA were found to have cancer after surgical specimen examination. Diagnosis of FC was confirmed in 60% of patients. **Conclusions:** Our results reveal that FNA has a relatively low sensitivity and specificity for diagnosing follicu-

lar adenoma and follicular carcinoma. We conclude that a definitive diagnosis beyond follicular neoplasm NOS is quite difficult based on FNA alone and histologic evaluation remains the gold standard.

9:23 Criterion Based Training to Reduce Surgical Errors

Marvin P. Fried, MD*, Bronx, NY; Marc J. Gibber, MD, Bronx, NY (Presenter); Rachel J. Kaye, BA, Bronx, NY; Alexis H. Jackman, MD, Bronx, NY; Boris P. Paskhover, BA, Bronx, NY; Babak Sadoughi, MD, Bronx, NY; Joseph B. Jacobs, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role of surgical simulation in modern otorhinolaryngology training and compare the performance of residents trained to proficiency with those trained by conventional methods.

Objectives: We investigated whether training otorhinolaryngology (ORL) residents to criterion performance levels on the ES3 (endoscopic sinus surgery simulator) produces residents whose performance in the operating room is superior to residents who are trained by performing a fixed number of surgeries. **Study Design:** As a prospective cohort study, subjects were ORL junior residents and attending surgeons: eight experimental, six control, and six attendings. **Methods:** Resident subjects completed validated objective tests to assess baseline abilities. All subjects were videotaped performing an initial standardized surgical procedure. Experimental subjects achieved benchmark proficiency criteria on the ES3 while control subjects repeated the surgical procedure twice. Residents were videotaped performing a final surgery. All videos were assessed for metrics by a panel of attending surgeons. **Results:** Attendings outperformed the resident groups in the majority of parameters on the initial procedure. Experimental and attending groups outperformed controls in some parameters on the final procedure. There was no difference between resident groups in initial performance, but the experimentals outperformed controls in navigational tasks in the final procedure. There was no difference in final performance between subgroups of the experimental group that were based on the number of trials needed to attain proficiency. **Conclusions:** We corroborated the ability of the ES3 to produce subjects trained to benchmarked proficiency levels in objective measurements. Simulator training can improve resident skills to reach proficiency for all residents, despite the existence of an inherent range of abilities. This proficiency level attained is equal, if not superior, to that acquired by conventional training using finite repetition of live surgeries.

9:31 ORL Emergencies Boot Camp: A Novel Approach to Onboard Otolaryngology Residents Using Simulation

Sonya Malekzadeh, MD, Washington, DC; Eugenia Chu, MD, Washington, DC; Kelly M. Malloy, MD, Philadelphia, PA; Jared Tompkins, BS, Washington, DC; Alexis Battista, MBA NREMT-P, Washington, DC; Ellen S. Deutsch, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss effective methods for comprehensive simulation based airway training for junior level residents. Participants will be able to explain the need for simulation based training in otolaryngology residency and be able to describe a proposed model for an interactive airway training course designed for junior level residents.

Objectives: Incoming otolaryngology residents have to triage and manage airway, bleeding and other emergencies with little experience. Simulation has become increasingly important in surgical education and provides tools to develop psychomotor skills and judgment early in residency using realistic experiences while eliminating patient risk. We surveyed residents' experiences and developed a course designed to improve junior residents' knowledge, confidence, technical skills, and clinical performance. **Study Design:** A one day course was developed consisting of six skills stations (intubation, mask ventilation, flexible laryngoscopy, direct laryngoscopy, epistaxis control, and cricothyroidotomy), as well as triaging telephone inquiries and managing teams during two complex airway management scenarios. **Methods:** Residents completed pre and post boot camp questionnaires regarding their previous experience, concerns, confidence level, knowledge, technical skills and clinical performance with each skill. **Results:** Thirty residents enrolled and 27 participated in the course and completed both surveys. Previous experiences and confidence levels were variable, and 25 of 30 (83%) identified emergency airway management as a concern before attending the course. An overwhelming majority of participants agreed or strongly agreed the intervention was useful in improving their self-assessed

technical skills, knowledge, confidence and clinical performance. A Fisher's exact test demonstrated improved confidence (P<0.05) for every skill. **Conclusions:** The boot camp questionnaire provides a description of the preliminary procedural experience of a large subset of incoming otolaryngology residents. Simulation based learning supplements limited clinical skills in managing airway, bleeding and other emergencies by increasing the experience, confidence and self-assessed knowledge of otolaryngology residents.

9:38 Discussion/Q&A

♦ **9:45 - 10:15 Break with Exhibitors - View Posters** ♦

RHINOLOGY/PLASTIC-RECONSTRUCTIVE

Moderator: Brent A. Senior, MD*, Chapel Hill, NC

10:15 Nasal Spray Regimens after Endoscopic Sinus Surgery: A Double Blinded Randomized Controlled Trial
Brian W. Rotenberg, MD MPH FRCSC, London, ON Canada; Irene Zhang, MD, London, ON Canada; Ian Arra, MD, London, ON Canada; Keith B. Payton, MD FRCPC, London, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to understand 1) methodology of a blinded randomized trial; and 2) the role of nasal steroids and saline sprays after endoscopic sinus surgery.

Objectives: The literature is lacking in evidence guiding the postoperative management of patients with chronic rhinosinusitis with nasal polyposis (CRSwP) undergoing endoscopic sinus surgery (ESS). The purpose of this study was to compare three different standardized medication regimens prescribed to patients after ESS. **Study Design:** A three arm randomized double blinded controlled trial was conducted. **Methods:** After inclusion/exclusion criteria were met, patients were enrolled into the study and underwent standard ESS. Postoperatively patients were randomized into three medication regimens, those being control group A—saline irrigation alone; group B—saline irrigation plus budesonide nasal spray; group C—saline irrigation mixed with budesonide nasal spray. Outcome measures were SNOT-21 scores, Lund-MacKay (LM) CT scores, and Lund-Kennedy Endoscopic Scores (LKES), taken at baseline, then at six months and one year postoperatively. Side effect profiles were also measured (ACTH blood level ranges and intraocular pressure (IOP)). Routine ANOVA and Chi-square analyses were conducted using a Bonferroni correction, as well as routine descriptive statistics. Inter- and intra-group comparisons were made. **Results:** Sixty subjects were recruited. All groups were equivalent at baseline in all outcomes. All intra-group analyses showed statistically and clinically significant improvements in disease status as compared to baseline ($p<0.0167$), with a lessened improvement at one year. No statistically or clinically significant differences were observed between groups at any time point. There was no treatment effect noted. **Conclusions:** In this study, nasal steroids did not confer any additional benefit over saline alone as post-ESS care in our CRSwP patient population.

10:23 Regional and Specialty Variations in the Treatment of Chronic Rhinosinusitis
Linda N. Lee, MD, Boston, MA; Neil Bhattacharyya, MD*, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand and discuss variations in the medical treatment of chronic rhinosinusitis (CRS) among geographic regions and between physician specialties.

Objectives: To identify regional and specialty differences in the medical treatment of chronic rhinosinusitis (CRS). **Study Design:** Cross-sectional analysis of a national database. **Methods:** Ambulatory visits for CRS were extracted from the National Ambulatory Medical Care Survey (NAMCS) for years 2005-2006. Medication utilization associated with CRS (antibiotics, antihistamines, nasal steroids and oral steroids) were tabulated for

both medication class and individual drug. Statistical analyses were conducted to determine variations in medication class and specific drug utilization by U.S. geographic region and physician specialty, specifically primary care physicians (PCP) versus otolaryngologists (ORL). **Results:** Among an estimated 36.2±0.3 million annual visits for CRS (mean age, 36.8±1.4 years; 60.1±1.9% female), the ratio of PCP to ORL visits was 10:1. Percent of clinician visits with prescriptions for antibiotics (47.3±3.0% of overall visits), nasal steroids (10.8±1.4%) and oral steroids (2.8±0.7%) did not vary significantly by geographic region (p=0.79, 0.66 and 0.34, respectively). Antihistamines were significantly more often prescribed in the South (15.3±3.4% of visits, versus 11.3±1.8% overall nationally, p=0.04). PCP's were significantly more likely to prescribe antibiotics compared to ORL's (53.3±2.9% versus 27.4±4.2%, respectively, p<0.001) and less likely to prescribe both nasal steroids (9.7±1.5% versus 17.5±2.8%, p=0.01) and oral steroids (2.3±0.7% versus 6.6±2.0%, p=0.01). Significant differences existed for specific drugs prescribed according to specialty. **Conclusions:** There are significant variations in the outpatient medical treatment of CRS according to geography and specialty. This study highlights the need for evidence -based medical treatment protocols for CRS.

10:31 Treatment of Refractory Chronic Rhinosinusitis with Integrative East-West Medicine

Arthur W. Wu, MD, Los Angeles, CA; Jeffrey D. Suh, MD, Los Angeles, CA; Malcom Taw, MD, Los Angeles, CA; Chau Nguyen, MD, Ventura, CA; Marilene B. Wang, MD*, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to analyze efficacy of treatment of patients with refractory chronic sinusitis using an integrative East-West approach, including acupuncture, dietary counseling, stress management, exercise, and lifestyle changes.

Objectives: Chronic rhinosinusitis (CRS) may not respond to maximal medical and surgical therapy. Use of alternative therapies to treat health conditions has gained increasing attention from both patients and health care providers. Studies demonstrating benefit from alternative medical therapy for CRS are scarce. This pilot study's objective was to determine whether an integrative East-West approach is beneficial in the treatment of CRS. **Study Design:** Prospective, non-randomized trial. **Methods:** Patients with refractory CRS were offered treatment with an 8 week protocol of integrative East-West medicine. Patients who elected to join the study were given the 20 item Sino-Nasal Outcome Test (SNOT-20) and the 36 item Short Form (SF-36) surveys to complete. The treatment protocol included weekly treatments of acupuncture and massage, as well as instruction in dietary modification, lifestyle changes, exercise, stress management, and self acupressure. At the end of the treatment period, they completed the SNOT-20 and SF-36 surveys. Pre- and post-treatment surveys were compared for changes in disease specific and general quality of life. **Results:** Ten patients completed the protocol. There were trends toward improvement in mean scores for all individual elements of the SNOT-20; however, only "need to blow nose" and "reduced concentration" were statistically significant. In the SF-36, role physical, vitality, social functioning, and mental health were all significantly improved after treatment. There were no adverse events and no significant worsening of scores in any category. **Conclusions:** This pilot study demonstrates that an integrative East-West approach may benefit patients with refractory CRS who have failed standard surgical and medical therapy.

10:39 Endoscopic Endonasal Revision Surgery for Blowout Fractures

Yasuyuki H. Hinohira, MD PhD, Tokyo, Japan; Masahiro K. Komori, MD PhD, Nankoku, Japan; Naoaki Y. Yanagihara, MD PhD, Matsuyama, Japan; Harumi S. Suzaki, MD PhD, Tokyo, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand endoscopic endonasal sinus surgery is a successful technique for reducing blowout fractures, and to explain the cause of persisting diplopia following the initial surgery.

Objectives: This study demonstrated that endoscopic endonasal sinus surgery (ESS) is a successful technique for reducing blowout fractures even though used in revision surgery. **Study Design:** Retrospective study. **Methods:** Between 1997 and 2009, 124 patients with isolated blowout fractures not involving the orbital rim, the zygoma, or the maxillary bone were operated on, using an endoscopic endonasal approach based on ESS techniques. Bone fragments entrapping the orbital contents were removed, and no reconstructive material was used except temporary balloon catheter or silastic sheet in our surgeries. 8 of the 124 patients underwent revision surgery for persisting diplopia (6), ophthalmalgia (1), infection (1). They consisted of 4 inferior, 3

combined, and 1 medial wall fractures. All revision surgeries were also performed using ESS techniques. **Results:** In 6 patients complaining of persisting diplopia following the initial surgery, adhesion between the orbital contents that reprotruded into the paranasal sinus and the sinus mucosa was remarkable. Intraoperative eye traction tests to determine the ocular motility disturbance indicated the adhesion caused diplopia, and the diplopia improved by dissecting the adhesion in 5 of the 6 patients. Remnant bone fragments entrapped the orbital contents in a case complaining of ophthalmalgia. A silastic sheet that had been inserted to the ethmoid sinus for preventing adhesion shut the maxillary sinus opening in the infection case. **Conclusions:** Endoscopic endonasal reduction surgery for blowout fractures is useful even though used in revision surgery. This study indicated that the cause of persisting diplopia is adhesion between the orbital contents and the paranasal sinus mucosa.

10:47 The ADVANCE Study: A Prospective, Multi-Center Study of a Bioabsorbable, Steroid Eluting Sinus Stent

Keith D. Forwith, PhD MD, Louisville, KY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the advantages of a steroid eluting stent for avoiding complications of endoscopic sinus surgery.

Objectives: Disease recurrence and impaired wound healing in the form of inflammation, polyposis, adhesions and middle turbinate lateralization cause suboptimal outcomes following sinus surgery. A bioabsorbable, steroid eluting stent was studied for its ability to preserve sinus patency and provide controlled steroid delivery to the sinus mucosa. The study objective was to assess safety and efficacy of the stent used following functional endoscopic sinus surgery in patients with chronic rhinosinusitis (CRS). **Study Design:** Prospective, multi-center, single cohort trial enrolling 50 patients. **Methods:** The study allowed bilateral or unilateral steroid eluting stent placement. Oral and topical steroids were withheld for 30 days postop. Endoscopic followup was performed to 60 days. Patient reported outcomes (SNOT 22, RSDI) were collected to 6 months. Efficacy was assessed by grading inflammation, polyp formation, adhesions and middle turbinate position. Safety assessment included ocular exams at baseline and 30 days. **Results:** Stents were successfully deployed in all 90 sinuses. Mean inflammation scores were minimal at all time points. At one month, the occurrence of polypoid edema was 10.0%; adhesions 1.1%; middle turbinate lateralization 4.4%. Changes from baseline in patient reported outcomes were statistically significant ($P<0.0001$). No clinically significant changes from baseline in intraocular pressure occurred. **Conclusions:** This consecutive case series provides clinical evidence of the safety, efficacy and clinical utility of a bioabsorbable steroid eluting stent for use in CRS patients. The stent is effective in improving wound healing by preserving sinus patency, reducing inflammation and minimizing adhesions via controlled local steroid delivery without evidence of ocular risk.

10:55 A Prospective Study of Endoscopic Eustachian Tube Balloon Tuboplasty

Edward D. McCoul, MD MPH, New York, NY; Madeleine R. Schaberg, MD MPH, Philadelphia, PA; Vijay K. Anand, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the technique and indications for eustachian tube balloon tuboplasty.

Objectives: Eustachian tube dysfunction (ETD) is a common otologic condition that can produce auditory and rhinologic symptoms. Although several treatment options exist, the optimal treatment for this condition has yet to be determined. Endoscopic eustachian tube balloon tuboplasty (ETBT) is a new technique for treatment of ETD with no available prospective data. We report our early outcomes using both objective and disease specific quality of life (QOL) measures. **Study Design:** Prospective intervention study. **Methods:** Consecutive patients undergoing ETBT were enrolled from a tertiary medical center. Patients with ETD or recurrent otitis media who failed medical therapy with specific indications were included for study. Patients under 18 years or with known craniofacial syndrome were excluded from study. Preoperative evaluation included imaging of the paranasal sinuses, audiometry, and nasal endoscopy. Outcomes were measured using the Eustachian Tube Dysfunction Questionnaire (ETDQ), the Sinonasal Outcome Test-22 (SNOT-22), otoscopy and tympanometry. Each measure was recorded prior to surgery and again at 6 and 12 weeks postoperatively. **Results:** A consecutive series of 27 patients with ETD were enrolled for study. Forty-eight percent were female with a mean

age of 55.8 years. Seventy-five percent underwent bilateral ETBT, and 41.6% underwent concurrent septoplasty. All patients underwent concurrent inferior turbinectomy. Improvement from baseline was observed for both ETDQ and SNOT-22 at 6 weeks and 12 weeks postoperatively. Tympanometry and otoscopic examination were improved in all patients. There were no reported complications. **Conclusions:** ETBT is an effective intervention for the management of ETD. Disease specific QOL instruments and objective measures both have important roles in determining treatment success.

11:03 Botulinum Toxin for Rhinitis: A Double Blind, Placebo Controlled Pilot Study with Quantitative Measurements of Efficacy

Dan Novakovic, MD, New York, NY; Scott Rickert, MD, New York, NY (Presenter); Lesley Childs, MD, New York, NY; Andrew Blitzer, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand potential use of botulinum toxin for rhinitis through a discussion of quantitative measurements of airflow of the first human study of botulinum toxin for rhinitis.

Objectives: To demonstrate rhinitis as a hyperstimulation of cholinergic nerve endings, leading to mucosal hypersecretion and an increase in nasal blood flow. As botulinum toxin is a powerful cholinergic blocker, the application of this toxin intranasally helps to decrease the symptom complex associated with rhinitis. Shaari et al., using a canine model, noted a 41% reduction of stimulated nasal secretions after botulinum toxin application to the nasal mucosa. A quantitative assessment of this use in humans has never been performed. **Study Design:** Prospective double blind, placebo controlled clinical trial. **Methods:** A double blind, placebo controlled clinical trial was performed by injecting botulinum toxin into the inferior turbinates of 8 human subjects. Each side was randomized to receive botulinum toxin A (four 2.5 unit aliquots) or equivalent volume of normal saline as control. Airflow was measured at baseline and each visit using hot wire airflow device. Baseline and stimulated nasal secretions were collected on filter paper then weighed. The patients were followed monthly for a total of 4 months. **Results:** There was a statistically significantly greater airflow on the toxin treated sides compared with control sides. Maximum benefit was at 1 month and benefit seemed to carry through to the 3 month followup. There was a notable trend toward reduction of nasal secretions for at least 3 months. **Conclusions:** Further work is necessary, but this study provides quantitative evidence of benefit from this therapeutic application of botulinum toxin.

11:11 Discussion/Q&A

Moderator: John S. Rhee, MD MPH*, Milwaukee, WI

11:15 Impact of Vasopressors on Outcomes in Free Tissue Transfer for Head and Neck Reconstruction

Luke D. Harris, MD, Toronto, ON Canada; David P. Goldstein, MD, Toronto, ON Canada; Stuart A. McCluskey, MD, Toronto, ON Canada; Ralph W. Gilbert, MD, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the impact that intraoperative vasopressors have on free tissue transfer outcomes.

Objectives: The primary objective of the study was to determine the frequency of intraoperative vasopressor administration among patients undergoing free tissue transfer for head and neck reconstruction, and the secondary objective was to determine the impact of intraoperative vasopressor on free tissue transfer outcomes, including the impact of cumulative vasopressor dose and timing of intraoperative vasopressor administration. **Study Design:** Retrospective review. **Methods:** A retrospective review was performed of all patients undergoing free tissue transfer for defects of the head and neck between 2004 to 2008. **Results:** From 2004 to 2008 inclusive, 485 patients underwent 496 free tissue transfers for head and neck reconstruction. The complete failure rate was 2.2% (11 of 485 patients). The partial failure rate was 1.4%, and the operative take-back rate for venous congestion or arterial thrombosis was 1.6%. This gave a total major flap complication rate of 5.2%, which was used as the primary free tissue transfer outcome measure. Of the 485 patients who underwent free tissue transfer, 320 (66.0%) received intraoperative vasopressor. Of these patients, the majority (97.5%)

received phenylephrine and/or ephedrine. There was no significant relationship between receiving intraoperative vasopressor and major free flap complications, which were defined as complete failure, partial failure, or operative take-back for venous congestion or arterial thrombosis. **Conclusions:** Intraoperative vasopressors are used routinely in free tissue transfer for the reconstruction of head and neck defects. The use of intraoperative vasopressors does not appear to adversely affect free tissue transfer outcomes.

11:23 The Effects of Timing of Melatonin Administration on Ischemic Flaps in Rats

Jeffrey L. Schmidt, MD, Omaha, NE; Adam M. Pleas, MD, Omaha, NE; John J. Baker, MD, Omaha, NE; Oleg N. Militsakh, MD, Omaha, NE

Educational Objective: The goal of this presentation is to explain the role of reperfusion injury that follows tissue ischemia. We intend to demonstrate how timing of administration of an antioxidant such as melatonin may mitigate reperfusion injury.

Objectives: The investigators aimed to 1) evaluate melatonin's ability to dampen effects of reperfusion injury of a pedicled inferior epigastric artery flap in rats; and 2) assess how the timing of melatonin administration had an impact on this ability. **Study Design:** This was a double blinded, randomized controlled experiment. **Methods:** Seventy-four male Wistar rats underwent pedicle clamping and unclamping operations, separated by 12 hours of ischemia. Each rat was randomly assigned to one of four groups. Groups 1 and 2 received placebo and melatonin just before reperfusion, respectively. Group 3 received melatonin within the 12 hour ischemia period and just before reperfusion. Group 4 received melatonin just before ischemia and just before reperfusion. These groups were intended to mimic various clinical scenarios. Tissue was compared between groups via gross computer planimetry analysis and histological analysis.
Results: Using median scores of the three raters to calculate ANOVA, the p-value for total percentage necrosis was 0.23. Intraclass correlation of the 3 evaluators for percentage necrosis scores was 0.88. **Conclusions:** There was a difference between groups receiving melatonin and the placebo group, though this did not reach statistical significance. Larger sample sizes may have resulted in a statistical difference. There is no difference in timing of administration of melatonin on flap survival. Computer planimetry is a reliable way of measuring flap survival among different raters.

11:31 The Straight Truth: Measuring Observer Attention to the Crooked Nose

Andres N. Godoy, MD, Baltimore, MD; Masaru A. Ishii, MD, Baltimore, MD; Patrick J. Byrne, MD, Baltimore, MD; Kofi D. Boahene, MD, Baltimore, MD; Carlos O. Encarnacion, San Juan, PR; Lisa E. Ishii, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to explain a novel method for objectively evaluating observer attention and the success of surgical procedures to minimize the appearance of deformities.

Objectives: Quantify attentional distraction to crooked noses pre- and postoperatively as compared to normal noses using an established metric of attention. **Study Design:** Prospective random cross-sectional. **Methods:** The SMI eye tracker system recorded the eye movement patterns, called scan paths, of forty naïve observers gazing at pictures of faces with crooked noses preoperatively, or postoperatively, and faces without a crooked nose included as "normals". The fixation durations within the nasal area for each group of faces presented were compared. **Results:** A mixed design univariate analysis of variance (ANOVA) was performed to test the hypothesis that mean fixation times in the nasal region varied by face group. The results were highly statistically significant ($F(2,116) = 20.28$, $p = 0.000$, $\eta^2 = 0.029$). Marginal means were calculated for each nasal area of interest group with confidence intervals (normal 2.32 [2.26-2.38], preoperative 2.66 [2.58-2.75], postoperative 2.43 [2.35-2.51]). Post hoc testing with Bonferroni correction for 3 comparisons showed differences between the normal and preoperative groups (χ^2 41.38, $p = 0.000$), and between the preoperative and postoperative groups ($\chi^2$14.41, $p = 0.000$) but no difference between the normal and postoperative groups ($\chi^2$4.19, $p = 0.12$). **Conclusions:** There were highly statistically significant differences in the amount of attention paid to the nasal area of crooked noses preoperatively and postoperatively, and there were no differences in attention to the nasal area between the postoperative noses and the noses considered normal. This represents a novel

method for objectively evaluating observer attention and the success of surgical procedures to minimize the appearance of deformities.

11:39 Estimation of Skin Removal in Aging Asian Blepharoplasty
Amy K. Hsu, MD, New York, NY; Albert Jen, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe a technique for determining the amount of skin to remove in upper blepharoplasty in the aging Asian eyelid.

Objectives: To describe a method for estimating the amount of skin to resect in upper blepharoplasty in the aging Asian eyelid and to report our experience with this technique. **Study Design:** Retrospective review of patients in a single private practice. **Methods:** Resection of skin in upper blepharoplasty in an Asian eyelid can often be less forgiving than in other ethnicities due to the unique anatomy of the supratarsal fold. Excising a maximal amount of excess skin will result in an unfavorable appearance of the upper eyelid in an Asian patient. We applied a technique of pinching the skin while the patient is awake until the patient is satisfied with the appearance. The skin is then measured and the precise amount resected during blepharoplasty. The supratarsal crease is always recreated even in patients who have a preexisting crease. We conducted a retrospective review of 55 consecutive patients undergoing upper blepharoplasty using this technique. All patients were Asian and aged 40 years or older. **Results:** The study group included 55 patients with a mean age of 55.7 (range: 42-78). The mean followup time was 24 months (range: 12 - 30). The amount of desired skin overhang superior to the supratarsal crease varied considerably between patients. Complications included asymmetry in 5 patients (9.1%), scarring in 3 patients (5.5%), and unfavorable cosmetic result 2 patients (3.6%). No patients experienced infection, bleeding, or visual changes. **Conclusions:** In upper blepharoplasty in the aging Asian eyelid, it is necessary to resect less skin than in the Caucasian patient to achieve the desired appearance of the supratarsal crease. Using a patient assisted approach to estimating the amount of skin to remove, a favorable cosmetic result with a low incidence of complications was achieved in a consecutive series of patients.

11:47 Discussion/Q&A

Introduction of President-Elect
Robert H. Ossoff, DMD MD*, Nashville, TN

GENERAL

A131. Removal of Obstructing T-Tube and Stabilization of the Airway

Sanjay M. Athavale, MD, Nashville, TN; C. Gaelyn Garrett, MD*, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to educate their patients on a novel, unpublished, simple technique to relieve their airway in the event of T-tube obstruction.

Objectives: The Montgomery T-tube maintains the tracheal airway while serving as a stent, protecting the airway from collapse or stenosis thereby allowing for speech and respiration through the native airway. Obstruction of the distal tracheal limb is the most dreaded complication of a T-tube. Many otolaryngologists send their patients home with a small sized ETT and instructions to place the tube down the distal tracheal limb should they develop air hunger from an obstructed T-tube. Unfortunately, though this may seem feasible from the practitioner's standpoint and from the standpoint of a calm, non-labored patient, this is rarely a simple task in the face of airway occlusion. **Study Design:** How I do it. **Methods:** We describe a simple method by which any patient should be able to remove their occluded T-tube and resecure their airway with a tracheostomy tube. **Results:** Step one involves removal of the obstructing T-tube. The patient should be given instructions to grab the T-tube with a Kelly clamp that they have been given and pull the T-tube out completely. Step two involves placement of a tracheostomy tube. The patient should be instructed to slide the outer cannula of the tracheostomy through the stoma and follow this with the inner cannula. **Conclusions:** Though the technique described above may seem simple to practicing otolaryngologists, patients are not surgeons. In a life threatening situation, a patient needs a simple, repeatable, and minimally invasive procedure to relieve their airway obstruction. We are hopeful that this will help prevent morbidity and mortality from acute airway obstruction related to T-tubes.

A132. Salivary Flow Rate: A Prospective Cohort Study Unlocking the Two Hit Hypothesis for Peritonsillar Abscess Development

Sanjay M. Athavale, MD, Nashville, TN; Jennifer H. Dang, BA, Nashville, TN; James A. Teng, BA, Nashville, TN; John W. Seibert, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the following: 1) the two proposed pathophysiologic mechanisms of peritonsillar abscess development; 2) salivary flow testing; 3) the role inherent salivary flow function may play in the development of peritonsillar abscesses; and 4) the novel two-it hypothesis of peritonsillar abscess development.

Objectives: Two mechanisms of PTA development have been theorized, but neither has been proven. The first is that PTAs are the endpoint of an infectious pathway beginning with tonsillar inflammation. The second is that PTAs develop secondary to salivary stasis of Weber's glands in the face of tonsillar inflammation. Our study looked to better define the role of salivary flow in PTA development. **Study Design:** A prospective cohort study. **Methods:** Recruited patients fell into one of three groups: 1) history of PTA drained in the past two years; 2) history of chronic tonsillitis (CT) necessitating a tonsillectomy within the past two years without a history of PTA; and 3) no history of CT or PTA. Fifty patients were recruited in each arm. All patients underwent the following salivary flow testing: 1) dehydrated unstimulated; 2) dehydrated stimulated (DS); 3) hydrated unstimulated (HU); and 4) hydrated stimulated (HS). Statistical comparisons were then obtained. **Results:** Data on 20 patients in each arm have been obtained and the remaining 30 patients are scheduled for testing. Our current data shows that PTA patients have higher salivary flow rates in all four categories when compared to CT without PTA and control patients. Statistically significant values are found in the hydrated state, both unstimulated and stimulated ($p<.05$). **Conclusions:** Patients with a history of PTA have increased salivary flow compared to patients with a history of CT without PTA and controls. Increased stagnant saliva in the peritonsillar fossa may be the second hit needed to develop a PTA in the face of an inflamed tonsil.

A133. Injuries during Orotracheal Intubation Using the GlideScope Video Laryngoscope

Neal W. Burkhalter, MD, Jackson, MS; Christine B. Franzese, MD, Jackson, MS; Kristen J. Otto, MD, Jackson, MS

Educational Objective: At the conclusion of this presentation, participants should be able to describe the indications and advantages of using the video laryngoscope for intubation. However, the participant should be cognizant of the potential for oropharyngeal injuries and mechanisms to avoid such complications.

Objectives: To demonstrate potential complications when using the video laryngoscope in a series of six patients and propose ways to avoid injuries. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review was performed on six patients from the otolaryngology service at two institutions that sustained injuries during orotracheal intubation using the GlideScope video laryngoscope. **Results:** Six patients sustained injury to the oropharynx during attempted orotracheal intubation using the GlideScope laryngoscope. Injuries were more commonly found to be right-sided. Five of the six patients had their injury identified intraoperatively including one patient intubated completely through the soft palate. Three patients required closure of soft tissue injuries. One of the six patients received an unplanned tracheostomy tube due to significant oral bleeding and inability to carryout orotracheal intubation. Other than the requirement for tracheostomy, there were no long term complications from the injuries. **Conclusions:** The video laryngoscope can be helpful in managing difficult airways but can be associated with significant oropharyngeal injuries. Care must be taken during its use as the endotracheal tube can cause significant oropharyngeal injury if its path is not directly visualized at all times.

A134. Otoscopy Simulation: A New Paradigm in Undergraduate Medical Education

Paolo Campisi, MD*, Toronto, ON Canada; Yamilet Tirado, MD, Toronto, ON Canada; Neil Chadha, MD, Toronto, ON Canada; Faisal Abdulkader, MD, Toronto, ON Canada; Vito Forte, MD, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the educational value of otoscopy simulation in the training of medical students.

Objectives: To apply an otoscopy teaching tool to an otolaryngology clerkship course and to assess the impact of otoscopy simulation on the medical student's ability to identify normal ear anatomy and recognize pathological states. **Study Design:** Randomized, prospective, controlled study. **Methods:** The simulation tool was offered to third year clinical clerks during their otolaryngology clerkship rotation during the 2009-2010 academic year. Participants were randomly assigned to a control group (standard curriculum) or an intervention group (standard curriculum plus an otoscopy simulation session). Proficiency in otoscopy was evaluated using a mock examination. Diagnostic accuracy (percentage correct) and the time to complete the mock examination were the main outcome measures. **Results:** Sixty-five medical students participated in the study (control n=24; simulation group n=41). The mean score in the control group was 54.3%. The mean score in the simulation group was 78.3%. The difference in performance between the two groups was statistically significant ($p<0.0001$). There was no significant difference in the time taken to complete the examination between the two groups ($p=0.487$). There was a statistically significant negative sloping correlation between the time taken to complete the examination and the percent score ($p=0.006$). **Conclusions:** The simulator improved the otoscopy skills of medical students. Improved student confidence was also evident in participant feedback questionnaires.

A135. Comparing Performance between Male and Female Residents in Otolaryngology

David A. Diaz Voss Varela, MD, Baltimore, MD; Kulsoom Laeeq, MD, Omaha, NE; Howard W. Francis, MD, Baltimore, MD; Robert A. Weatherly, MD, Kansas City, KS; Charles W. Cummings, MD*, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to understand about the statistics of gender in selection for otolaryngology residency. We will explore if perceived performance during residency training may be a determining factor for otolaryngology programs to have a predominantly male resident population.

Objectives: The purpose of our study is to identify whether performance during otolaryngology residency might adversely bias the selection of future female residents. **Study Design:** Retrospective study. **Methods:** Thirty-four residents were enrolled from 2008 to 2010 in our otolaryngology training program; 23 males and 11 females. Resident performance was compared for in-service examination scores, faculty evaluations, and residents' surgical competency in mastoidectomy and endoscopic sinus surgery. Analysis of variance was used to compare results between male and female residents. **Results:** Our results indicate that there are no gender differences in otolaryngology residency program based on faculty evaluations. We did not find any statistically significant difference for in-service examination scores and surgical competency evaluations. **Conclusions:** Over the past decade the number of female residents in the field of otolaryngology is gradually increasing. It is clear that gender is not a predictor of better outcome in this specialty, so performance during residency should not be a consideration for their future selection.

A136. Otolaryngology Related Transfers: Analysis of Outcomes and Cost Effectiveness over a One Year Period

Niklaus V. Eriksen, MD, Albany, NY; Christopher J. Ito, MSIV, Albany, NY; Allison D. Lupinetti, MD, Albany, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss current trends, outcomes, and cost efficiency in patient transfers for otolaryngological problems.

Objectives: Understand current trends, outcomes, and cost efficiency in patient transfers for otolaryngological problems. **Study Design:** Retrospective chart review. **Methods:** Retrospective chart review of patients transferred to a single tertiary care medical center between 7/1/08 and 6/30/09 for otolaryngology related problems. Data regarding diagnoses before and after transfer, treatments rendered, repeated tests, and estimated cost of transfer were collected and analyzed. **Results:** 126 patients were transferred over a one year period for otolaryngology related problems. These transfers were mainly associated with head and neck (H&N) infections (42), facial trauma (41), aerodigestive tract foreign bodies (12), H&N bleeding (18), and airway management (7). There were many discrepancies between the diagnosis at transfer versus the diagnosis after OHNS evaluation. Of 30 patients transferred for drainage of H&N abscesses, 10 (33%) did not have an abscess. Only 1 of 18 patients transferred for H&N bleeding was found to be actively bleeding upon evaluation in the ER. There were 13 avoidable, repeated radiologic studies; and 27 avoidable, repeated laboratory studies. Estimated avoidable costs were $69,000 for one year. **Conclusions:** Patient transfers are often necessary to provide urgent care, and providers should error on the side of patient safety. However, the transfer process for otolaryngology related problems may be inefficient and cost ineffective at times. In order to reduce inefficiencies in the transfer process, physicians should strive to communicate accurately and effectively, as well as prevent unnecessary repeated diagnostic studies.

A137. Tracheotomy Related Pressure Sores in Critically Ill Patients

Harry S. Hwang, MD, Boston, MA; Ivan H. El-Sayed, MD, San Francisco, CA (Presenter); Lauren J. Luk, BS, San Francisco, CA; Eric J. Kezirian, MD, San Francisco, CA; Hildegarde M. Schell-Chaple, RN, San Francisco, CA; Susan Barbour, RS, San Francisco, CA; Wendy Ma, BS, San Francisco, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss potential risk factors associated with tracheotomy related pressure sores and consider modifications in care related factors to decrease the occurrence of tracheotomy related pressure sores.

Objectives: To analyze potential risk factors associated with tracheotomy related pressure sores. **Study Design:** Retrospective cohort study. **Methods:** Review of critically ill patients undergoing a tracheotomy from July 2008 to December 2009 at an academic, tertiary care hospital system. **Results:** One hundred sixty-seven adult patients underwent tracheotomy. Nineteen (11.4%) developed tracheotomy related pressures sores. Percutaneous tracheotomy, age, obesity, duration of intensive care unit stay, duration of tracheotomy faceplate sutures, and low albumin were each associated with pressure sores. However this study had insufficient power to determine if these risk factors were independent of each other. **Conclusions:** Tracheotomy related pres-

sure sore formation is likely multifactorial, including patient related and care related factors. Larger studies are required to examine the independence of the potential risk factors that were identified.

A138. Brachiocephalic Vein Stenosis and Superior Vena Cava Syndrome Presenting as Acute Airway Obstruction

Alfred Marc C. Iloreta, MD, New York, NY; Marita Teng, MD, New York, NY

Educational Objective: At the conclusion of this presentation, participants should be able to understand the possibility of developing airway obstruction from superior vena cava syndrome, and to discuss the management of a patient with brachiocephalic vein stenosis causing such a complication.

Objectives: To present a case of acute airway obstruction and superior vena cava syndrome secondary to brachiocephalic vein stenosis and to review the literature regarding this uncommon complication. **Study Design:** Case report and literature review. **Methods:** The patient chart, including pertinent history, physical examination, clinical course and ancillary studies were reviewed. A literature search was performed and appropriate papers were identified. **Results:** We report the case of a 66 year old man with a complicated medical history including diabetes mellitus, hypertension, and endstage renal disease on home dialysis through an AV fistula. The patient presented to our emergency department with a two day history of progressive shortness of breath and odynophagia. At presentation, he was unable to tolerate liquids or solids. On physical exam, the patient had massive edema of the head and neck and upper extremities. Flexible fiberoptic laryngoscopy revealed significant retropharyngeal and supraglottic edema with near complete obstruction of the airway, requiring controlled fiberoptic intubation in the operating room. He was initially managed with antibiotics and high dose steroids, but when the edema failed to resolve, a tracheostomy was performed, and a CT scan of the neck with contrast was obtained. CT scan revealed high grade stenosis of the right innominate vein extending to the proximal right jugular vein. The superior vena cava was patent, and there were no masses at the base of the neck or thoracic inlet. Angiography demonstrated a thrombosed right sided AV fistula and a high grade right brachiocephalic vein stenosis. Thrombectomy was performed of the AV fistula, and the nearly occluded right brachiocephalic vein required balloon venoplasty and placement of two stents across the stenosis. Followup venogram demonstrated resolution of the stenosis and disappearance of collateral vessels in the upper chest. Following stent placement, the patient' edema decreased significantly and rapidly. He was decannulated, was able to tolerate oral diet, and was discharged home soon thereafter. A literature search found very few cases of acute airway obstruction following central vein thrombosis, and these were following central venous access placement. Both cases required only removal of the indwelling vascular access for symptomatic resolution. The only remotely similar case in the otolaryngology literature involved a patient who had had previous neck dissection, then suffered a thrombosed central venous line on the contralateral side. This patient was managed with systemic anticoagulation. **Conclusions:** Airway obstruction is a common complication initially managed by an otolaryngologist. Venous hypertension, albeit rare, should be considered in certain patients. Chronic renal patients, who frequently have AV fistulas or long term indwelling central lines, should be recognized as higher risk for this type of complication. Prompt recognition and involvement of a vascular interventionist can bring about a diagnosis followed by definitive treatment. Rather than systemic anticoagulation, the use of thrombectomy and intravascular stents in these patients, who commonly have many medical comorbidities, may be particularly safe and effective.

A139. Ethical Oversight in Clinical Research

Roni M. Keller, MD, Brooklyn, NY; Jonathan Cohen, MD, Brooklyn, NY; Marika Fraser, MD, Brooklyn, NY; David Bernstein, BA, Brooklyn, NY; Richard Rosenfeld, MD MPH*, Brooklyn, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss ethical reporting practices in otolaryngology research and other disciplines.

Objectives: Ethical considerations in the conduct and reporting of biomedical research include privacy, confidentiality, and protection of subjects. We sought to compare the degree and completeness of reporting of ethical review in otolaryngology and other disciplines. **Study Design:** Cross-sectional survey of six biomedical journals linked to national associations, representing the disciplines of otolaryngology, surgery, pediatrics, internal medicine, family practice, and plastic and reconstructive surgery. **Methods:** reviewed all clinical research

articles from 2002-2008 and abstracted data using a standardized form. Data included type of study, study support or funding, IRB approval (stated explicitly, in general terms, or not at all), ethics committee approval (stated explicitly, in general terms, or not at all), methods of informed consent, type of data collected, level of patient interaction with the investigators, location of study, and mention of the declaration of Helsinki. **Results:** A total of 10,327 articles were analyzed, of which 6,875 (68%) were clinical research. Annals of Internal Medicine (75.3%), Pediatrics (67.4%) and Annals of Family Practice (60.5%) were the journals most likely to have ethical reporting. Otolaryngology-Head and Neck Surgery (45.1%), Journal of the American College of Surgeons (39.1%), and Plastic and Reconstructive Surgery (15.1%) were least likely to have any ethical reporting. Case reports were the study design least likely to have any reporting (94%). Risk factors for lack of ethics reporting included international studies, non-funded studies, pre-existing data, and no direct patient contact. **Conclusions:** The results of our study highlight deficiencies in reporting of ethical review and identify areas for future improvement.

A140. Facial Nerve Paresis Caused by Benign Parotid Neoplasms: A Case Report and Review of the Literature

Andrew J. Kleinberger, MD, New York, NY; Zan Mra, MD, New York, NY; Benjamin D. Malkin, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be aware of facial nerve weakness as a rare but reported presenting sign of benign parotid neoplasms.

Objectives: Present a case of preoperative facial nerve paresis from a benign parotid neoplasm and review the literature for this association. **Study Design:** Case presentation and literature review. **Methods:** The patient chart was reviewed. A literature search was performed and English language papers with appropriate cases were identified. **Results:** The patient is a 25 year old man with an enlarging 4 cm right sided parotid mass associated with ipsilateral facial weakness. CT of the neck demonstrated a heterogeneous intraparotid mass; FNA was nondiagnostic. In the OR a well encapsulated parotid tumor displacing branches of the facial nerve was resected completely with nerve preservation; pathology revealed a pleomorphic adenoma. A review of the English literature revealed over 20 cases of facial nerve palsy caused by benign parotid neoplasms; however, many of these occurred with tumor recurrence or in the setting of infection, hemorrhage, or necrosis. Including the present case, there was an approximately equal histologic distribution between Warthin's tumor and pleomorphic adenoma, and the most common mechanism for facial palsy was nerve stretching or compression. **Conclusions:** The finding of facial nerve paresis in the setting of a parotid mass typically heralds the presence of malignancy. Such information is critical to appropriate patient counseling and surgical planning in terms of how the facial nerve may be managed. Although rare, benign parotid tumors may also lead to facial palsy due to mechanical forces rather than direct pathologic invasion. Depending on the timeframe of presentation and degree of deficit, recovery of facial function will be variable; however, nerve preservation should be attempted in these cases.

A141. The Efficacy of OSATS in Surgical Competency: A Systematic Review

Mohammad U. Malik, MD, Baltimore, MD; Laeeq Kulsoom, MD, Baltimore, MD; David A. Diaz Voss Varela, MD, Baltimore, MD; Stacey L. Ishman, MD, Baltimore, MD; Margaret Skinner, MD, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to have a clear understanding regarding the efficacy of objective structured assessment of technical skills (OSATS) in the assessment of surgical competency.

Objectives: To demonstrate that OSATS is a valid, reliable and feasible methodology to measure the assessment of surgical competency in surgery. Objectively assessing the operative competency in residency programs can identify the surgically challenged residents early during the surgery training and hence provide a chance for remediation. **Study Design:** A systematic review. **Methods:** A PubMed, Medline, MedPlus and Lancet search was performed using the keywords "OSATS", "objective structured assessment of technical skills", "operative competency" and "assessment of surgical skills of residents" from the respective start dates of the databases between 1997 and 2010. The pertinent articles which met the inclusion and exclusion crite-

ria were selected by two reviewers. **Results:** The collative opinion from different authors across different specialties reveals that OSATS demonstrates a good reliability and validity in assessment of surgical skills. **Conclusions:** Objective assessment of technical skills is of paramount importance when striving to improve assessment of surgical competency. The review of literature shows that OSATS is a valid, reliable and feasible methodology to gauge the technical skills, pertinent to surgery. By employing OSATS in residency programs, a comprehensive and objective evaluation of surgically challenged residents could be obtained and thus early remediation could be implemented.

A142. Headache and Dizziness and Dust Mite Allergy

Bulent Mamikoglu, MD, Peru, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to understand value of allergy evaluation in management of dizziness.

Objectives: Objective of this study was to observe effect of allergen immunotherapy for patients' dizziness and headache complaints. **Study Design:** Prospective clinical study. **Methods:** Adult dust mite allergic patients who were not receiving specific treatment for dizziness and headache symptoms. All patients had allergen specific immunotherapy for at least one year. Patients symptom scale scores compared before and one year after start of allergen specific immunotherapy. Statistical significance calculated by using Wilcoxon non-parametric test. **Results:** 29 patients with median age of 41 years included for the study. Significant improvement ($p<0.05$) in dizziness and headache symptom scores was seen in addition to improvement other symptoms such as nasal congestion, runny nose and sneezing. **Conclusions:** Specific immunotherapy in dust mite allergic patients alleviates dizziness and headache complaints.

A143. PASS—Palatal Advancement and Suspension Suture Technique: A Novel, Minimally Invasive Uvulopalatopharyngoplasty Technique for Sleep Apnea

Patrick C. Melder, MD, Marietta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain a novel, anatomically based, nondestructive technique for palatal reconstruction to correct the palatal component contributing to obstructive sleep apnea. At the conclusion of this presentation, the participants should be able to compare the difference between the potential morbidities and complications associated with uvulopalatopharyngoplasty and the minimal morbidities and complications of the PASS procedure.

Objectives: To develop a minimally invasive surgical technique to treat the palatal component of OSA. To perform a pilot trial to determine feasibility. **Study Design:** Prospective, non-randomized clinical trial. **Methods:** Fifty patients were studied. The PASS technique was used to treat the palatal component of obstruction in multilevel surgery for OSA (mild-severe). The distance from the free edge of the palate to the posterior pharyngeal wall was measured at the level of the arches of the palate prior to PASS. Three permanent (Ethibond), submucosal, periosteal based sutures were then placed: bilaterally from each hamulus to the ipsilateral palatopharyngeus muscle within the posterior tonsillar pillar and a single suture from the midline junction of the hard and soft palate to the base of the uvula. Gentle tension resulted in advancement of the palate. **Results:** The PASS technique proved to be a consistently reliable method to advance and suspend the palate without palatal excision to correct the palatal component of OSA. The average palatal advancement noted at the two measured positions was 7.5mm. Lateral cephalograms confirmed intraoperative findings of palatal advancement. **Conclusions:** The results of this pilot study demonstrated the PASS technique as a functionally and anatomically based nondestructive treatment for palatal obstruction to treat apnea. The limitations of the following study are the limited numbers of patients; the lack of a control arm with the gold standard UPPP; and the lack of isolating the PASS as a single treatment for palatal only OSA. The complications were minor and were primarily suture extrusion.

A144. Evaluation and Treatment of the Patient with Chronic Cough Referred to the Otolaryngologist

Robert James Morrison, BS, Portland, OR; Joshua S. Schindler, MD, Portland, OR

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the common etiologies of chronic cough, be familiar with current consensus guidelines on the approach to the patient with chronic cough, and explain the unique characteristics of the chronic cough patient seen by the otolaryngologist which should be considered during evaluation and treatment.

Objectives: To evaluate characteristics of patients with chronic cough referred to otolaryngology, efficacy of common therapies, and the yield of common studies used to evaluate cause of chronic cough. **Study Design:** Retrospective review. **Methods:** 132 patients were referred for cough between 2005 and 2010. Initial consultation and clinical encounters were reviewed and diagnostic studies/therapies recorded. Findings on diagnostic studies were noted if they aided in treatment. Response to therapies was determined by reviewing clinical encounter documentation and therapies were rated: no response, partial response, or complete response. **Results:** The average age was 56.6 years and chronic cough was more common in women. 49% received treatment for upper airway cough syndrome with minimal benefit. 40.1% received a course of oral corticosteroids, with half noting complete response of cough. 69.7% received a course of proton pump inhibitor, with 25% noting improvement in cough. **Conclusions:** Upper airway cough syndrome (UACS) and reflux disease were less prevalent than classically described in the literature. Many patients were referred still actively smoking, on ACE inhibitor therapy, or without adequate trial of PPI. Tricyclics and gabapentin/pregabalin were useful for treating cough not otherwise attributable to UACS, asthma, or reflux. Benzonatate and cough suppression therapy were effective adjuvant treatments. Nearly half of patients who had a course of OCS noted complete resolution of cough. Consequently, utilizing an empiric trial of OCS following first line treatment for UACS, asthma, and reflux may be a useful way of triaging patients into steroid responsive and steroid unresponsive cough to guide further evaluation and treatment.

A145. Multiple Cranial Neuropathies Related to Wegener's Granulomatosis of the Skull Base: An Unusual Presentation

Rajanya S. Petersson, MD, Rochester, MN; Jonathan W. Hafner, MD, Rochester, MN; Jan L. Kasperbauer, MD*, Rochester, MN; Colin L.W. Driscoll, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) describe the head and neck manifestations of Wegener's granulomatosis; 2) explain the workup for Wegener's granulomatosis; and 3) understand the importance of keeping Wegener's granulomatosis in the differential for many otolaryngological conditions.

Objectives: To describe an unusual presentation of Wegener's granulomatosis. **Study Design:** Case report. **Methods:** Case report and review of the literature. **Results:** A 22 year old female presented with an 8 month history of worsening left ear pain and conductive hearing loss after multiple courses of antibiotics and various otic drops. Computed tomography imaging of her temporal bones revealed left middle ear opacification. She underwent mastoidectomy with facial recess approach. Pathological evaluation of the middle ear tissue was consistent only with chronic inflammation. She was admitted two days later for nausea and vomiting, and it was noted that she had neuropathies of cranial nerves III, V, VII, X, and XII. Magnetic resonance imaging revealed enhancement of the left parapharyngeal space extending through foramen ovale to involve the dura. Workup for meningitis and other infectious processes were negative. Further workup included positive c-ANCA and PR-3, suggesting Wegener's granulomatosis. Tissue biopsy was requested by rheumatology from the left parapharynx or dura, but was not performed due to the risks of the procedure. Six days after readmission, mucosal changes consistent with Wegener's granulomatosis were noted by the left eustachian tube orifice. Biopsy showed necrotizing granulomas, consistent with Wegener's granulomatosis. Initiation of treatment with high dose steroids resolved all cranial neuropathies within days. **Conclusions:** Otolaryngologists are often involved in the care of patients with Wegener's granulomatosis, given the high incidence of nasal involvement. It is important to consider that the disease process can involve other areas in the head and neck. Wegener's granulomatosis should remain in the differential for many head and neck conditions.

A146. Added Value of Drug Induced Sleep Endoscopy

Ryan P. Reddy, MD, Charleston, SC; Shaun A. Nguyen, MD, Charleston, SC; Marion B. Gillespie, MD, Charleston, SC

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand the use of drug induced sleep endoscopy in the treatment of obstructive sleep apnea.

Objectives: To determine whether drug induced sleep endoscopy (DISE) provides clinical information not available on routine clinical inspection and awake fiberoptic endoscopy (AE) in obstructive sleep apnea syndrome (OSA) patients. A secondary objective was determining whether DISE resulted in a change in the surgical plan of care. **Study Design:** Prospective, self-controlled clinical trial. **Methods:** 24 patients (16 males, 8 females) with mean age of 46.75 (range: 18 - 67 years) and mean BMI of 30.68 +/- 6.54 underwent flexible endoscopy while awake and under propofol induced sleep to assess the location and degree of airway collapse, classify velopharyngeal closure, and grade Pringle & Croft obstruction. Surgical plan was assessed prior to and following DISE. Data was evaluated using Yates' chi-square analysis. **Results:** Comparison of AE and DISE assessments showed divergence in total airway collapse measures in 79% of cases, with most discrepancies seen at the palate, lateral walls, or epiglottis. Significant differences identifying collapse were seen at the palate (p=.0001), lateral wall (p=.00009), tongue base (p=.016), and total airway (p=.00007). Velopharyngeal closure class changed in 33.3% of cases, a significant difference (p = 0.0022). Pringle and Croft grades changed in 34.8% of cases with no statistical significance. SNE resulted in modified surgical plans in 54.2% of cases, though no significant correlation was seen with the observational values. **Conclusions:** DISE provides more clinical information to assess airway function and collapse than routine clinical inspection and AE alone and can assist with surgical planning in OSA patients.

A147. Thulium Laser Dacryocystorhinostomy for Symptomatic Epiphora

Scott M. Rickert, MD, New York, NY; Lesley Childs, MD, New York, NY; Joanna D'Elia, MD, New York, NY; Martin Leib, MD, New York, NY; Andrew Blitzer, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate advantages of laser dacryocystorhinostomy (DCR) with the affordable, portable new thulium laser. Discussion of laser DCR versus standard DCR will be performed and the advantages of the thulium laser will be presented.

Objectives: To demonstrate the efficacy of laser dacryocystorhinostomy (DCR) with the new affordable and portable thulium laser in the setting of symptomatic epiphora. **Study Design:** Retrospective case study of 14 cases of symptomatic epiphora. **Methods:** 12 patients with symptomatic epiphora were found to have 14 eyes documented with epiphora by dacryocystogram. Under monitor controlled anesthesia, a thulium laser fiber was placed in the canaliculi to the blockage site. With endoscopic vision, a laser DCR was performed just anterior inferior to the middle turbinate, creating a 5x5 mm opening. Silicone stents were placed, oral and ophthalmic antibiotics were given postoperatively. **Results:** 14 thulium laser DCRs were performed. Average followup with 1.65 years (range 0.25-2.17 years). 100% noted initial improvement and 92.9% noted continued improvement in epiphora postoperatively. No pain or vision changes were noted. 1 infection and 1 recurrence of epiphora occurred requiring office intervention. These results are in line with the success rate in the current literature for laser DCR. **Conclusions:** Thulium laser dacryocystorhinostomy is an effective new, affordable and portable laser that can be used to perform laser DCR on patients with symptomatic epiphora.

A148. Melkersson-Rosenthal Syndrome: From a Facial Nerve Center Perspective

Carlos M. Rivera-Serrano, MD, Pittsburgh, PA; Li Man, MD, Pittsburgh, PA; Barry M. Schaitkin, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that facial paralysis patients diagnosed with Melkersson-Rosenthal syndrome may have higher proportion of full triad of symptoms than what has been previously reported in the literature. In addition, participants should understand that patients with Melkersson-Rosenthal syndrome may present to different specialties complaining of different symptoms, and frequently, not all the classic features of the triad will be present.

Objectives: Melkersson-Rosenthal syndrome (MRS) is a rare disorder of unknown etiology. Few articles in the literature report series with more than 20 patients. **Study Design:** Retrospective. **Methods:** We searched for patients with MRS in a university based facial nerve center. Multiple clinical variables were analyzed. **Results:** Twenty-one patients were identified from 1971 to 2010. The age of presentation ranged from 22 to 67 years (mean 44.1). Seven (33.3%) were male and 14 (66.7%) were female. All (100%) patients had facial paralysis. Fourteen (66.7%) patients who initially presented with unilateral paralysis subsequently developed metachronous contralateral paralysis (alternating unilateral facial paralysis). One (4.7%) patient had simultaneous bilateral facial paralysis. The number of episodes per patient ranged from 1 to 8 (mean 3.1). Laterality was relatively equal: 35 episodes occurred on the right side and 31 on the left. The patient with most episodes of facial paralysis had 4 on the left and 4 on the right (metachronous). This was followed by 3 patients with 6 episodes each. The age of first incidence of facial paralysis ranged from 2 to 60 years (mean 34.4, median of 39). The mean interval between episodes was 4.7 years (range 0-30, median 3). Six (28.5%) of the patients reported a family history of MRS. **Conclusions:** Patients with MRS may present to different specialties complaining of different symptoms, and frequently, not all the classic features of the triad will be present. In our series of facial paralysis patients diagnosed with Melkersson-Rosenthal syndrome, a higher proportion had the full triad of symptoms than has been previously reported in the literature.

A149. Treatment of Zygomaticomaxillary Complex Fractures with Steinmann Pins

Jonathan B. Salinas, MD, Los Angeles, CA; Darshi Vira, MD, Los Angeles, CA; David Hu, MD, Los Angeles, CA; Maie St. John, MD PhD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) explain the importance of bony structure restoration after midfacial trauma; and 2) compare the Steinmann pin technique as a more efficient treatment alternative for patients with zygomaticomaxillary complex fractures.

Objectives: This case series presents our experience treating zygomaticomaxillary complex (ZMC) fractures through closed reduction using a Steinmann pin. **Study Design:** Case series. **Methods:** Charts for 23 consecutive patients with ZMC fractures presenting to the otolaryngology-HNS department at our medical center from 2005 to 2009 were reviewed. Postoperative CT scans were analyzed for malar symmetry. Patients were separated into two groups: those treated with open reduction and internal fixation and those treated with closed reduction and transzygomatic external fixation. Postoperative followup ranged from three to 55 months. Telephone interviews were conducted, evaluating patient satisfaction with aesthetic outcome and surgical complications. **Results:** Of the twenty-three patients, twelve patients had sufficient data for analysis. A total of six patients were found to have undergone ZMC fracture repair by open reduction with internal fixation (ORIF), while six patients had undergone ZMC fracture repair via closed reduction with a Steinmann pin. Average operative time was significantly lower for patients treated via the closed technique as compared to the open technique: 65.3 minutes and 162.5 minutes. Two tailed t-test demonstrated a statistically significant result ($p = 0.02$). Additionally, only a single one centimeter incision was required with the closed repair system versus several incisions using traditional methods. **Conclusions:** Closed reduction and external fixation with a Steinmann pin for ZMC fractures provides adequate reduction, good bony alignment and aesthetics, as measured by postoperative CT scans and patient questionnaires. Our study supports this system in ZMC fractures repair, as it requires significantly less operating time, a small incision, and allows for excellent patient outcomes.

A150. A Patient Safety Initiative—The Prevalence of Clinically Relevant OTC Medication Use in the Otolaryngology Preoperative Patient

Manikandan Sugumaran, MD, New York, NY; Ashutosh Kacker, MBBS*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the prevalence of nonprescription medication use in the otolaryngology preoperative patient. Identify the most commonly used nonprescription medications. Provide a tool (survey) that allows full disclosure of nonprescription medication use and educates patients on potential side effects from use of these medications during the preoperative period.

Objectives: The objective of this study was to determine the prevalence of over the counter and complimentary alternative medication (nonprescription) use in the preoperative otolaryngology patient population. In the

process develop a tool to optimize disclosure and educate the patient in regards to the potential complications with the use of nonprescription medications. **Study Design:** Cross-sectional study. **Methods:** A survey with commonly used nonprescription medications was given to all patients scheduled for surgery during the routine scheduling process. The list also included a space to fill in any medications that were not listed. These surveys were reviewed with inclusion of the patient's age and sex. **Results:** From a 6 month time period March 25, 2010 to September 25, 2010, 92 patients completed the survey. The average age was 41 years old. 42 (46%) reported the use of nonprescription medications. Of these, 11 (26%) were male and 31 (74%) were female. The average age of nonprescription medication users was 49 years old. 48% of these patients reported use of more than one nonprescription medication. The most commonly used nonprescription medications used were aspirin, ibuprofen, and green tea. **Conclusions:** The use of nonprescription medication in the otolaryngology population is common. The most commonly used nonprescription medications could potentially cause complications or compromise the quality of service provided. Our results show that the average age of patients who used nonprescription medication was higher than the average age who completed the survey. Also more females reported nonprescription medication use than males.

A151. Implementation and Evaluation of a Multidisciplinary Difficult Airway Response Team

Marietta Tan, MD, Baltimore, MD; Alexander T. Hillel, MD, Baltimore, MD; John Ok, MD, Baltimore, MD; Lynette J. Mark, MD, Baltimore, MD; Lauren C. Berkow, MD, Baltimore, MD; Eugenie S. Heitmiller, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss components of a multidisciplinary approach aimed at improving management of difficult airway emergencies.

Objectives: Difficult airways are both a challenge to the provider and a source of morbidity and mortality to the patient. Adverse airway events also have significant economic impact, with recent claims related to such events totaling >$4 million at our institution. We sought to demonstrate the effectiveness of a multidisciplinary difficult airway response team (DART) initiative in improving our hospital's responses to difficult airway emergencies. The goals were to 1) improve coordination of resources, including personnel and equipment; 2) identify system defects and apply safety programs to improve patient care; and 3) ensure sustainability through an educational program and simulations. **Study Design:** Descriptive and retrospective database analysis. **Methods:** Root cause analysis of airway sentinel events at an academic tertiary care center revealed lack of a systematic approach to communication of and response to difficult airways. A multidisciplinary DART, involving the departments of otolaryngology, anesthesiology, trauma surgery, and emergency medicine, was therefore implemented to provide a systems based approach to airway safety. Outcomes including sentinel events and surgical airways were studied. **Results:** The team responded to 61 DART calls in year 1 and 57 calls in year 2. Emergency surgical airways decreased from four in year 1 to two in year 2. There have been no sentinel events in the two years since the initiative began, compared to six in the preceding three years. **Conclusions:** At our institution, a multidisciplinary difficult airway response team has been effective in improving management of airway emergencies, improving hospital safety through practice based learning and a systems based approach.

A152. Evaluating the Usefulness of the Temporal Artery Biopsy for Giant Cell Arteritis

Stephen V. Tornabene, MD, Oakland, CA; Raymond L. Hilsinger, MD*, Oakland, CA; Raul M. Cruz, MD, Oakland, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the most common presenting signs and symptoms associated with patients undergoing a temporal artery biopsy.

Objectives: Giant cell arteritis (GCA) is systemic, inflammatory, vascular syndrome that predominantly affects the temporal arteries. The temporal artery biopsy is a common procedure used to aid in the diagnosis of this condition. The goal of this study was to identify analytical and clinical variables that may improve the effectiveness of the temporal artery biopsy. **Study Design:** Retrospective chart review. **Methods:** This retrospective study examined all temporal artery biopsies done in our institution in the past five years. Variables including demographic information, erythrocyte sedimentation rate (ESR), and biopsy data including the length and side of the biopsy were recorded. Clinical variables such as the presenting symptoms, timing of symptoms, and

treatment with corticosteroids were collected. **Results:** One hundred and five biopsies were completed in the study period. Four of these were positive for GCA, 71% were female, and the average age was 72. The most common presenting symptom was headache (90%), followed by visual symptoms (28%), and jaw claudication (15%). The physical exam finding of temporal artery tenderness was uncommon (16%). Seventy-three percent had an ESR greater than 50. The majority of the patients were treated with corticosteroids before the biopsy (78%). Seventeen percent of patients were continued on long term prednisone treatment for GCA despite a negative biopsy. **Conclusions:** This study examined clinical and laboratory variables associated with a temporal artery biopsy. Headaches and visual symptoms were common and did not predict a positive biopsy. Steroid treatment prior to the biopsy is common and may contribute to the low numbers of positive results. Many patients were continued on treatment despite a negative biopsy. The clinical utility of a temporal artery biopsy at our institution is questionable. Changes in patient selection may be necessary to increase the percentage of positive results for this test.

A153. Otolaryngologic Significance of the Hutchinson Sign

Parker A. Velargo, MD, Memphis, TN; Merry E. Sebelik, MD, Memphis, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to identify herpes zoster lesions of the face, recognize the Hutchinson sign and understand its clinical significance, and implement the appropriate treatment for herpes zoster ophthalmicus.

Objectives: As otolaryngologists, we need to familiarize ourselves with the presentation of herpes zoster as well as have a detailed understanding of the anatomy of the trigeminal nerve. Our patients' vision rests on our ability to recognize the Hutchinson sign. The anatomic basis of the Hutchinson sign lies within the ophthalmic division of the trigeminal nerve (V1), specifically the nasociliary branch. Thus, this case report will strive to demonstrate the clinical significance of this sign as well as serve to illustrate pertinent anatomy. **Study Design:** This study is a case report with review of the literature. **Methods:** A 38 year old female presented with pruritic and painful lesions to her columellar-labial angle and right periorbital area. Our patient was promptly diagnosed with herpes zoster ophthalmicus with a preceding positive Hutchinson sign. A review of the literature revealed limited information on this sign in otolaryngologic journals. **Results:** A positive Hutchinson sign indicates an increased risk of ocular involvement in herpes zoster ophthalmicus (HZO). Additionally, the Hutchinson sign has been found to be strong predictor of visual loss in HZO. Treatment of our patient was coordinated with the ophthalmology service. **Conclusions:** As otolaryngologists, we often see patients with facial lesions, especially lesions on or around the nose. It is imperative that we are familiar with the appearance of herpes zoster as well as the clinical significance of the Hutchinson sign. Because of the sign's strong association with visual loss, our ability to obtain an urgent ophthalmologic consultation is mandatory to prevent severe ocular complications.

A154. Rosai-Dorfman Disease Isolated to the Nasal Septum

William G. Young, MD, Detroit, MI; Jamie M. Segel, BS, Detroit, MI; Danny M. Meslemani, MD, Detroit, MI; Tamer A. Ghanem, MD PhD, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to describe typical presentation, pathology findings, and treatment options for patients presenting with Rosai-Dorfman disease.

Objectives: To describe the typical presentation, pathology findings, and treatment options for patients presenting with Rosai-Dorfman disease. **Study Design:** This case report was completed using chart review for data collection. **Methods:** The case report was generated through chart review looking at physical findings found at presentation, intraoperative findings, and pathology. A literature search was completed, investigating typical presenting symptoms, surgical management, pathology findings, and treatment options. **Results:** The patient is 38 year old gentleman who presented complaining of a six month history of nasal congestion with recurrent epistaxis. He was found to have significant enlargement of the nasal septum with no cervical lymphadenopathy. Surgical excision of the lesion via open rhinoplasty approach revealed surgical pathology consistent with Rosai-Dorfman disease. Due to the lack of involvement of other head and neck sites, no other intervention was necessary but close observation was recommended. **Conclusions:** Rosai-Dorfman disease

can present with isolated head and neck extranodal involvement at sites including the nasal septum. While no ideal treatment has been determined, interventions should correspond to the degree of symptoms experienced. Adjuvant therapies may be indicated beyond surgical excision.

HEAD & NECK

A155. Proinflammatory Mediators Upregulate IMP-3 in Head and Neck Squamous Cell Carcinoma (HNSCC)

Christine M. Anastasiou, BS, Los Angeles, CA; Jie Luo, BS, Los Angeles, CA; Yuan Lin, 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 discuss the role and regulation of IMP-3 in the IL-1(β) induced promotion of EMT in HNSCC.

Objectives: Prolonged exposure of human neoplasms to inflammatory mediators promotes epithelial-mesenchymal transition (EMT), tumor growth, invasion, and metastasis. Interleukin-1(β) (IL-1(β)) is an inflammatory mediator elevated in the HNSCC microenvironment and associated with EMT and tumor growth. We have shown that IL-1(β) upregulates the transcriptional repressor Snail, which then plays a direct role in E-cadherin downregulation. Recent microarray data from our laboratory demonstrated that insulin-like growth factor-II (IGF-II) mRNA-binding protein-3 (IMP-3) was increased significantly (>3x, $p<0.02$) in six Snail overexpressing cell lines compared with parental controls. IMP-3 is an oncofetal protein believed to regulate translation of the potent growth factor and apoptosis inhibitor IGF-II. IMP-3 overexpression in HNSCC correlates with higher histologic grade, lymph node metastases (LNM), and advanced disease stages. We therefore examined the role and regulation of IMP-3 in the inflammation induced promotion of EMT in HNSCC. **Study Design:** Western Blot and RT-PCR analyses were utilized to determine how IL-1(β) affects IMP-3 expression in HNSCC cell lines. **Methods:** HNSCC cell lines, Snail overexpressing cell lines, and NFκB knockdown cell lines were exposed to IL-1(β). **Results:** We confirmed that IMP-3 RNA and protein levels are elevated in Snail overexpressing cell lines. IL-1(beta) treated HNSCC cells showed increased IMP-3 protein expression. This effect was diminished in NFkB knockdown cells. **Conclusions:** We provide the first report indicating the role of IMP-3 in the inflammation induced promotion of EMT in HNSCC. We also document NFκB-dependent transcriptional regulation of IMP-3. This newly defined pathway has important implications for chemoprevention and novel therapies. Tailoring therapies to aggressively treat HNSCC will improve long term survival.

A156. Complications of AlloDerm and DermaMatrix for Parotidectomy Reconstruction

Sanjay M. Athavale, MD, Nashville, TN; Brannon Mangus, MD, Nashville, TN; James L. Netterville, MD*, Nashville, TN; Brian B. Burkey, MD, Cleveland, OH; Robert J. Sinard, MD, Nashville, TN; Wendell G. Yarbrough, MD*, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the difference in complication profiles between AlloDerm and DermaMatrix for parotidectomy reconstruction.

Objectives: AlloDerm and DermaMatrix are two acellular dermal implants currently utilized by reconstructive surgeons at our institution for reconstruction of parotidectomy defects. Our group was unable to find any literature to date reporting the complication rate associated with AlloDerm and DermaMatrix in the post-parotidectomy bed. **Study Design:** A retrospective chart review of patients undergoing total or subtotal parotidectomy with AlloDerm or DermaMatrix reconstruction in the past 10 years. **Methods:** We looked at the postoperative complication rates following subcutaneous implantation of these acellular dermal implants for parotid bed reconstruction. **Results:** One hundred patients were analyzed. Sixty-nine AlloDerm implants were associated with five complications (7%), while thirty-one DermaMatrix implants were associated with eight complications (26%) ($p = .0207$). When comparing total parotidectomies, the complication rate was one of 20 (5%) for AlloDerm and one of 12 (8%) for DermaMatrix ($p=.7061$). When looking at subtotal parotidectomies, the incidence of complications was found to be four of 49 (8%) for AlloDerm and seven of 19 (37%) for DermaMatrix ($p=.004$). **Conclusions:** Our study suggests that DermaMatrix was associated with increased postoperative complications compared to AlloDerm, especially in the subset of patients undergoing subtotal parotidectomy.

A157. Reconstruction of Parotidectomy Defects in the Rat Model: A Comparison of AlloDerm versus DermaMatrix

Sanjay M. Athavale, MD, Nashville, TN; Sanjeet V. Rangarajan, M EnG, Grand Rapids, MI; Latif M. Dharamsi, MD, Nashville, TN; Sabrina C. Wentz, MD, Nashville, TN; Sharon E. Phillips, MS BSN, Nashville, TN; Wendell G. Yarbrough, MD*, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the interaction of AlloDerm and DermaMatrix in the animal model of parotidectomy reconstruction with respect to inflammation, neovascularization and fibroblast proliferation. This knowledge will allow clinicians to compare and contrast the tissue interaction of these implants within the post-surgical parotid bed.

Objectives: We looked to analyze tissue incorporation, immune response, and neovascularization of AlloDerm and DermaMatrix in a rat model to determine which implant would be better suited for use in the post-parotidectomy bed. To our knowledge, this is the first study to examine histological differences between both implants in a post-parotidectomy animal model. **Study Design:** A prospective rat study comparing AlloDerm and DermaMatrix in the post-parotidectomy bed and dorsum. **Methods:** Eight male Sprague-Dawley rats were used. In each rat, three folded AlloDerm implants were placed in the post-parotidectomy bed and three were placed in the dorsum as controls. The same was done for DermaMatrix. Two animals were sacrificed at 4, 8, and 12 days. A blinded pathologist assessed the degree of fibroblast proliferation, microvessels, and inflammatory cells present in each section of implant. **Results:** Significant differences between type and location of implants were more prevalent at later time points. In the parotid gland, AlloDerm showed higher degrees of fibroblast proliferation at eight days ($p = 0.0106$), with no significant differences with DermaMatrix in the number of inflammatory cells or degree of neovascularization. When compared with the dorsum, DermaMatrix implants in the parotid gland had higher numbers of inflammatory cells at eight and twelve days, with 14.17 ($p = 0.0490$) and 33.33 ($p = 0.0046$) cells per section respectively. **Conclusions:** Our study showed that there are mild postoperative histologic differences between AlloDerm and DermaMatrix in the post-parotidectomy bed. The unique properties of each implant could potentially be a source of differing complication profiles in humans.

A158. Progressive Dental Loss from Gastroomental Free Flap Transfer

Stephen W. Bayles, MD, Seattle, WA

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize a potential limitation of gastroomental flap transfer in oral cavity reconstruction.

Objectives: To inform reconstructive surgeons of a potential limitation of gastroomental free flap reconstruction in the oral cavity which has not been previously reported. **Study Design:** Case report. **Methods:** A patient underwent reconstruction of a hemiglossectomy for T2 squamous cell carcinoma of the oral tongue. A gastroomental free flap was performed to avoid potential arm and hand morbidity from radial forearm harvest since the patient was an artisan craftsman by trade and would not accept potential risk to his hands and no other skin site was felt to offer adequate pliability. **Results:** Over a postoperative period of 6 months, the patient went on to develop progressive enamel loss and pain as a result of gastric acid secretion from the flap, ultimately requiring full dental extraction. High dose H2 blockade was unsuccessful in suppressing this progressive loss. **Conclusions:** Parietal cell production of hydrochloric acid may persist after transfer of gastroomental free flap. In the setting of the dentate patient, close proximity of acid production in the oral cavity may lead to enamel erosion and dental loss. The reconstructive surgeon should use caution in selecting use of this flap in this setting.

A159. Removal of a Large Ectopic Lingual Thyroid Using Transoral Robotic Surgery

Nichole L. Boettcher, BS, Minneapolis, MN; Kathryn M. Van Abel, MD, Rochester, MN (Presenter); Jonathan W. Haffner, MD, Rochester, MN; Matthew L. Carlson, MD, Rochester, MN; Eric J. Moore, MD*, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the clinical and radiographic findings as well as management strategies for large ectopic lingual thyroid.

Objectives: To report a novel surgical approach for the removal of a large ectopic lingual thyroid (ELT) using transoral robotic surgery (TORS). **Study Design:** Case report. **Methods:** The ELT was removed by TORS with cautery. **Results:** The operative course was unremarkable with a total operative time of 34 minutes. The ELT was easily visualized and was removed en bloc. There was minimal blood loss and no clips or sutures were required for hemostasis. The patient was extubated and tolerated oral intake immediately postoperatively. She was discharged home on a regular diet and oral pain medications on postoperative day one. She returned to the ER on postoperative day 11 with a slow oropharyngeal bleed requiring transoral cauterization in the operating room. She was discharged in stable condition the following day without further complication. **Conclusions:** We describe the utility of transoral robotic surgery for the removal of a large ELT. We have found this strategy to result in satisfactory removal of all thyroid tissue with minimal operative time and relatively little postoperative morbidity compared with an open transhyoid approach.

A160. Intraoperative Use of OCT in Robotic Assisted Thyroidectomy

Jonathan W. Boyd, MD, Irvine, CA; Marc Rubinstein, MD, Irvine, CA; Brian J.F. Wong, MD PhD*, Irvine, CA; Jason H. Kim, MD, Irvine, CA

Educational Objective: At the conclusion of this presentation, the participants should understand the utility and value of optical coherence tomography in robotic assisted thyroidectomy.

Objectives: To determine the feasibility of the optical coherence tomography (OCT) to image and identify parathyroid and thyroid glands in the neck during robotic assisted thyroidectomy. OCT is a high resolution optical imaging modality that generates a cross-sectional image within turbid media such as living tissue with resolution approaching that of light microscopy. OCT relies upon intrinsic differences in tissue optical properties for image contrast. **Study Design:** In vivo, prospective clinical study. **Methods:** An OCT imaging system (Niris, Imalux, Cleveland, OH) was used to image parathyroid and thyroid in consecutive patients during robotic assisted thyroidectomy. Images were obtained by raster scanning, a single mode fiber across the interior of the probe. The imaging probe was sterilized and inserted through the incision and placed in light contact with the tissue of interest. Images were acquired at a frame rate of 1Hz and resolution of ~10 μm with a 1 mm depth penetration. **Results:** OCT demonstrated distinct differences in structural architecture and signal intensity that allowed us to differentiate between thyroid and parathyroid tissues. **Conclusions:** This is the first study to systematically use OCT to differentiate thyroid and parathyroid glands during robotic assisted thyroidectomy. OCT can be used to evaluate these structures, which can be then confirmed with histopathologic evaluation via frozen or permanent sections. In the future, OCT has potential for use as an intraoperative method to more efficiently differentiate parathyroid glands, and thus not only decrease the operating time, but potentially obviate the need for frozen section confirmation, decreasing the risk of damaging the parathyroid.

A161. Adenoid Cystic Carcinoma of the Airway: A 30 Year Review at One Institution

Audrey P. Calzada, MD, Los Angeles, CA; Mia E. Miller, MD, Los Angeles, CA; Chi K. Lai, MD, Los Angeles, CA; David A. Elashoff, 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 discuss the treatment and prognosis for adenoid cystic carcinoma of the airway.

Objectives: To evaluate the treatment results of adenoid cystic carcinoma (ACC) of the airway at a single institution during a 30 year period. **Study Design:** Retrospective chart review. **Methods:** All cases of ACC of the airway over a 30 year period at one tertiary care institution were reviewed. The demographics, surgical intervention, postoperative radiation, pathologic characteristics and outcomes were evaluated by examining records and reviewing pathology. **Results:** Eight women and three men were treated for ACC of the airway with an age range of 25-72 years (median, 48 years). Four patients presented with ACC in the larynx, 2 patients with ACC in the subglottis, and 5 patients with ACC in the trachea. All patients underwent surgical intervention and radiation; nine of the 11 patients had postoperative external beam radiation, one patient had preoperative external beam radiation and the remaining patient had postoperative neutron beam therapy. 4 patients had microscopic or grossly positive margins after surgery; all of these patients had tracheal ACC. 8 patients had perineural invasion on pathology. Only one patient had recurrence of disease, which occurred at

10 months followup. Followup varied from 3 months to 168 months (median, 28 months). **Conclusions:** We report high disease free survival rates for ACC of the airway in patients who underwent definitive surgical resection followed by postoperative radiation. There is a higher risk for local recurrence with advanced tumor size, distal tracheal location, positive surgical margins and perineural invasion.

A162. BRAFV600E Is Associated with Increased Urokinase Plasminogen Activator (uPA) Levels in Papillary Thyroid Carcinoma (PTC)

E. Ashlie Darr, MD, New York, NY; Theodore S. Nowicki, BS, Valhalla, NY; Melanie E. Macewan, BS, Valhalla, NY; Julie Dunbar, BS, New York, NY; Codrin E. Iacob, MD, New York, NY; Jan Geliebter, PhD, Valhalla, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the roles of the BRAFV600E mutation and urokinase plasminogen activator in invasive papillary thyroid cancer.

Objectives: Papillary thyroid carcinomas (PTC) possessing the BRAFV600E mutation have been associated with greater local invasion and regional metastatic potential. This study sought to determine the extent to which BRAFV600E mutation status predicts upregulation of the urokinase plasminogen activator (uPA), an important mediator of invasion and metastasis, in patient samples of PTC. **Study Design:** Prospective study using patient thyroid tissue samples obtained over a 6 year period at a single tertiary care center. **Methods:** DNA and RNA were obtained from patient PTC and matched, normal thyroid tissue samples using the Trizol method. BRAFV600E mutational status of the DNA was determined using the TaqMan SNP genotyping assay, while RNA was analyzed for differences in uPA transcription levels (relative to matched, normal thyroid tissue) by qRT-PCR. **Results:** 54% of the PTC samples possessed the BRAFV600E mutation. PTC samples bearing the BRAFV600E mutation displayed significantly higher uPA transcription levels than those samples with wild type BRAF (5.883 vs. 1.27-fold higher RNA levels than corresponding normal thyroid tissue, $p<0.05$, Wilcoxon signed-rank test). Additionally, uPA RNA levels were significantly higher in patients with nodal metastasis ($p<0.05$). **Conclusions:** These data provide new evidence of the roles of BRAFV600E and uPA in PTC invasive pathology and demonstrate for the first time that BRAFV600E status is able to predict higher uPA levels in PTC.

A163. Transglottic Paraganglioma in a 16 Year Old Male

Kenneth C. Deem, MD MPH, Buffalo, NY; Joseph L. Muscarella, DO, Buffalo, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) describe the presentation and management of laryngeal paragangliomas; and 2) demonstrate clinical features distinguishing benign laryngeal paragangliomas from other more aggressive laryngeal neoplasms.

Objectives: 1) Describe the presentation and management of a transglottic paraganglioma; and 2) demonstrate clinical features that distinguish benign laryngeal paragangliomas from more aggressive laryngeal neoplasms. **Study Design:** Case report. **Methods:** We report the presentation, management and 3 year followup of a 16 year old male with a transglottic paraganglioma. **Results:** The patient's chief complaint was progressive hoarseness over one year. Family history was significant for vagal paraganglioma in his mother and pheochromocytoma in his maternal aunt. A submucosal vascular appearing mass was seen on flexible laryngoscopy occupying the left anterior false and true vocal folds. Imaging with CT and MRI/MRA showed a four centimeter bilobed lesion with prominent tumor blush extending inferolaterally through the cricothyroid membrane. No synchronous lesion was identified. Vital signs and catecholamine metabolites were normal. The lesion was excised submucosally via laryngofissure and immunohistochemical staining confirmed a paraganglioma. Injection laryngoplasty was performed eight months postoperatively with excellent return of vocal function. There was no evidence of recurrence at three years followup. Octreotide scans of the patient's siblings were negative. Genetic testing is ongoing. **Conclusions:** Laryngeal paragangliomas are rare benign neuroendocrine tumors typically isolated to the supraglottis. This is the first reported laryngeal paraganglioma to present with both supraglottic and subglottic components. The transglottic growth pattern clinically suggests the presence of anastomoses between the superior and inferior laryngeal paraganglia. A familial association with laryngeal paragangliomas, as seen in this case, has not been previously reported. Careful attention to family

history, endoscopic appearance, and radiographic features established the diagnosis preoperatively, supporting conservative resection and successful voice restoration.

A164. Parotid Tumor Size Predicts Proximity to Facial Nerve

Natalie A. Domenick, BS, Pittsburgh, PA; Jonas T. Johnson, MD*, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain how parotid tumor size predicts proximity to the facial nerve and discuss the use of this method for preoperative risk stratification.

Objectives: Parotid surgery mandates that every effort be made to identify and preserve the integrity of the facial nerve. Benign neoplasia and the majority of malignant tumors present with normal facial function. Therefore, while preoperative facial nerve palsy indicates almost certain nerve involvement, intact function does not rule it out. A simple method of predicting the proximity of the facial nerve to the capsule of the tumor preoperatively, particularly for asymptomatic patients, may benefit surgical planning and patient counseling. **Study Design:** We hypothesized that parotid tumor diameter would be an easily available, thus attractive, method to predict facial nerve proximity to the capsule. **Methods:** To this end, 256 pathology reports for patients undergoing parotidectomy in a tertiary care hospital were reviewed. Diameter and facial nerve margin positivity were observed, recorded, and analyzed for 109 pleomorphic adenomas, 41 Warthin's tumors, and 106 malignant lesions. **Results:** In all histologies, the average size for a tumor in which the facial nerve formed the margin was significantly greater than that of a tumor with negative facial nerve margins. Moreover, in pleomorphic adenomas greater than 4 cm in diameter, there was a 77% chance that the facial nerve would make up part of the margin. For malignant lesions greater than 5 cm in diameter, there was an 86% chance of facial margin involvement. **Conclusions:** These results demonstrate that parotid tumor diameter is both a convenient and functional means of predicting proximity of tumor to the facial nerve in asymptomatic patients and for preoperative risk stratification.

A165. The Role of Nerve Monitoring to Predict Postoperative Recurrent Laryngeal Nerve Function in Thyroid and Parathyroid Surgery

Issam N. Eid, MD, San Antonio, TX; Frank R. Miller, MD, San Antonio, TX; Stephanie D. Rowan, MSN, San Antonio, TX; Randal A. Otto, MD*, San Antonio, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role and efficacy of intraoperative recurrent laryngeal nerve (RLN) stimulation in the prediction of early and permanent postoperative nerve function in thyroid and parathyroid surgery.

Objectives: The objective of the study was to determine the role and efficacy of intraoperative recurrent laryngeal nerve (RLN) stimulation in the prediction of early and permanent postoperative nerve function in thyroid and parathyroid surgery. **Study Design:** A retrospective review of thyroid and parathyroid surgeries was performed with calculation of sensitivity and specificity of the response of intraoperative stimulation for different pathological groups. **Methods:** Normal EMG response with 0.5 mAmp stimulation was considered a positive stimulation response with postoperative function determined by laryngoscopy. No EMG response at >1-2 mAmps was considered a negative response. The rates of early and permanent paralysis as well as sensitivity, specificity, positive and negative predictive values for postoperative nerve function were calculated for separate pathological groups. **Results:** The number of nerves at risk analyzed was 909. The overall early and permanent paralysis rates were 3.2% and 1.2% respectively with the highest rate being for Grave's disease cases. The overall sensitivity was 98.4%. The specificity was lower at 62.5% but acceptable in thyroid carcinoma and Grave's disease patients. The majority of nerves with a positive stimulation result and postoperative paralysis on laryngoscopy recovered function in 3 to 12 weeks showing positive stimulation to be a good predictor of eventual recovery. **Conclusions:** Stimulation of the RLN during thyroid and parathyroid surgery is a useful tool in predicting postoperative RLN function. The sensitivity of stimulation is high showing positive stimulation to be an excellent predictor of normal nerve function. Negative stimulation is more predictive of paralysis in cases of thyroid carcinoma and Grave's disease.

A166. Assessing the Prevalence and Implications of Fungal Colonization in Chondroradionecrosis of the Larynx

Craig E. Fichandler, MD, Louisville, KY; Hannan I. Farghaly, MD, Louisville, KY; Jeffrey M. Bumpous, MD*, Louisville, KY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the incidence of fungal invasion in irradiated larynges, compare those to non-irradiated specimens, and explain the implications of such pathology. They should be able to discuss further treatment measures that should be considered for patients undergoing organ preservation treatment of the larynx.

Objectives: 1) To determine the prevalence of fungal invasion in chondroradionecrosis; and 2) to determine the prevalence of fungal invasion of irradiated larynges and compare them to non-irradiated specimens. **Study Design:** Retrospective review. **Methods:** Charts from 1999-2009 were reviewed at a single training program. Inclusion criteria were total or partial laryngectomy for neoplasm, both primary and residual or recurrent, chondroradionecrosis, or non-functional larynx. Demographic data was collected and pathologic reports were reviewed. **Results:** Five of 112 (4.5%) patients were diagnosed with chondroradionecrosis, of which two (40%) showed microscopic evidence of candidiasis on H&E staining, confirmed by PAS and GMS staining. Of the patients receiving total laryngectomy for persistent disease, none of the specimens had evidence of fungal elements on H&E staining. However, twenty of thirty-one (64.5%) were positive for fungal invasion seen after special staining. In comparison, none of the primary surgical specimens evidenced invasion, and only two showed noninvasive fungal elements. No statistical differences were found between treatment populations based on demographic data collected. **Conclusions:** Chondroradionecrosis is an important recognized complication of external beam radiation of laryngeal disease. While well understood, the role of fungal colonization or infection may be underestimated in the disease process. Our data suggests that fungal invasion of irradiated laryngeal tissues is a common occurrence and may contribute to both severity of disease and treatment planning. Close monitoring and proactive, prophylactic treatment for irradiated patients may change the planning for persistent disease, decrease disease progression for those at risk for chondroradionecrosis, and ultimately reduce the necessity for laryngectomy in a non-neoplastic organ.

A167. Laryngotracheal Stenosis Treated with Multiple Surgeries: Experiences, Results and Prognostic Factors of 70 Patients

Andrea Gallo, MD PhD, Rome, Italy; Giulio Pagliuca, MD PhD, Velletri, Italy; Salvatore Martellucci, MD, Priverno, Italy; Alberto Mascelli, MD, Tivoli, Italy; Massimo Fusconi, MD, Rome, Italy; Marco De Vincentiis, MD, Rome, Italy

Educational Objective: Participants should be able to compare the treatment options and explain the prognostic factors that favor the decannulation of patients with laryngeal stenosis.

Objectives: Laryngotracheal stenosis is a complex condition which usually requires multiple procedures to restore physiological respiration. The aim of this study is to evaluate the percentage of decannulation with respect to different or multiple surgical treatments. **Study Design:** Retrospective case review. **Methods:** We retrospectively reviewed the charts of 70 patients treated between 1990 and 2005 for laryngotracheal stenosis of various etiologies: iatrogenic stenosis (53 cases), post-traumatic stenosis (11 cases), other causes (autoimmune disease: 3, laryngeal papillomatosis: 2, diphtheria: 1). In order to maintain laryngotracheal patency, a Montgomery safe-T tube was used in all patients as unique dilation treatment or was associated with endoscopic and/or open neck surgery. A total of 257 surgical interventions were performed. **Results:** 54/70 patients (77.1%) were ultimately decannulated; 39 of these (72.2%) underwent 3 or less surgical procedures, showing a significant difference compared to patients who underwent more than 3 surgeries (p:0.00002). Only 7/54 patients (13%) were decannulated after more than 5 surgical procedures. Patients over 60 years of age showed a significantly lower success rate (p:0.0017). There is no significant correlation between the rate of decannulation and gender, etiology, site of stenosis or surgery. **Conclusions:** Patients undergoing dilation for laryngotracheal stenosis usually require multiple procedures. The T tube plays an important role in the treatment of this pathology. However, if the tracheostomy is not removed within 3 surgical interventions, the odds of decannulating the patients decrease significantly and additional surgeries may constitute a therapeutic relentlessness.

A168. Harmonic Scalpel versus Flexible CO2 Laser for Tongue Resection: A Histopathological Analysis of Thermal Damage in Human Cadavers

Grayson Gremillion, MD, New Orleans, LA; Duncan F. Hanby, MD, New Orleans, LA; Bridgt Loehn, MD, New Orleans, LA; Richard Whitworth, PhD, New Orleans, LA; Rohan R. Walvekar, MD, New Orleans, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand 1) the working of harmonic scalpel and CO2 laser as surgical tools for resection of tongue tumors; and 2) thermal damage caused by and compare thermal damage to cadaveric tongue tissue by both surgical tools.

Objectives: 1) To be able to understand the working of harmonic scalpel and CO2 laser as surgical tools for resection of tongue tumors; and 2) to understand thermal damage caused by and compare thermal damage to cadaveric tongue tissue by both surgical tools. **Study Design:** Human cadaveric study. **Methods:** Two fresh human cadaver heads were enrolled for the study. Oral tongue was exposed and incisions were made in the tongue akin to a tongue tumor resection using the harmonic scalpel and flexible C02 laser fiber at recommended settings. The margins of resection were sampled, labeled, and sent for pathological analysis to assess depth of thermal damage calculated in millimeters. The pathologist was blinded to the surgical tool used. Control tongue tissue was also sent for comparison as a baseline. **Results:** Three tongue samples were studied to assess depth of thermal damage by harmonic scalpel. The mean depth of thermal damage was 0.69 (range, 0.51 - 0.82). Five tongue samples were studied to assess depth of thermal damage by CO2 laser. The mean depth of thermal damage was 0.3 (range, 0.22 to 0.43). As expected, control samples showed 0 mm of thermal damage. There was a statistically significant difference between the depth of thermal injury to tongue resection margins by harmonic scalpel as compared to CO2 laser (p=0.003). **Conclusions:** In a cadaveric model, flexible CO2 laser fiber causes less depth of thermal damage when compared with harmonic scalpel at recommended settings. However, the relevance of this information in terms of wound healing, hemostasis, safety, cost effectiveness, and surgical outcomes needs to be further studied in clinical settings.

A169. Intraparotid Facial Nerve Schwannoma: Management Decision Based on Facial Nerve Function

Brian C. Gross, MD, Rochester, MN; Michelle M. Roeser, MD, Falls Church, VA; Kerry D. Olsen, MD*, Rochester, MN; Eric J. Moore, MD*, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should understand the clinical presentations of patients with intraparotid facial nerve schwannoma, be able to compare the diagnostic modalities that are most beneficial for intraparotid facial nerve schwannomas, and compare the treatment options and clinical indications for conservative management versus surgical extirpation of the tumor.

Objectives: To gain insight into the management of intraparotid facial nerve schwannoma (IPFNS) based on tumor characteristics and facial nerve function. **Study Design:** A retrospective case series of patients at our clinic diagnosed with IPFNS from 1975 to 2010. **Methods:** Fifteen patients with IPFNS were identified and their presentation, diagnostic studies, management and facial nerve function were reviewed. **Results:** Thirteen cases presented with a painless parotid mass, and all but 2 patients had normal facial nerve function. Five of fifteen tumors were attached to the nerve and ten were intertwined with the nerve. Eighty percent of attached tumors were resected with normal postoperative facial nerve function. Intertwined tumors often involved an intratemporal component and had a worse overall prognosis, requiring resection and nerve grafting in seventy percent of the cases. The average postoperative facial nerve function for the intertwined tumors that were resected and grafted was House-Brackmann grade 4.3/6. Eight of the fifteen were exclusively intraparotid tumors and the remainder had an intratemporal component. Of the extratemporal tumors, five were attached and four of these were resected with normal facial nerve function. Three were intertwined and two of these were observed and one resected and grafted, all with worsened postoperative facial nerve function. **Conclusions:** Diagnosing IPFNS is challenging and intraoperative frozen section biopsy is critical. The most important factors in making a surgical decision are preoperative facial nerve function, the gross relationship of the tumor to the facial nerve, and the location of the tumor.

A170. Thyroid Disease Associated with Cowden Syndrome: A Meta-Analysis

Joseph E. Hall, MD, Nashville, TN; Davood J. Abdollahian, BSE, Nashville, TN; Robert J. Sinard, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the incidence, significance, and surgical management of thyroid disease in patients with Cowden syndrome. Participants will be able to compare the incidence of thyroid disease from our analysis to data previously reported in the literature. Finally, participants will be able to explain the pathology findings and malignancies typically seen in the thyroid gland of Cowden syndrome patients and recognize the importance of diagnosing Cowden syndrome.

Objectives: To perform a meta-analysis of thyroid disease associated with Cowden syndrome. **Study Design:** Meta-analysis and case report. **Methods:** A meta-analysis of the literature was performed using the search words Cowden syndrome OR Cowden's syndrome OR Cowden disease OR Cowden's disease. Cases reported within the literature were analyzed. **Results:** We review a case of thyroid disease with Cowden syndrome. Review of published journal articles yielded 554 citations that fulfilled the inclusion criteria and 95 articles met the inclusion and exclusion criteria. A total of 181 cases were subsequently analyzed. Of the 181 patients, 99 females (54.7%) and 77 males (42.5%) were noted. The age of presentation ranged from 3 days to 78 years with mean and median ages of 38 years and 39 years, respectively. Ninety-six patients (96/181, 53.0%) were reported to have thyroid disease. Thyroid abnormalities were most commonly found on examination prior to diagnosis (37/96, 38.5%). Surgical management of thyroid disease was performed in 80.2% (77/96) of patients with thyroid disease. Thyroid pathology reported with CS patients included goiter (39/96, 40.6%), adenomas (24/96, 25%), unknown/unspecified pathology (8/96, 8.3%), follicular carcinoma (7/96, 7.3%), thyroiditis (7/96, 7.3%), papillary carcinoma (6/96, 6.3%), cancer (unknown type) (3/96, 3.1%), medullary carcinoma (1/96, 1%), and hyperthyroidism (1/96, 1%). **Conclusions:** CS is composed of a multitude of common findings. Given the high prevalence of thyroid disease and notable potential of malignancy, careful monitoring of thyroid disease in CS patients is imperative.

A171. Identification of Pro-Differentiation Patterns by Gene Expression Analysis following Pioglitazone Treatment in a Primary Laryngeal Tumor Cell Line

Nathan R. Handley, BS, Minneapolis, MN; Beverly R.K. Wuertz, BS, Minneapolis, MN; Frank G. Ondrey, MD, Minneapolis, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the implications of pioglitazone therapy on gene expression profiles in primary laryngeal tumors.

Objectives: Pioglitazone, a peroxisome-proliferator-activated receptor (PPAR) gamma activator currently approved as an antidiabetic agent, affects differentiation and proliferation in head and neck squamous cell carcinoma (HNSCC) and has demonstrated utility as a chemopreventative agent in several HNSCC cell lines. In the current study, we examined the effects of pioglitazone on gene expression in laryngeal tumors. **Study Design:** Gene microarray analysis. **Methods:** Six samples of a primary laryngeal tumor cell line, UMSCC9, were treated with either 4 uM pioglitazone or 10 mM DMSO. DNA microarray analysis was performed utilizing Affymetrix U133A chip platform. Differentially expressed genes were identified by calculating generalized t-tests ($p>0.001$). Resulting genes were then interrogated using Ingenuity Pathway Analysis to characterize pro-differentiation patterns in expression. **Results:** Preliminary data suggest that the activity of numerous genes downstream from the PPAR gamma receptor have altered activity following pioglitazone treatment. Of note, cyclin D1, Ki-61, and CD31 are downregulated; proline oxidase, adiponectin, and uroplakin are upregulated. A global analysis of gene regulation following pioglitazone therapy in laryngeal cancer has not been performed previously. **Conclusions:** Pioglitazone exerts significant effects on differentiation and proliferation pathways and a laryngeal tumor cell line.

A172. A Case of Multinodular Goiter with Posterior Mediastinal Extension

Sanaz Harirchian, MD, Newark, NJ; Justin T. Sambol, MD, Newark, NJ; Paul J.P. Bolanowski, MD, Newark, NJ; Soly Baredes, MD*, Newark, NJ

Educational Objective: At the conclusion of this presentation, the participants should be able to review the clinical presentation and management of posterior mediastinal goiters and the indications for sternotomy +/- thoracotomy.

Objectives: To review the presentation and management of cervicomediastinal goiters with posterior mediastinal extension. **Study Design:** Retrospective chart review. **Methods:** Case report and review of the literature. **Results:** Most cervicomediastinal goiters are located in the anterosuperior mediastinum and can be accessed via a cervical approach or median sternotomy. Goiters with posterior mediastinal extension offer a greater challenge. We present a case of a 62 year old male with a two year history of progressive dyspnea, dysphagia, and hoarseness. CT of the neck noted a large multinodular thyroid, each lobe measuring 8-12 cm, with significant extension into the retrotracheal space and tracheoesophageal groove. On flexible bronchoscopy, a left true vocal cord paralysis and 50-75% tracheal compression was noted. The patient underwent a total thyroidectomy. A sternotomy and posterolateral thoracotomy was necessary to deliver the mediastinal and retrotracheal component. Pathology was consistent with multinodular goiter. **Conclusions:** Cervicomediastinal goiters are frequently symptomatic, presenting with persistent cough, wheezing, dyspnea and in advanced cases, stridor, superior vena cava syndrome, and dysphagia. The incidence of preoperative vocal cord paralysis with multinodular goiter is very rare, usually occurring in patients with carcinoma or prior thyroidectomy. Most intrathoracic goiters should be resected because of the potential for continued growth and compression of important mediastinal structures, and a small incidence of coexisting malignancy. Resection of these retrosternal goiters with posterior mediastinal extension can be challenging, often requiring a cervical approach, sternotomy and thoracotomy. In our case, a posterolateral thoracotomy was needed in addition to sternotomy to deliver the mediastinal and retrotracheal component.

A173. Hemangiopericytoma of the Larynx: A Rare Clinical Entity

Sanaz Harirchian, MD, Newark, NJ; Neena Mirani, MD, Newark, NJ; Soly Baredes, MD*, Newark, NJ

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the unusual presentation, pathologic and radiographic findings, differential diagnosis, workup, management, and clinical course of laryngeal hemangiopericytomas.

Objectives: To review the presentation and management of a hemangiopericytoma of the larynx. **Study Design:** Retrospective chart review. **Methods:** Case report and review of the literature. **Results:** Hemangiopericytomas are rare vascular neoplasms of the head and neck. Laryngeal involvement is even more rare, with only 9 previously reported cases in the literature. We present an unusual case of a 46 year old male with an incidental finding of an obstructing submucosal supraglottic mass while being evaluated for complaints of nasal obstruction. Biopsy was consistent with a hemangiopericytoma. PET/CT noted an intensely FDG avid mass involving the left epiglottis, AE fold, and lateral/posterior pharyngeal wall, with mild uptake in level IV lymph nodes, but no distant metastases. The patient underwent preoperative angioembolization of the feeding left superior thyroid artery, supraglottic laryngectomy, and level IV lymph node excisional biopsy. Pathology confirmed a hemangiopericytoma with negative surgical margins and lymph nodes negative for tumor. The patient is currently 4 months postop with no evidence of disease and no dysphonia or dysphagia. **Conclusions:** Hemangiopericytoma of the larynx is an extremely rare vascular neoplasm with a high propensity for local recurrence, unpredictable behavior, and the potential for distant metastasis. Most cases present in the supraglottis. Due to the paucity of cases reported in the literature, the clinical outcome, prognosis, and indications for postoperative adjunctive treatment are unknown. Otolaryngologists need to be aware of this rare tumor that can be treated successfully with surgical resection. Close long term followup is needed since recurrence can present many years after initial treatment.

A174. Clear Cell Carcinoma of the Larynx: A Report of a Rare Case and Review of the Literature

Stephen R. Hoff, MD, Stanford, CA; Kristen B. Pytynia, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the presentation, histopathological characteristics, management, and prognosis of clear cell carcinoma of the larynx.

Objectives: To discuss the presentation, diagnosis, histopathology, and characteristics of clear cell carcinoma of the larynx, including squamous and mucoepidermoid variants. **Study Design:** Case report and review of the literature. **Methods:** We report the sixth known case of clear cell carcinoma of the larynx, of squamous origin, in a patient who presented with massive thyroid cartilage destruction and expansion in a short amount of time. We also present a review of the published literature on these lesions. **Results:** A 68 year old male presented with a rapidly expanding exophytic supraglottic mass with adjacent cartilage destruction. Biopsy was consistent with a stage IV clear cell carcinoma of the larynx, derived from squamous cells. He underwent total laryngectomy with bilateral neck dissections, followed by radiation and chemotherapy. He remains disease free after 12 months. **Conclusions:** Clear cell carcinoma (CCC) of the larynx is a rare neoplasm, with only nine cases previously reported in the literature. Of these, four were clear cell variants of mucoepidermoid or adenocarcinoma and five were of squamous cell origin. We report a sixth case of CCC of the larynx derived from squamous cells. These tumors are considered highly aggressive, with high rates of recurrence (> 85%) and short overall survival times (mean = 12 months). There is a predilection for the supraglottis, and they tend to present in elderly men, which corresponds to the findings in our patient. Surgery is the treatment of choice, and postoperative radiation/chemotherapy should be considered for this aggressive neoplasm.

A175. Thyroid and Parathyroid Surgery: The General Otolaryngologist Experience

Alyn J. Kim, MD, New York, NY; David A. Ross, BS BA, New York, NY; Erich P. Voigt, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the complication rate of thyroid and parathyroid surgery by a general otolaryngologist to rates reported in the literature.

Objectives: This study compares the rate of complications of thyroid and parathyroid surgery performed by a general otolaryngologist to those reported by general surgeons and fellowship trained head and neck surgeons. **Study Design:** Retrospective chart review. **Methods:** We reviewed 96 cases of thyroidectomy and/or parathyroidectomy performed between 2000 and 2010 by a general otolaryngologist. Data collected included patient age, sex, ultrasound, FNA results, surgical time, nerve monitor use, drain use, estimated blood loss, pathology, calcium levels, recurrence, complications, and mortality. **Results:** We found a comparable or decreased rate of hypocalcemia, vocal cord paralysis, scar formation, and hematoma when compared to previously published studies. Nine patients (9.3%) had transient hypocalcemia and no patients developed permanent hypocalcemia. In our study one patient (1%) had temporary vocal cord paresis lasting less than 6 months and one patient (1%) had permanent vocal cord paralysis secondary to sacrifice of the recurrent laryngeal nerve. These rates are in the lower range of that reported in the literature. Two patients (2%) developed keloid scars which were treated with steroid injections. One patient (1%) underwent reoperation for evacuation of a postoperative hematoma. One patient (1%) developed a wound infection treated with antibiotics. **Conclusions:** This study supports the safety of thyroid and parathyroid surgery by a general otolaryngologist when compared to prior studies performed by general surgeons and fellowship trained head and neck surgeons.

A176. Tumors of the Cervical Sympathetic Chain—Diagnosis and Management

Alexander J. Langerman, MD, Nashville, TN; Sanjay M. Athavale, MD, Nashville, TN; Sanjeet V. Rangarajan, MA, Nashville, TN; Michelle Q. Pham, BS, Nashville, TN; James L. Netterville, MD*, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate

understanding of the anatomy of the prestyloid parapharyngeal space and the differential diagnosis of lesions in this area. Participants will also discuss the workup, radiologic diagnosis, and treatment of tumors of the cervical sympathetic chain, including intraoperative identification and preservation of all uninvolved nerves and vessels.

Objectives: Tumors originating from the cervical sympathetic chain are uncommon but important entities in the differential diagnosis of prestyloid parapharyngeal space masses. We sought to evaluate the presentation of these tumors and the outcomes of surgical treatment. **Study Design:** Retrospective chart review. **Methods:** We report our experience with 24 patients from 1994 to 2010. Clinic notes, operative and pathology reports, and radiologic images and reports were used to create the study database. **Results:** The most common presenting symptoms were dysphagia (29%, n=7), neck mass (n=7, 29%), and throat fullness (n=4, 17%). Two patients (8%) presented with Horner's syndrome. Although radiologic images showed classic lateral displacement of the carotid arteries in 10 (42%), in 8 (33%) patients the radiologic findings mimicked a carotid body tumor, and in 6 (25%) the findings were indeterminate. Three patients were observed, two due to patient preference and one because of multiple bilateral cranial nerve involvement. Twenty-two patients underwent surgical removal, with pathology revealing 10 paragangliomas, 10 schwannomas, and 1 neurofibroma. Three patients (14%) had cranial nerve weaknesses (two vagal and one spinal accessory). With a mean followup of 20 months there have been no recurrences. **Conclusions:** This represents the largest original series of tumors of the sympathetic chain to date. Although anterolateral displacement of the carotids on imaging is suggestive of a sympathetic tumor, absence of these findings does not rule out this entity. Cervical sympathetic tumors can be safely managed with operative intervention with less than a 15% incidence of cranial nerve weakness.

A177. Conservative vs. Aggressive Treatment of Paragangliomas: What Factors Determine the Best Approach?

Daniel S. Fink, MD, Boston, MA; Dunia Abdul-Aziz, MD, Boston, MA; Joseph Shargorodsky, MD, Boston, MA; Linda N. Lee, MD, Boston, MA; Robert A. Frankenthaler, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the clinical, radiographic, and histopathologic features of paragangliomas as well as the appropriate role of genetic testing for succinyl-dehydrogenase (SDH) B, C, and D mutations, laboratory values, and octreotide scanning. Participants will discuss the options of management including observation, surgery, radiotherapy, chemotherapy, and adjuvant therapy. Participants will also understand factors in the patient's workup that should help guide therapeutic decision making.

Objectives: To review the presentation, genetics, and management of paragangliomas and to understand options for diagnosis and treatment. **Study Design:** Case report and review of the literature. **Methods:** Retrospective review of a case of multiple, bilateral paragangliomas. Genetic, surgical, radiographic, and histopathologic findings are shown and discussed. Therapeutic modalities are compared and indications for preoperative embolization are reviewed. Surgical approaches for the parapharyngeal space are compared. **Results:** A 38 year old female presented with neck swelling and dysphagia for four months. Family history was significant for malignant paraganglioma. Radiographic imaging revealed bilateral carotid body tumors (CBT) in addition to a left 3.5cm glomus tumor extending to the skull base. Octreotide scanning confirmed uptake in the parapharyngeal space. Urine metanephrines were normal. Genetic testing was positive for the SDH-D mutation. After embolization, transcervical exploration of the left neck revealed a glomus tumor inseparable from the vagus and superior laryngeal nerves. The glomus tumor and left CBT were successfully resected en bloc. **Conclusions:** Management of head and neck paragangliomas lacks a discrete protocol; rather, many decisions must be made using the otolaryngologist's critical judgment. The proximity of these masses to vital neurovascular structures brings risk to both observation of these tumors, as well as to intervention. If surgery is needed, the risks and benefits of preoperative embolization must be carefully considered. Furthermore, as malignancy can only be established through evidence of distant metastasis, otolaryngologists must also decide when full body imaging is indicated. Genetic testing for SDH-B, SDH-C, and SDH-D can help guide treatment decisions and should be well understood by all otolaryngologists.

A178. Postoperative Common Carotid Rupture Associated with Staphylococcus Aureus Infection

Barry T. Malin, MD MPP, Buffalo, NY; Mihai Merzianu, MD, Buffalo, NY; Krishnakumar Thankappan, MD, Buffalo, NY; Nestor R. Rigual, MD*, Buffalo, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the role of local wound infection with staphylococcus aureus as a cause of carotid artery rupture (CAR) in the immediate postoperative period, discuss the impact of cervical reoperation on CAR risk, and identify histopathologic features associated with CAR resulting from perioperative S. aureus infection.

Objectives: To describe the clinical and histopathologic findings associated with acute carotid artery rupture (CAR) resulting from wound infection with staphylococcus aureus in the immediate postoperative period following oncologic neck surgery. **Study Design:** Case report. **Methods:** Clinical chart review and histopathologic assessment of the ruptured carotid artery. **Results:** A 57 year old man with a history of several neck surgeries for thyroid and parathyroid carcinoma in the last 4 years underwent resection of residual parathyroid carcinoma in the tracheoesophageal groove. He was readmitted for mild symptoms of local wound infection on postoperative day (POD) #4. Although the mild wound erythema and low grade fever symptoms rapidly resolved with parenteral antibiotic therapy, spontaneous CAR occurred on POD #6 requiring surgical intervention and saphenous vein interpositional graft. The same day the patient was returned to the operating room for carotid artery ligation after a second CAR. The patient recovered fully without neurologic sequela. Histologic examination showed a centripetal pattern of arterial injury with extensive disruption of the adventitia, multiple foci of inflammation within the vessel media, and relative preservation of the lamina propria interna. The second CAR fragment of artery showed minimal wall disruption and the vein graft was intact. Cultures grew S. aureus. **Conclusions:** Local wound infection with S. aureus in patients with fibrosis due to multiple neck surgeries may lead to rapid and extensive destruction of the carotid resulting in rupture despite prompt antibiotic treatment.

A179. Validation of a Chicken Thigh Model and Objective Scoring System for Microvascular Competence Assessment

Grace L. Nimmons, MD, Iowa City, IA; Kristi E. Chang, MD, Iowa City, IA; Gerry F. Funk, MD, Iowa City, IA; David S. Shonka, MD, Iowa City, IA; Nitin A. Pagedar, MD, Iowa City, IA

Educational Objective: At the conclusion of this presentation, the participants should be able to use a chicken thigh as a model for microvascular anastomosis, and describe how to assess competence using the microvascular Objective Structured Assessment of Technical Skills scoring system.

Objectives: The learning curve for microsurgical dexterity is difficult when limited to observation and performance in infrequent clinical cases. In addition, the medical profession is under increasing pressure to be able to assess skills and competence. Laboratory models can help develop familiarity with handling of microinstruments under the microscope for training and provide a means for assessment of technical skills. Previous models and simulations of microsurgery have been described, but few of these have been validated. The purpose of this study is to demonstrate the construct validity of the chicken thigh model and a novel scoring system for microvascular competence. **Study Design:** Validation study. **Methods:** Twenty surgical staff and trainees completed an anastomosis of a chicken ischiatic artery. Training level and microsurgical experience were assessed by questionnaire. The performance was recorded and scored using a version of the Objective Structured Assessment of Technical Skills (OSATS), which was modified to include microvascular task-specific measures. Scoring was performed independently by two experts. **Results:** Analysis of variance revealed a significant effect of training and microvascular experience for both the task specific score and global rating scale score ($p < 0.005$ for all). Interrater reliability was 0.7. Experience level demonstrated a logarithmic relationship with task time. **Conclusions:** The chicken thigh model and microvascular OSATS can differentiate between levels of microvascular ability. They demonstrate construct validity and reliability for the assessment of microvascular competence using a cost effective and easily accessible model.

A180. Coccidioidomycosis of the Temporal Fossa with Intracranial Extension

Nguyen S. Pham, MD, Sacramento, CA; Rony K. Aouad, MD, Sacramento, CA; Paul J. Donald, MD*, Sacramento, CA; Stewart H. Cohen, MD, Sacramento, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the life cycle of coccidioides immitis in both the environment and within its human hosts. Additionally, the viewer will be able to demonstrate a clear workup and treatment plan for evaluating and treating this infection.

Objectives: Describe a case of disseminated coccidioidomycosis infection presenting as an infratemporal fossa lesion. Review of literature including diagnosis and treatment of this disease. **Study Design:** Case study. **Methods:** A 70 year old woman of East Indian descent was diagnosed with pulmonary coccidioidomycosis three years prior to her visit and treated with oral fluconazole for over a year. Coccidioides titers confirmed complete response with the fluconazole. After a quiescent period of about 2 years, she developed a spontaneous swelling to her left eye. She denied night fevers or sweats. A MRI scan was performed which revealed a large lytic lesion centered at the left temporalis muscle and squamous temporal bone. It extended intracranially at the medial extent through a 3cm defect in the temporal bone. The lesion abutted the lateral rim of the orbit anteriorly. A fine needle aspiration confirmed coccidioides within the lesion. **Results:** Given the aggressiveness of the lesion and the intracranial extension, calvarial resection and temporalis muscle resection were thought to be necessary. The patient was switched to posaconazole and had a robust response both clinically and radiologically. She remains disease free 1 year after treatment. **Conclusions:** In the head and neck, disseminated coccidioidomycosis commonly presents as skin lesions, laryngeal lesions, neck masses, and within calvarial and facial bones. Ours is the first reported case of disseminated coccidioidomycosis presenting primarily within the temporalis muscle with intracranial and infratemporal fossa extension. Diagnosis of coccidioidomycosis can be achieved with direct tissue sample showing characteristic spherules. Between 1 to 3 weeks after infection, serum IgM antibodies can be identified. IgG antibodies appear 3 weeks after the initial infection. Serum IgG levels decrease with successful treatment of the disease and can be followed to assess clinical response. Because the severity of coccidioidomycosis varies so widely, treatments must be highly individualized. In the vast majority of symptomatic cases, no treatment is necessary. Disseminated disease that affects the head and neck requires concurrent management with an infectious disease specialist. The need for surgical intervention varies on a case by case basis. The latest Infectious Disease Society clinical guidelines recommend amphotericin, ketoconazole, fluconazole, itraconazole. Voriconazole and posaconazole are not yet FDA approved for treatment of coccidioidomycosis, but case reports suggest both are effective.

A181. Analysis of Sialocele and Salivary Fistula in Post-Parotidectomy Patients

Ryan P. Raju, MD, Oklahoma City, OK; Nilesh R. Vasan, MD, Oklahoma City, OK; Greg A. Krempl, MD*, Oklahoma City, OK; Jesus E. Medina, MD*, Oklahoma City, OK

Educational Objective: At the conclusion of this presentation, the participants should be able to gain a better understanding about the incidence of salivary fistula following parotidectomy, its clinical course, as well as identify factors that are associated with its formation.

Objectives: To review the incidence and factors associated with the formation of a sialocele/fistula following parotidectomy. **Study Design:** Single institution, multiple surgeon retrospective review. **Methods:** Patients undergoing parotid surgery were reviewed over a three year period. A sialocele was defined as a painful swelling that worsened with mastication, and persisted after needle aspiration. A salivary fistula is defined as postoperative drainage that is persistent (> 1 week) or amylase positive. Factors that were examined included tumor pathology, type of parotidectomy performed (partial lobectomy, complete superficial parotidectomy, deep lobe parotidectomy, and radical parotidectomy), duration of drain placement, volume of the specimen, and duration of the sialocele or fistula. Patients that required flap reconstruction were excluded. A student's t test was used. **Results:** The incidence of sialocele and/or fistula in 65 patients was 21.4%. A salivary fistula was seen in 28% of patients who had a complete superficial parotidectomy and 5% of patients who had a partial parotidectomy ($p<0.05$). The pathology of the tumor, duration of drain placement, the volume of gland removed, or the use of AlloDerm were not strongly associated with the formation of a sialocele. On average, sialoceles persisted 24 days. A variety of treatment methods were employed, but did not appear to significantly

reduce the duration of the drainage. **Conclusions:** Sialoceles and salivary fistulas are a complication of parotid surgery that appear to occur more frequently with removal of the entire superficial lobe of the parotid. Resolution may take up to one month.

A182. Free Dermal Fat Graft Reconstruction of the Head and Neck: A Cosmetically Appealing Reconstructive Option

Sanjeet V. Rangarajan, M Eng, Nashville, TN; Sanjay M. Athavale, MD, Nashville, TN (Presenter); Alexander Langerman, MD, Nashville, TN; Sarah L. Rohde, MD, Nashville, TN; James L. Netterville, MD*, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the surgical technique, long term imaging, cosmetic outcome, and complications of free abdominal fat graft reconstruction of post-ablative head and neck defects. The participants will also learn of a novel patient based numerical scale for assessing patient satisfaction after post-ablative head and neck reconstruction.

Objectives: Ablative procedures of the head and neck often result in significant contour defects. Free dermal fat grafts (FDFG) possess complete histocompatibility, are relatively resistant to infection, and accommodate long term facial growth. Our objective is to confirm the benefits of FDFG reconstruction in post-ablative head and neck defects. **Study Design:** Retrospective chart review and patient survey. **Methods:** Patients who underwent FDFG reconstruction of the head and neck between 1997 and 2010 were identified. Of 205 patients identified, 62 met inclusion criteria. The pathology, surgical technique, long term imaging, cosmetic outcome, and complications were analyzed. Postoperative cosmetic results were assessed by a novel patient based numerical grading scale. Six of 62 patients with extensive photographs and imaging are presented in greater detail. **Results:** The mean age was 50.4 years (7 months to 83 years). Twenty-two patients were male (35%) and 40 patients were female (65%). FDFG were used to correct a variety of defects with the most common location being the lateral skull base (n=25) followed by the parotid gland (n=22). A majority of patients had a diagnosis of paraganglioma (n=20) although numerous pathologies were identified. Only three patients had a complication related to their FDFG recipient site (4.8%) and no patients had abdominal donor site complications (0%). The patient cosmesis survey revealed high numerical levels of satisfaction (4.9 out of 5.0). **Conclusions:** FDFG is an excellent head and neck reconstructive option with few complications. Moreover, FDFG can be used in a variety of locations and patients tend to be very happy with their final cosmetic outcome.

A183. Thyroidectomy under Molecular Fluorescence Imaging with Novel Nerve Peptide in Transgenic Rodent Model of Papillary Thyroid Cancer

Jasper Y. Shen, BA, La Jolla, CA; Mike A. Whitney, PhD, La Jolla, CA; Jessica L. Crisp, BA, La Jolla, CA; Paul A. Steinbach, PhD, La Jolla, CA; Roger Y. Tsien, PhD, La Jolla, CA; Quyen T. Nguyen, MD PhD, La Jolla, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand 1) current recurrent laryngeal palsy rates and limits of intraoperative nerve monitoring; and 2) utility of novel nerve probe for intraoperative visualization of the recurrent laryngeal nerve.

Objectives: The most serious and common complication of thyroidectomy is temporary and permanent injury to the recurrent laryngeal nerve (RLN) leading to ipsilateral, paramedian vocal cord paralysis. Surgical identification and preservation of RLN can be challenging especially when invasion of the thyroid tumor involves the nerve and distorts the local anatomy. RLN palsy, from a medicolegal perspective, ranks as the leading reason for litigations in thyroid surgery. We show that the use of a fluorescent nerve probe improves the intraoperative visualization of the recurrent laryngeal nerve as it travels in proximity to murine models of thyroid cancer. **Study Design:** Total thyroidectomy and complete thyroid cancer resection were performed in adult transgenic mice of thyroid cancer with and without the aid of fluorescently labeled nerve probe. **Methods:** Thyroid gland and associated papillary thyroid cancer was identified after brief cervical dissection in our transgenic mice. Thyroidectomies were performed in standard white light illumination in the control group whereas fluorescently labeled nerve probe was used to visualize nerves in the experimental group. Mice were observed for RLN functional loss by postoperative stridor, respiratory distress, and vocalization changes. **Results:** The use of fluo-

rescently labeled nerve probe resulted in improved intraoperative visualization of the recurrent laryngeal nerve. **Conclusions:** The use of molecular fluorescence imaging of nerves may enable surgeons to better navigate the field and avoid critical nerve tissue. The use of this probe will likely improve surgical outcome by helping surgeons avoid accidental transections and injury.

A184. Morphometric Assessment of Dissection Fields with Robotic Thyroidectomy Approaches: Pre-Clinical Investigation

Michael C. Singer, MD, Augusta, GA; Melanie W. Seybt, MD, Augusta, GA; David J. Terris, MD*, Augusta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe different robotic thyroidectomy techniques. They should understand that robotic facelift thyroidectomy might require less dissection than an alternative robotic thyroidectomy approach.

Objectives: Robotic thyroidectomy was introduced in the United States despite scant pre-clinical data. We sought to define differences in the extent of dissection associated with 2 different robotic thyroidectomy techniques using morphometric measurements of the area of dissection required for each approach. **Study Design:** Morphometric analysis of human cadavers. **Methods:** Seven fresh human cadavers were obtained for surface anatomical study. Using previously defined landmarks, the area necessary to accomplish robotic thyroidectomy using either the transaxillary (TAT) or facelift approach (RFT) was marked in a standardized fashion for these procedures and then photographed. ImageJ software (National Institute of Health) was used to calibrate the photographs and measure the surface area of the region requiring dissection in each approach. **Results:** A total of 28 robotic thyroidectomy dissection pockets were simulated (14 for each of the 2 surgical approaches) with each specimen serving as its own control. The mean area of dissection required for RFT was 39.2 ± 6.6 cm² (range 25.2 to 47.9 cm²). For RAT, the area was 38.3% greater on average ($p<0.0001$): the mean was 63.5 ± 9.6 cm² (range 52.3 to 83.6 cm²). **Conclusions:** There are few objective data governing the recent adoption of technology intense robotic thyroidectomy procedures. We have quantified the difference in dissection required when accomplishing two different robotic approaches. These measurable differences may help to define advantages when comparing available surgical techniques.

A185. Videofluoroscopic Guided Botulinum Injections for the Treatment of Pharyngoesophageal Spasm after Total Laryngectomy

Matthew E. Spector, MD, Ann Arbor, MI; Elizabeth A. Callaway, MS CCC-SLP, Ann Arbor, MI; Mark E. Prince, MD, Ann Arbor, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to gain the understanding that videofluoroscopic guided botulinum injections for the treatment of pharyngoesophageal (PE) spasm after total laryngectomy represent a safe, effective, and cost efficient technique and should be considered to improve tracheoesophageal (TE) voice disfluency.

Objectives: To discuss the evaluation and management of patients with suspected pharyngoesophageal (PE) spasm after total laryngectomy (TL) using videofluoroscopic guided botulinum injections. **Study Design:** Retrospective case series. **Methods:** Ten consecutive patients were reviewed who underwent TL with or without previous chemoradiation and were at least one month after tracheoesophageal (TE) prosthesis fitting and demonstrated persisting poor TE voice quality. PE spasm was diagnosed fluoroscopically as a dynamic remnant of the pharyngeal constrictors that impeded superior air flow during attempts to produce TE voice. Seventy-five units of Botox® were injected at three points (25 units each) along the PE segment using fluoroscopic guidance. Outcomes of interest were improvement in voice fluency and improvement in the range of swallowing consistencies. **Results:** Following initial Botox® injections all patients reported improvement in their voice quality, with 70% (7/10) having a significant and sustained improvement. Repeat Botox® injections within one month were performed on 2 of the 3 patients who had minimal improvement, resulted in more functional voice fluency and loudness. The other patient had an underlying PE stricture and was successfully treated with dilation. Of 10 patients who underwent either single or repeated injections to improve TE voice, 90% (9/10) had increased fluency during connected speech. Incidentally 4 patients reported improved swallow function after receiving Botox® injections. **Conclusions:** Videofluoroscopic guided botulinum injections to

treat pharyngoesophageal spasm after total laryngectomy represent a safe, effective, and cost efficient technique and should be considered to improve TE voice disfluency. Botox® injections may also improve dysphagia after TL when stricture is not present.

A186. CD147, MCT1 and MCT4 Expression in Recurrent Cutaneous Squamous Cell Carcinoma

Larissa Sweeny, MD, Birmingham, AL; Nichole R. Dean, DO, Birmingham, AL; John W. Frederick, BS, Birmingham, AL; Renee L. Desmond, PhD DVM, Birmingham, AL; J. Scott Magnuson, MD*, Birmingham, AL; Eben L. Rosenthal, MD*, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the role of CD147 and monocarboxylate transporters (MCT) expression in predicting survival in cutaneous squamous cell carcinoma (SCC) and implications for targeted therapeutics.

Objectives: Currently the role of CD147 and MCT in advanced cutaneous SCC is unknown. Our purpose was to determine the expression patterns of CD147 and related proteins (MCT1, MCT4) and to examine their correlation with survival in these tumors. **Study Design:** Retrospective cohort study. **Methods:** Patients who underwent surgical resection for advanced stage (stage III or IV) cutaneous squamous cell carcinoma of the head and neck between 1998 and 2006 (n = 50) were included. CD147, MCT1 and MCT4 expression was assessed by immunohistochemical analysis and immunofluorescent analysis of archived tumor samples and correlations were made with survival and various clinicopathologic characteristics. **Results:** The majority of patients (92%) were diagnosed with stage III disease, with 46% having positive nodal metastasis and 8% with distant metastasis. Compared to normal skin, CD147 was found to be overexpressed in 94% of tumors. Overexpression of MCT1 (20%) and MCT4 (48%) was also observed. Overall 2 year survival rate was 69% and the overall 5 year survival rate was 61%. Decreased survival was associated with overexpression of CD147 (p=0.17), MCT1 (p=0.11) and MCT4 (p=0.155). Analysis of node positive patients revealed decreased survival in tumors overexpressing CD147 (p=0.37), MCT1 (p=0.25) and MCT4 (p=0.15). **Conclusions:** CD147 represents a potential biomarker for predicting outcomes and a potential therapeutic target in advanced cutaneous SCC.

A187. Safety and Feasibility of Thulium:YAG Laser Assisted Transoral Robotic Surgery

Kathryn M. Van Abel, MD, Rochester, MN; Matthew L. Carlson, MD, Rochester, MN; Steven M. Olsen, MD, Rochester, MN; Kerry D. Olsen, MD*, Rochester, MN; Eric J. Moore, MD*, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the use of Thulium:YAG lasers in transoral robotic surgery for oropharyngeal and supraglottic lesions.

Objectives: Transoral robotic surgery (TORS) is emerging as an attractive treatment modality for tumors involving the oropharynx and supraglottis. Advantages include decreased overall morbidity and shorter hospital stay. The Thulium:YAG (Tm:YAG) laser (RevoLixTM, Lisa Laser Products, Katlenburg, Germany) demonstrates several qualities that might be particularly advantageous for its use in TORS including a flexible cable, precise cutting ability, and superior hemostasis. The feasibility and safety profile for transoral Tm:YAG laser assisted robotic surgery (TTYLRS) is unknown. The authors report their preliminary experience managing 15 patients with lesions involving the oropharynx and supraglottis. **Study Design:** Prospective case series. **Methods:** Fifteen patients underwent TTYLRS for management of lesions of the oropharynx and supraglottis between December 2009 and May 2010. **Results:** Fifteen patients (12 male; mean age 55.9 years) underwent TTYLRS and were prospectively followed (average 4.4 months). Nine lesions involved the palatine tonsil, 3 the base of tongue and 3 the supraglottis. Fourteen lesions were malignant (13 squamous cell carcinomas, 1 adenocarcinoma) with a median T2N1M0 (stage 3) pathological stage. All tumors underwent complete excision with negative margins without conversion to transcervical access. With the exception of one patient, clips or bipolar cautery were not needed. No immediate or delayed postoperative bleeding was encountered and tracheotomy was never required. Twelve of 15 patients were able to resume oral intake by postoperative day 1 and the average hospital stay was 2.7 days. **Conclusions:** These preliminary data suggest that TTYLRS is a feasible and safe modality for the surgical management of select oropharyngeal and supraglottic lesions.

A188. A Rare Case of Epithelial Myoepithelial Carcinoma of the Nasopharynx and Review of the Literature

Nopawan Vorasubin, MD, Los Angeles, CA; Arthur Wu, MD, Los Angeles, CA; Chi K. Lai, 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 describe the typical clinical presentation and histopathologic characteristics of epithelial myoepithelial carcinoma of the nasopharynx.

Objectives: To present a very rare case of epithelial myoepithelial carcinoma (EMC) of the nasopharynx and review the literature. **Study Design:** Case presentation and review of the English literature. **Methods:** PubMed literature search. **Results:** A 62 year old female presented with 6 months history of right nasal obstruction and intermittent epistaxis. She was found to have a posterior nasopharyngeal mass that was biopsied twice before EMC could be diagnosed. She was then taken for endoscopic tumor debulking and is currently receiving adjuvant radiation therapy. EMC is a rare salivary gland tumor usually affecting the parotid but can occur in minor salivary glands. Only four cases of EMC of the nasal cavity/nasopharynx have been reported. The usual presentation is nasal obstruction and intermittent epistaxis. The mass usually appears as a smooth mucosal swelling. The mean age at presentation is 55 with a female predominance (60%), which is consistent with EMC of the major salivary glands. CT usually shows a well defined mass with no boney erosion. Diagnosis depends mainly on the surgical pathologist s ability to identify both epithelial ductal structures and myoepithelial cells. EMC is usually treated with wide local excision however, in the nasopharynx, gaining clear margins is challenging thus the authors suggest augmenting treatment with adjuvant radiation. **Conclusions:** EMC is a very rare salivary gland tumor and even more rarely occurs in the nasopharynx. While the treatment of choice for this tumor is surgical excision, in the nasopharynx, clear margins are difficult to achieve, thus, adjuvant radiation should be considered.

A189. Is Extracapsular Dissection for Parotid Pleomorphic Adenoma Enucleation?

Robert L. Witt, MD*, Newark, DE; Mary A. Iacocca, MD, Newark, DE

Educational Objective: At the conclusion of this presentation, the participants should be able to distinguish the difference in the amount of exposed capsule (margin) comparing partial superficial parotidectomy with facial nerve dissection and extracapsular dissection (without facial nerve dissection).

Objectives: Long term favorable results for recurrence and facial nerve function have been reported for extracapsular dissection (ECD) and partial superficial parotidectomy (PSP) for parotid pleomorphic adenoma (PPA). PSP is distinguished from ECD in that the facial nerve is dissected in PSP, but not in ECD. This manuscript attempts to answer the question as to whether ECD is enucleation. **Study Design:** Retrospective, single surgeon, single institutional study. **Methods:** Twelve consecutive parotidectomy procedures with a final pathology report of pleomorphic adenoma were retrospectively measured for margin (the percent of capsule exposure around the tumor). In 8 highly selected patients (mobile, tail of parotid, superficial tumor, well defined capsule, less than 4 cm, with FNA and imaging consistent with benign neoplasm), extracapsular dissection (ECD) with nerve integrity monitoring and loop magnification was performed. 4 parotid surgical procedures not meeting these criteria underwent PSP and served as controls. All patients had frozen section analysis. The pathologist was blinded for operation type when retrospectively measuring margin. **Results:** The 8 ECD patients had a mean of 80% (71-99%) of the capsule exposed. The 4 PSP procedures had 21% (4-50%) of the capsule exposed ($p<0.05$). No case had capsule rupture. **Conclusions:** ECD is enucleation. Enucleation (ECD) and published long term favorable results for recurrence, facial function, numbness, Frey's syndrome and sialocele with ECD with experienced surgeons contradicts the axiom of not enucleating PPA. In the occasional and/or novice parotid surgeon, ECD may lead to devastating higher rates of recurrence and facial nerve dysfunction.

A190. "Not All that Glitters Is Gold"—An Unusual Presentation of an Asymptomatic Neck Mass

Hootan Zandifar, MD, Los Angeles, CA; Raphael Nach, MD, Los Angeles, CA; Lorraine M. Smith, MD, Los Angeles, CA; Ryan F. Osborne, MD*, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to see the importance of consideration of foreign body reaction for neck masses even if the inciting event is 40 years ago.

Objectives: This is a case presentation of a 55 year old male with unusual presentation and diagnosis for his neck mass. **Study Design:** This is a case report. **Methods:** Patient is a 55 year old male who presented from a dermatologist's office with history of a neck mass for several months and failure of medical management. Imaging studies were obtained that revealed a level 3 neck mass with evidence of calcification. Patient underwent excisional biopsy of the mass. **Results:** During surgery the mass was removed from surrounding tissues without any problems. Once it was further examined it became evident that the mass was an immunological reaction around a piece of wood. Once this was described to the patient he recalled a motorcycle accident when he was 15 years old during which a branch had penetrated his neck and he had exploratory surgery and removal of branch. Patient has been doing well since excision of the foreign body. **Conclusions:** This was an unusual presentation of a neck mass as well as a foreign body reaction to an event 40 years ago.

A191. The Effect of Chemexfoliation and Anti-Aging Regiments on Fibroblast Expression of IGF-1: A Pilot Study

Hootan Zandifar, MD, Los Angeles, CA; Davina A. Lewis, MS, Indianapolis, IN; Dan F. Spandau, PhD, Indianapolis, IN; William H. Beeson, MD, Carmel, IN; Jeffrey B. Travers, MD PhD, Indianapolis, IN

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the role of insulin like growth factor 1 secreted by fibroblasts to prevent squamous cell skin cancer. Furthermore, they should be able to see the effects of chemexfoliation and anti-aging regiments on the levels of this growth factor.

Objectives: Recently, IGF-1 secreted by fibroblasts has been shown to prevent development of squamous cell carcinoma of sun damaged skin. The purpose of this study is to see if skin rejuvenation regiments can increase the levels of IGF-1 secreted and thus prevent the development of squamous cell skin cancers. **Study Design:** This is a prospective investigational study. **Methods:** 3 subjects were selected. Silicone cast and photos of right and left pre- and postauricular sites were obtained. Each site either underwent a deep chemexfoliation, medium depth chemexfoliation or one of two novel antioxidant cream regiments. Subjects were followed for 3 months. Followup silicone casts were obtained for surface profilometry. Biopsies of the treated regions and a control site were also obtained and sent for histological evaluations, pro-collagen levels and for IGF-1 levels. **Results:** 2 out of 3 subjects showed improvement of skin wrinkles using the antioxidant regiments. Also, 2 out of the 3 subjects showed increase in IGF-1 levels using an antioxidant regiment. The sites treated with chemexfoliation showed increase in IGF-1 levels. Pro-collagen levels were increased in all test sites and subjects, regardless of intervention, when compared to control. **Conclusions:** These results suggest that antioxidant creams and chemexfoliation could protect the skin against squamous cell carcinoma.

LARYNGOLOGY-BRONCHOESOPHAGOLOGY

A192. Spectrum of Dysphonia: Diagnosis, Demographics, and Quality of Life

Lee M. Akst, MD, Baltimore, MD; Hamad Chaudhary, MD, Detroit, MI; Stacey L. Ishman, MD MPH, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the diagnoses and demographics of patients presenting to an academic laryngology practice with chief complaint of dysphonia, to analyze the impact of demographics upon diagnosis, and compare the relative impact of different diagnoses on patient quality of life measures.

Objectives: To characterize and compare voice related quality of life (VRQOL), demographics, and symptomatology in patients with dysphonia presenting to an academic laryngology practice. **Study Design:** Prospective cohort study. **Methods:** All new patients presenting with chief complaint of dysphonia from May 2007 - April 2009 were included. Baseline characteristics and impact of diagnosis on VRQOL were analyzed with one way ANOVA. Multivariate regression identified those factors most predictive of overall VRQOL. **Results:** 551 patients (11-96 years; 38.2% male/61.8% female) were categorized: 29.0% inflammatory; 19.0% paralysis; 16.5% phonotrauma; 11.5% functional; 9.8% post-traumatic; 7.1% other neurologic; 4.6% neoplasm; and 2.5% stenosis/other. Among these groups, neoplastic had the greatest proportion of males (p=0.0009) and highest current smokers and total pack years (p<0.0001 for each). Odynophonia, odynophagia, and otalgia were highest with functional dysphonia (p=0.0001, 0.0324, 0.0001), while dysphagia was highest with paralysis and stenosis/other (p=0.0002). Neurologic disease had longest duration of dysphonia (mean 72 months); the next longest group was neoplasm (42 months, p=0.0003). Overall VRQOL was 70-74 for phonotraumatic, post-traumatic, neoplastic, and inflammatory conditions and 45-56 for paralysis, functional, neurologic, and stenosis/other (p<0.0001). In multivariate regression, age, gender, and smoking were not predictive of individual VRQOL while paralysis and stenosis/other correlated with low VRQOL (p=0.018 and 0.043). **Conclusions:** There are significant differences among causes of dysphonia with regard to baseline demographics, associated clinical characteristics, and VRQOL. Comparative knowledge of these conditions and an understanding of their relative proportions may speed diagnosis and improve treatment of patients with voice complaints.

A193. Ventilation and Voice: Unilateral Laryngeal Pacing versus Unilateral Cordotomy for the Treatment of Bilateral Vocal Fold Paralysis

Sanjay Manohar Athavale, MD, Nashville, TN; Jennifer H. Dang, BA, Nashville, TN; Yike Li, MD, Nashville, TN; Rajshri Mainthia, BA, Nashville, TN; Elizabeth C. Pearce, MD, Nashville, TN; David Zealear, PhD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the advantages and disadvantages of cordotomy and laryngeal pacing for the treatment of bilateral vocal fold paralysis.

Objectives: The objective of this study was to compare voice and ventilation parameters in patients who had undergone either unilateral laryngeal pacing or unilateral transverse CO2 laser cordotomy (UTLC) for the treatment of bilateral vocal fold paralysis (BVFP). **Study Design:** We retrospectively reviewed voice and ventilatory parameters in a similar cohort of patients who had undergone either laryngeal pacing or UTLC for the treatment of BVFP. **Methods:** Voice was subjectively evaluated using the GRBAS scale while ventilation was evaluated by way of peak inspiratory flow (PIF), a marker of airway resistance during inspiration. **Results:** Four patients were present in both the unilateral laryngeal pacing arm and the cordotomy arm. All patients had a history of BVFP resulting from thyroidectomy with subsequent synkinetic reinnervation of the larynx. The average PIF for the cordotomy arm was 1.02 ± 0.5 compared to the laryngeal pacing arm which was 1.53 ± 0.41. The average GRBAS score in the cordotomy group was 2.66 ± 0.58 compared to 1.25 ± 0.50 in the laryngeal pacing group. Additionally, the number surgeries per patient in the cordotomy arm were 1.66 ± 0.58 versus 1.0 ± 0 in the laryngeal pacing arm. **Conclusions:** In our subset of patients with BVFP, unilateral laryngeal pacing was found to be superior to UTLC with respect to voice and ventilation parameters. An upcoming prospective randomized clinical trial comparing bilateral laryngeal to bilateral cordotomy for the treatment of BVFP will shed more light on an exciting new treatment for the paralyzed larynx.

A194. Current Dysphonia Trends in Patients over the Age of 65 - Is Vocal Atrophy Becoming more Prevalent?

Taryn Davids, MD FRCSC, Newmarket, ON Canada; Adam M. Klein, MD, Atlanta, GA; Michael M. Johns, MD, Atlanta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify current trends in geriatric referrals, including diagnostic patterns.

Objectives: The current trends in geriatric voice referrals including the number of patients over the age of 65 seen per year, the common diagnostic patterns, and specifically, the number of patients with vocal atrophy are assessed. **Study Design:** Retrospective chart review. **Methods:** Chart review was performed for all new patients over the age of 65 seen at our institution between the years of 2004 to 2009. Age and diagnosis was recorded. Of those patients identified with vocal atrophy, treatment options and outcomes were recorded. **Results:** Of the 6360 patients seen over a 6 year period, 21% were over the age of 65. Fifty-eight percent of patients over the age of 65 had vocal complaints with the most common diagnoses being vocal atrophy (25%), neurologic vocal dysfunction (23%), and vocal fold immobility (19.2%). Of those patients diagnosed with vocal atrophy the majority opted for voice therapy (57%), followed by reassurance (39%), and injection laryngoplasty (6%). There was a statistically significant improvement in mean pre- and post-therapy VRQOL values. **Conclusions:** As the number of people in the over 65 year age bracket increases, so do the number of geriatric referrals. While diagnostic trends remain the same, vocal atrophy is becoming more prevalent with a large number of patients seeking intervention, this will likely result in an increased need for health resources in the future.

A195. Efficacy and Safety of Acute Injection Laryngoplasty for Vocal Cord Paralysis following Thoracic Surgery

Evan M. Graboyes, AB, St. Louis, MO; Joseph P. Bradley, MD, St. Louis, MO; Brian F. Meyers, MD, St. Louis, MO; Brian Nussenbaum, MD*, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the rationale for using injection laryngoplasty in the acute postoperative setting for treating patients with unilateral vocal cord paralysis related to a thoracic surgical procedure.

Objectives: The primary objective of this study is to evaluate the effectiveness and safety of injection laryngoplasty using a temporary injectable agent in the acute care setting for patients with unilateral vocal cord paralysis following thoracic surgical procedures. **Study Design:** Retrospective consecutive case series in an academic institution. **Methods:** Inclusion criteria included patients acutely treated with injection laryngoplasty from January 1, 2006 to March 31, 2010 for a unilateral vocal cord paralysis that occurred after a thoracic surgical procedure (n=20). All patients were injected with Radiesse® Voice Gel using microlaryngoscopy technique. **Results:** The mean time to vocal cord injection was 4.5 days. There was 1 operative related complication of intraoperative bile reflux that caused a pneumonitis. None of the patients developed a post-injection aspiration pneumonia. Ninety percent (18/20) of patients were recommended for strict nothing by mouth (NPO) prior to injection. Of these, 94% (17/18) were allowed an oral diet following injection, while 67% (12/18) tolerated a regular diet. None of the patients required subsequent procedures for aspiration or dysphagia, while 25% (5/20) of the patients required further surgical intervention after discharge for persistent dysphonia. Patients with a known nerve transection had a higher rate of dysphonia requiring further surgical procedures. **Conclusions:** Acute treatment of thoracic surgery related unilateral vocal cord paralysis with injection laryngoplasty is safe, effective at preventing postoperative aspiration pneumonia, and improves swallowing function. For most patients, a single injection laryngoplasty is the only required treatment.

A196. Implantation Site Dependent Differences for Tracheal Regeneration with iPS Cells

Mitsuyoshi Imaizumi, MD, Fukushima, Japan; Yukio Nomoto, MD, Fukushima, Japan; Takashi Sugino, MD, Fukushima, Japan; Yuka Sato, PhD, Fukushima, Japan; Koichi Omori, MD, Fukushima, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand regeneration therapy using iPS cells.

Objectives: Our previous study demonstrated the potential for iPS cells to be used as a new cell source for tracheal regeneration therapy. However, teratoma (tumor) formation remains a major problem limiting the use of iPS cells. Cell line and implantation site dependent differences in teratoma formation have been reported (Miura, et al, 2009). In the current study, the teratoma forming propensity after implantation into tracheal defects and abdominal subcutaneous tissue was examined histologically and quantitatively. **Study Design:** Experimental study. **Methods:** Mouse iPS cells were cultured in artificial material under various conditions.

After cultivation in vitro, each iPS cell was examined histologically. Artificial materials with cultured iPS cells were then implanted into the tracheal defects and into the abdominal subcutaneous tissue in nude rats. Teratoma formation was evaluated histologically and quantitatively with measurement of maximum diameter (MD). **Results:** Teratoma was observed in 10 of 11 rats with tracheal defects and in 3 of 11 rats with abdominal subcutaneous tissue implants, respectively. Implanted iPS cells produced larger teratomas in tracheal defects than in the abdominal subcutaneous tissue. The average MD was 5.36 mm in the trachea and 0.97 mm in the abdomen. **Conclusions:** The results of histological findings and quantitative measurements demonstrated that there were differences in teratoma formation according to the site of implantation. Further, we believe that it is necessary to carefully examine the implantation site dependent differences for safety of iPS cell before proceeding with its clinical application.

A197. The Tough Tracheoesophageal Puncture

Michele Phillips Morrison, DO, Augusta, GA; Neil N. Chheda, MD, Gainesville, FL; Gregory N. Postma, MD, Augusta, GA

Educational Objective: At the conclusion of this presentation, the participants should be aware of the technique and success of in-office transnasal esophageal (TNE) guided tracheoesophageal puncture (TEP) placement in patients who have failed prior attempts in the operating room or are not healthy enough to undergo general anesthesia.

Objectives: To demonstrate the technique of TEP which can be completed safely in an office setting when patients are not able to undergo general anesthesia due to medical comorbidities or have previously had an unsuccessful attempt at TEP placement in the operating room due to anatomic reasons. **Study Design:** Retrospective chart review from 2007-2010. **Methods:** 11 outpatient adults with a history of total laryngectomy presenting to the laryngology clinic for TEP after either failing prior placement in the operating room or not being able to undergo general anesthesia due to medical comorbidities were identified. In-office TNE guided TEP placement was performed on all eleven patients. **Results:** All subjects underwent successful TNE guided TEP placement in the office. Complications included one possible false passage and one case of cellulitis. **Conclusions:** Patients who could not undergo TEP placement in the operating room due to poor exposure or medical comorbidities were able to successfully undergo the procedure in an office setting with good results.

A198. The Challenge of Protocols for Reflux Disease—A Review of Current Protocols and Development of a Critical Pathway

Neil L. Prufer, MD, New York, NY; Kenneth W. Altman, MD PhD*, New York, NY (Presenter); Michael F. Vaezi, MD PhD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the current protocols for reflux disease that exist, to consider the underlying principles that go into a protocol, and to understand the importance of developing a critical pathway.

Objectives: Gastroesophageal reflux disease (GERD) and laryngopharyngeal reflux (LPR) are very common and very controversial disease entities. We have previously reviewed clinical practice guidelines (CPG) on reflux disease, and these major consensus statements differ on what constitutes ideal management. Our aim is to critically review existing protocols for reflux in the literature based on CPG recommendations, and to present a refined protocol that may be further used to develop a critical pathway for reflux in ambulatory medical practice. **Study Design:** Literature review with discussion. **Methods:** A PubMed search was used to identify current clinical protocols for reflux disease, and the principal elements of each one of the protocols was compared. **Results:** 828 articles were identified in the PubMed search, and 11 met the search criteria. Together with 4 articles previously identified, 15 articles were analyzed. All protocols discuss the important role of empiric therapy, though they differ in how to employ it. Eight protocols (53%) used alarm symptoms to prompt a workup. For patients that need a workup, upper endoscopy was by far the most common diagnostic method suggested. The use of other modalities varies significantly between protocols. We propose a standard protocol that employs CPG recommendations and may be used for critical pathway outcomes measures. **Conclusions:** There are major differences between existing protocols in the literature, which reflects the many

clinical controversies. There has been very little data examining the outcomes of different protocol approaches. The authors propose a new protocol, as well as an approach for measuring outcomes.

A199. An Epiglottic Pyogenic Granuloma Presenting with Spontaneous Hemoptysis

Hailun Wang, BS, Farmington, CT; Harry S. Hwang, MD, Boston, MA (Presenter); Sandra Cerda, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the causes of oral pyogenic granulomas, recognize the classic clinical and histopathologic findings and be familiar with the various available treatment options.

Objectives: To highlight a very unusual presentation of a relatively common form of inflammatory hyperplasia. **Study Design:** Case report and literature review. **Methods:** A case of epiglottic pyogenic granuloma of unknown etiology presenting as spontaneous hemoptysis in a 69 year old female patient is reported. **Results:** The anatomic locations and predisposing factors for pyogenic granulomas are described to illustrate the range of presenting clinical features. The various treatment options are outlined and the relevant literature is reviewed. **Conclusions:** This case report represents the first reported case of a pyogenic granuloma arising from the epiglottis. This is a rare but potentially life threatening situation as bleeding from this site is difficult to control and may lead to airway compromise. Assessment of the airway and surgical management are necessary for prevention of recurrent episodes of supraglottic bleeding.

A200. Aortic Homograft for Pharyngeal Closure Subsequent to Total Laryngectomy: A Case Report of a New Method

Steven M. Zeitels, MD*, Boston, MA; Anca M. Barbu, MD, Boston, MA (Presenter); John C. Wain, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to consider a novel approach to neopharynx reconstruction.

Objectives: Wound breakdown and fistula formation subsequent to total laryngectomy in radiation failure scenarios are commonplace. A variety of reconstructive strategies have been developed to avert this complication with varying degrees of success and complexity. We encountered analogous wound healing issues during partial laryngectomy procedures, which were successfully remedied using cadaveric aortic homograft for large caliber cancer resection airway defects. We therefore sought to examine the value of homograft aorta for reconstructing the pharynx in an irradiated field. **Study Design:** Case report. **Methods:** A total laryngectomy was performed on a patient who had failed prior radiotherapy. Without using immunosuppression, a ~2.5cm x 3.5cm patch of homograft aorta was used to reconstruct the anterior wall of the neopharynx. **Results:** The patient healed without incidence and was able to take a full per oral diet within 2 weeks. **Conclusions:** Effective reconstruction of the neopharynx with cadaveric homograft aorta after total laryngectomy was achieved in a postradiation failure patient. The success of this approach is based on the ease of handling of the soft tissue graft substrate, lack of immunogenicity, and the practical incorporation of the aortic homograft into local soft tissues. The encouraging result was similar to our broader experience in laryngotracheal airway reconstruction. The neopharyngeal reconstruction is technically simple and within the skills of any head and neck surgeon. We present this isolated case due to the potential value of this approach for a variety of aerodigestive tract scenarios and the limited number of total laryngectomy procedures in our practice.

OTOLOGY

A201. Electrophysiological Insertion Properties in the Gerbil Using a Flexible Array

Oliver F. Adunka, MD, Chapel Hill, NC; Baishakhi Choudhury, MD, Chapel Hill, NC; Christine E. Demason, BS, Chapel Hill, NC; Faisal I. Ahmad, BS, Chapel Hill, NC; Craig A. Buchman, MD*, Chapel Hill, NC; Douglas C. Fitzpatrick, PhD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the potential application of electrophysiological markers during cochlear implant electrode insertion.

Objectives: To examine the feasibility of a flexible electrode array in conjunction with acoustically evoked early auditory potentials to determine insertion properties such as cochlear damage and electrode position. **Study Design:** Experimental animal study. **Methods:** Sixteen penetrations using a flexible electrode with a maximum diameter of 0.3 mm were performed in 13 gerbils. Acoustically evoked early auditory potentials were recorded through the electrode. A baseline recording was obtained at the round window. Then the round window was opened and the electrode was advanced using a micromanipulator. After each step, a set of responses was obtained. Following the experiment, each cochlea was histologically examined for signs of damage. **Results:** Electrode kinking was observed in 4 penetrations. Reversible and irreversible electrophysiological changes were observed in 7 and 5 of the 16 penetrations, respectively. Insertion depths ranged from 1.1 to 2.7 mm (average 1.7±0.4 mm). Tonotopical changes as the electrode was advanced were observed in 7 penetrations (not present in 5 and inconclusive in 4). Histological damage was observed in 9 of the 13 ears. No damage was present in 4 ears. Mostly, disruptions of the basilar membrane were observed. **Conclusions:** These results indicate that the proposed recording algorithm remains feasible in a model featuring a flexible electrode and therefore mimicking a realistic clinical scenario. Also, tonotopic information might be helpful to distinguish functional from dead cochlear regions. Ultimately, we plan to translate these results to develop custom insertions based on real time physiologic data.

A202. Analysis of Hearing Loss in Patients with Enlarged Vestibular Aqueduct (EVA) Syndrome

Bunmi A. Ajose-Popoola, BA, Boston, MA; Quinton S. Gopen, MD, Los Angeles, CA; Lin Huang, PhD, Boston, MA; Abigail Wilkins, BA, Boston, MA; Margaret A. Kenna, MD MPH*, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the audiological presentation of children with enlarged vestibular aqueduct syndrome.

Objectives: Describe the frequency, type, and clinical course of hearing loss in patients with EVA. **Study Design:** Retrospective review of 94 patients with a diagnosis of EVA syndrome from 1999-2010. Eligible patients included those with a computed tomography (CT) or magnetic resonance imaging (MRI) of the temporal bones, documented patient followup, and evaluation for the SLC26A4 (PDS) gene. **Methods:** Audiometric studies over the course of the patient's followup were compared. Pure tone averages of 3 frequencies (5/1/2 kHz), pure tone thresholds and air bone gaps were calculated for each audiogram. **Results:** Fifty-three patients had bilateral EVA, while forty-one patients had unilateral EVA. Ninety-nine patients had a cochlear abnormality in addition to EVA. 127 ears had sufficient data to classify the degree of hearing loss from pure tone air conduction threshold averages (range, 10-113 dBHL; mean 45 dBHL; SD 27 dBHL). Hearing loss was mild in 27 ears, moderate in 45 ears, severe in 19 ears, and profound in 5 ears. Normal hearing was observed in 35 of the patients with EVA. The type of hearing loss could be defined in forty-nine ears. Nine had a conductive loss, 13 had sensorineural hearing loss, and 27 had mixed loss by pure tone average calculations. We detected air bone gaps (ABGs) of 15-75 dB among our cohort. Individuals with SLC26A4 mutations and bilateral EVA had a similar degree of hearing loss when compared with individuals with bilateral EVA without mutations. Individuals with bilateral EVA in the absence of SLC26A4 did not have a significantly higher degree of hearing loss than individuals with unilateral EVA also in the absence of the SLC26A4 mutation. **Conclusions:** The presence of mutant SLC26A4 alleles did not have a significant association with the severity or configuration of hearing loss in ears with EVA. Bilateral EVA was not associated with a more severe degree of hearing loss when compared to unilateral EVA. This information will be of use for counseling patients and families on the etiology of EVA.

A203. Examination of Bone Ossification Markers in Cochlear Development

Jolie L. Chang, MD, San Francisco, CA; Kristin Butcher, BS, San Francisco, CA; Richard A. Schneider, PhD, San Francisco, CA; Omar Akil, PhD, San Francisco, CA; Lawrence R. Lustig, MD, San Francisco, CA; Tamara N. Alliston, PhD, San Francisco, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the pattern of bone ossification marker expression in the developing cochlea.

Objectives: The otic capsule is the hardest bone in the body and has limited bone turnover and remodeling. Several developmental bone defects are associated with hearing loss such as craniofacial dysplasias, osteogenesis imperfecta, and craniosynostoses. Past cochlear development research has focused on the early development of sensory structures, but few have looked specifically at the otic capsule. A growing number of genes have also been implicated in bone development, but many have not been examined in the otic capsule. This study examines the spatial and temporal expression patterns of several developmental bone ossification markers in the cochlea. **Study Design:** Experimental animal study. **Methods:** Cochlea from mice ages embryonic day 19, postnatal days 5, 12, and 21 were sectioned and processed using in situ hybridization (ISH) techniques. ISH probes were used to examine the spatiotemporal expression of several factors implicated in endochondral ossification including Sox 9, Col2a1, MMP13, Col10a1, VEGF, Runx2, Osteocalcin, Ephrine 2a, Eph4b. Sprouty2 and FGFR3 were used to validate the ISH technique in the cochlea. **Results:** During mouse cochlear development, a progression of marker gene expression is observed, consistent with chondrocyte proliferation, differentiation, and hypertrophy, angiogenesis, and, ultimately, osteogenesis. Unlike prior anatomic descriptions, the expression pattern of osteocalcin in mature osteoblasts suggests that the innermost layer of the otic capsule ossifies before the outer periosteal layer. In the mature cochlea there is limited expression of novel factors implicated in the control of bone remodeling, Ephrine 2a and Eph4b, consistent with prior studies supporting limited bone turnover and remodeling in the otic capsule. **Conclusions:** The otic capsule exhibits a progression of marker gene expression consistent with endochondral ossification. Understanding otic capsule development is an important step towards understanding the pathogenesis of cochlear involvement and hearing function in developmental bone diseases.

A204. Tympanoplasty Results in an Ethnically Diverse and Underserved Population

Jeffrey Cheng, MD, New York, NY; Nancy Jiang, MD, New York, NY; Benjamin Malkin, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to identify predictive factors for tympanoplasty success in ethnically diverse patient populations.

Objectives: To examine and report our results for tympanoplasties performed in a tertiary care city hospital that serves one of the most ethnically diverse neighborhoods in the United States. **Study Design:** Retrospective chart review. **Methods:** Adult patients who underwent type I tympanoplasty from January 2009 through July 2010 were eligible. Charts were reviewed for the pre- and postoperative drum status, patient characteristics, results of temporal bone CT scans and audiologic data. The primary outcome measure was successful repair, defined as an intact tympanic membrane at last followup visit. A secondary outcome measure was postoperative hearing improvement, defined as a difference between air conduction and bone conduction pure tone averages of less than 20 dB. **Results:** Twenty-seven patients were included in the study. Fifteen patients (60%) had perforations greater than 50% of the drum area and 9 (33%) had bilateral perforations. Overall, 18 patients (67%) had a successful repair. Success rates were lower in patients with preoperative temporal bone CT scans showing chronic otomastoiditis compared to those with normal CT scans ($p< 0.0034$); perforation size, patient age, bilateral disease and ethnicity were not predictive factors. Thirteen patients who had successful repairs had postoperative audiograms available for review, of which 11 (85%) showed hearing improvement. **Conclusions:** Ethnically diverse patient populations may be more difficult to treat because of a higher incidence of active chronic otitis media with perforations. Meticulous surgical technique with close attending surgeon-resident supervision, review of preoperative CT imaging and assessment of the need for an aerating mastoidectomy may lead to improved success for tympanoplasty in this population.

A205. Clinical Outcomes in Idiopathic Sudden Sensorineural Hearing Loss

Matthew S. Clary, MD, Philadelphia, PA; Ryan C. Murray, MD, Philadelphia, PA (Presenter); Patricia S. Loftus, MD, Philadelphia, PA; Ornela S. Dervishaj, BS, Philadelphia, PA; Scott W. Keith, PhD, Philadelphia, PA; Thomas O. Willcox, MD, Philadelphia, PA; Gregory J. Artz, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss patient recovery rates from idiopathic sudden sensorineural hearing loss (ISSHL) after oral steroid therapy; and 2) understand how outcomes are impacted by intratympanic steroid therapy (ITS).

Objectives: 1) Investigate patient recovery rates from idiopathic sudden sensorineural hearing loss (ISSHL) after oral steroid therapy; and 2) understand how outcomes are impacted by intratympanic steroid therapy (ITS). **Study Design:** Retrospective review. **Methods:** A retrospective chart review was performed on 65 patients diagnosed with ISSHL from 2002-2009 presenting in the outpatient setting. Patients were treated with oral prednisone and intratympanic steroids as salvage therapy. Outcomes were analyzed as a function of the type of therapy, time to treatment, and response. **Results:** An overall recovery rate of 66.2% (43/65) was seen. In non-responders to OS, recovery was strongly associated with ITS as 66.7% of patients who received ITS recovered while no patients who did not receive ITS recovered ($p < 0.001$). There was a 79.5% (31/39) overall recovery rate among patients receiving treatment within 10 days of hearing loss, compared to 46.2% (12/26) that were delayed ($p = 0.008$). Of those receiving ITS, responders initiated treatment 10 days earlier than non-responders, median 4.5 vs. 15.0 days ($p=0.03$). Recovery did not depend on audiogram type ($p = 0.93$). There was no decrease in recovery for diabetics ($p >0.99$). No complications were observed. **Conclusions:** ITS injections are an effective salvage therapy after failure with OS. As the efficacy of OS treatment can been questioned, our results suggest that initial therapy of ITS with OS should be considered to provide patients with the best chance of hearing recovery. This conclusion is based on data showing improved efficacy of earlier ITS therapy with minimal complications.

A206. Standardization of CT Depiction of Cochlear Implants

Candice C. Colby, MD, Atlanta, GA; Patricia A. Hudgins, MD FACR, Atlanta, GA; Norman Wendell Todd, MD MPH*, Atlanta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to give a more precise description with the use of consensus terminology (2010) of cochlear anatomy and cochlear implant electrode array depth on CT imaging.

Objectives: We sought to identify common discrepancies and the need for use of consensus terminology (2010) to give a more precise description of the cochlea and cochlear implant electrode array depth on CT imaging. **Study Design:** A retrospective study performed at a tertiary care referral center. **Methods:** A neuroradiologist and an implant surgeon independently viewed temporal bone CT images of 41 ears (39 children) with cochlear implants. Using consensus terminology (2010), axial source images with coronal, and oblique sagittal reformations were compared with each other, and contrasted with the prior formal report of clinical neuroradiologist. **Results:** Interobserver agreement was excellent for oblique sagittal reformations into the plane of, and directly perpendicular to the basal turn, but only fair to good for conventional axial and coronal planes. Agreement was best when images were actively reformatted on a workstation by either the neuroradiologist or the otolaryngologist. Clinical radiology reports, done prior to the new consensus terminology, ambiguously described the electrode array within the cochlea. **Conclusions:** More accurate determination of insertion depth of cochlear implant array is enabled by 1) cochlea specific reformation planes set in the plane of the basal turn; 2) using the round window niche as the zero reference and the first 360 degrees to designate the basal turn; and 3) using the term apical (indicating toward the apex of the cochlea). The combination of image manipulation and standard terms regarding cochlear anatomy results in a more precise description of implant depth.

A207. Electrode Deactivation in Post-Meningitic Cochlear Implant Recipients

Maura K. Cosetti, MD, New York, NY; Andrew M. Rivera, BS, New York, NY; Susan B. Waltzman, PhD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate increased understanding of the frequency and pattern of electrode deactivation in post-meningitis cochlear implant recipients over time.

Objectives: To assess the frequency of electrode deactivation over time in post-meningitic cochlear implant (CI) recipients. **Study Design:** Single center, retrospective review. **Methods:** All post-meningitis CI recipients with more than 2 years of followup data were included. Percent of active electrodes was calculated relative to maximum number of programmable electrodes. Frequency and pattern of electrode deactivation over time was analyzed and compared to published data on non-meningitic CI patients. **Results:** A total of 15 patients with 17 implanted ears were included. Length of followup ranged from 2-25 years. A total of 9 (53%) ears experi-

enced a reduction in active electrodes. Of these, 3 patients had deactivation of 1 electrode, 2 patients each lost 2 and 3 electrodes, and the remaining 2 patients had had 5 and 6 electrodes deactivated, respectively. All patients had a minimum of 12 active electrodes at all times. Rate of deactivation over time was variable with loss of electrodes occurring up to 5 years postoperatively. Loss of electrodes was not correlated with a decline in speech perception, age at implantation or type of device. As a group, patients without electrode deactivation had a shorter average time from meningitis diagnosis to implantation compared with the deactivation group. **Conclusions:** Deactivation of CI electrodes over time is common in post-meningitic CI recipients (53%) and exceeds rates from non-meningitic patients (1%). Although electrode deactivation is multifactorial, anatomic considerations such as ongoing compromise of the electrode-neural interface by labyrinthitis ossificans may contribute to deactivation in both the short and long term.

A208. Survival of the 8.5 mm Osseointegrated BAHA Abutment and Its Utility in the Obese Patient

Michael D. Darley, MSIV, St. Louis, MO; Anthony A. Mikulec, MD, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the differences between the 5.5 mm and 8.5 mm abutment lengths utilized in bone anchored hearing aids and how these differences can be applied to individual patients. Discuss the complications of bone anchored hearing aids and what measures can be taken to minimize complications. Discuss the differences of the mechanical properties of various fixture and abutment length combinations.

Objectives: Review outcomes of patients who received a BAHA device and create a model comparing mechanical forces in combinations of fixture and abutment lengths. **Study Design:** Retrospective case series and mathematical modeling. **Methods:** Tertiary referral center in an ambulatory setting. **Results:** The mean BMI of patients receiving the 5.5 vs. the 8.5 mm abutment was 26 and 28.5, respectively. Patients that received the 5.5 mm abutment developed tissue overgrowth in 6/16 cases (37.5%). None of the patients who initially received the 8.5 mm abutment developed tissue overgrowth with the 8.5 mm abutment (0/8). The mean number of followup visits in the first and second 90 day period postoperatively for patients that received the 5.5 mm abutment vs. the 8.5 mm abutment was 1.6 and 1.8 vs. 1.8 and 1.6 visits respectively. Applying the principle of equilibrium of a ridged body, the 5.5 mm abutment in combination with the 4 mm fixture provides the greatest mechanical advantage. **Conclusions:** Patients who received the 8.5 mm abutment tended to have a greater BMI, did not develop tissue overgrowth complications, and had essentially the same number of postop visits as those who received the standard length abutment. The 8.5 mm abutment has a calculated mechanical disadvantage, but it is not clear if this is clinically important.

A209. Otologic Complications of Q-Tip Use: One Institution's Experience

Ilaaf Darrat, MD, Detroit, MI; Matthew M. Smith, BS, Detroit, MI; Michael D. Seidman, MD*, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to determine the indications for surgical repair of tympanic membrane perforation secondary to Q-tip use. In addition, participants should be able to determine the appropriate timeframe to observe a tympanic membrane perforation due to Q-tip use.

Objectives: To evaluate the indications for observation versus surgery in the management of Q-tip induced tympanic membrane perforations (TMP). **Study Design:** Retrospective cohort study of 1540 patients with a diagnosis of TMP from 2001-2010. Patients with a Q-tip injury were subdivided into two groups: observation or surgery. **Methods:** Data collected included demographics, symptoms, surgery type, and pre- and post-intervention audiometry. Successful outcomes were defined as healed TMP, resolution or improvement of vertigo, tinnitus, or facial nerve paralysis, and/or closure of the air bone gap (ABG). **Results:** Fifty-four of 1540 (3.5%) patients who presented with a TMP were secondary to Q-tip use. Four of the 54 patients (7.4%) underwent surgical repair with 100% success. Preoperatively, one patient had a facial nerve paralysis and two had dizziness, both had perilymphatic fistulae. Postoperatively, the facial nerve paralysis resolved and only one patient had persistent dizziness. Fifty of 54 patients opted not to undergo surgery. 38 (97.4%) had spontaneous healing. The average size of the perforation was 19% and average time to perforation closure was 1.75 months. 12 of

38 patients had no ABG after healing. Three of 39 patients had dizziness after injury with one having persistent dizziness. **Conclusions:** Observation is an appropriate consideration for patients who have a TMP due to a Q-tip injury. Surgical intervention should be offered early when a perilymphatic fistula is suspected, or if there are significant findings such as the presence of facial paralysis, severe vertigo, or profound sensorineural hearing loss. As otolaryngologists, we should be reluctant to offer surgical intervention of an acute injury without significant symptoms as most patients will heal spontaneously within 2 months.

A210. Virtual Reality Training for Mastoidectomy: What Do Trainees and Faculty Think?

David A. Diaz Voss Varela, MD, Baltimore, MD; Asit Arora, MD, London, UK; Howard W. Francis, MD, Baltimore, MD; Neil Tolley, MD, London, UK; John K. Niparko, MD*, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the role the role of a virtual reality (VR) simulator to develop an integrated simulation training program (ISTP) for mastoid surgery. We will explain how both trainee and faculty's perception of this novel training method can modify a surgical curriculum to deliver more time efficient and effective surgical training.

Objectives: To explore trainee and faculty attitudes towards an ITSP using a VR mastoid simulator (Voxelman TempoSurg) in order to improve existing teaching methods for mastoid surgery. **Study Design:** International cross-sectional survey. **Methods:** One hundred trainees and 40 faculty professors in the US and UK were surveyed using a standardized questionnaire of 8 key items using a 5 point Likert scale. This was used to assess their perception of the role of VR simulation for mastoid surgery for training and assessment. Trainee surgeons were divided into 4 groups according to their operative experience. Analysis of variance was used to compare differences across all groups including experienced surgeons. **Results:** There was general consensus amongst all groups that the incorporation of VR simulation into the temporal bone surgical skills laboratory would be strongly beneficial to improve knowledge of surgical anatomy and to facilitate the acquisition of basic competency levels in mastoid surgery. Both junior trainees and the faculty group perceived an ITSP in mastoid surgery would benefit novice surgeons the most. Its role in assessment of surgical competency was undecided amongst all groups. **Conclusions:** The acquisition of surgical skills for mastoidectomy using VR simulation is perceived as a useful adjunct to the established model using cadaveric temporal bones. Its role in assessment requires further evaluation.

A211. Role of Connexin 32 (Cx32) and Hearing Loss in Charcot-Marie-Tooth Syndrome (CMTS)

Brian D. Gibson, MD, New York, NY; Anne Sollas, Valhalla, NY; Linda A. Mattiace, PhD, Valhalla, NY; Ana H. Kim, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to evaluate the role of Cx32 and hearing loss associated with Charcot-Marie-Tooth syndrome using a Cx32 knockout (KO) mice model.

Objectives: Evaluate the role of Cx32 and hearing loss associated with Charcot-Marie-Tooth syndrome using a Cx32 knockout (KO) mice model. **Study Design:** Prospective. **Methods:** Cx32KO mice were compared to CBA normal hearing controls and Cx32 wild type (WT) mice to determine differences in hearing using auditory brainstem response testing at approximately 3, 6, and 12 months of age. Mice were sacrificed afterwards to evaluate the distribution of Cx32 relative to Cx26 and 30, using immunofluorescent staining and epifluorescent microscopy. **Results:** Cx32KO mice showed greater hearing loss compared to CBA controls by 4.5-6 months of age (thresholds: 51.75 ± 10.3 dB verse 40 ± 5 dB, respectively). The difference became more pronounced with aging (13 month CBA control threshold: 41.7 ± 2.9 dB verses 10-11 month Cx32KO threshold: 63.6 ± 14.2 dB). Distribution of Cx32 differed from Cx26 and 30. Cx26 and 30 were prominent in the spiral lamina, supporter cell region, and lateral connective tissue of the stria vascularis of CBA and Cx32WT controls and Cx32KO mice. Cx32 showed minimal presence in the supporter cell region in CBA and Cx32WT controls and absent in the Cx32KO strain (quantitative difference correlated on quantitative PCR and Western blot analysis). **Conclusions:** Cx32 is not predominant in the inner ear compared to Cx26 and 30. While Cx32KO mice showed normal development of inner ear architecture, Cx32 deletion appears to result in greater hearing loss

at an earlier age compared to controls. Cx32KO mice may serve as an animal model to study the pathophysiology of hearing loss associated with Charcot-Marie-Tooth syndrome.

A212. Changes in Projections to the Inferior Colliculus following Early Hearing Loss in Rats

Miyako Hatano, MD PhD, Kanazawa, Ishikawa Japan; Jack B. Kelly, PhD, Ottawa, ON Canada; Makoto Ito, MD PhD, Kanazawa, Ishikawa Japan; Tomokazu Yoshizaki, MD PhD, Kanazawa, Ishikawa Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss about the therapeutic potential, as well as the limitations, of neural plasticity in the auditory brainstem nuclei of congenital deaf children.

Objectives: The purpose was to investigate the effects of early hearing loss on the anatomy of the central auditory system, specifically, the ascending projections to the inferior colliculus (IC). **Study Design:** We compared normal animals with animals deafened during early development by amikacin, an ototoxic antibiotic that is known to destroy the hair cells in the inner ear. **Methods:** Deafness was produced by daily administration of amikacin from postnatal days P7 to P16. A retrograde tract tracer, Fluoro-Gold (FG), was then injected unilaterally into the IC at either P30 or P90. After axonal transport the animals were sacrificed and their brains were prepared for histology. The FG labeled neurons in the cochlear nucleus (CN) and the dorsal nucleus of lateral lemniscus (DNLL) were counted for each of the animals in the two age groups. **Results:** For deaf animals sacrificed at P30 there was a significant reduction in the number of FG labeled neurons in the ventral CN ipsilateral to the tracer injection. For deaf animals sacrificed at P90, however, there was a significant decrease in the number of labeled cells in both dorsal and ventral CN on both sides of the brain. In DNLL there was no change in the number or pattern of labeled neurons. **Conclusions:** Neonatal deafness results in a decrease in the number of neurons projecting from the CN to the IC with the decrease being more apparent during later stages of deafness. In contrast, there are no significant changes in the projection from DNLL to IC.

A213. Patient Satisfaction and Effectiveness of the Glasscock Dressing in Cochlear Implantation

Bradley T. Johnson, MD, New Orleans, LA; Timothy B. Molony, MD, New Orleans, LA; Joshua T. Levy, MD, New Orleans, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe how the Glasscock dressing is a well tolerated and effective option in cochlear implantation in the context of patient satisfaction and complication rates.

Objectives: The aim of this study is to determine if the Glasscock dressing (GD) is an effective alternative to the traditional mastoid pressure dressing (MPD) in cochlear implantation (CI). **Study Design:** This study is a retrospective cohort study coupled with a patient satisfaction questionnaire. **Methods:** This study was approved by the institutional IRB. All patients had CI performed by the senior author from January 2000 to December 2009. Patients were seen monthly for followup visits during the first year and those with less than 90 days of followup were excluded. Both dressing types were removed within 24 hours. Complication rates were then compared between the MPD and GD groups using chi-squared analysis and Fisher exact testing. Variables examined included perioperative antibiotic given, wound infection, postoperative hematoma, and postoperative seroma. Additionally, a patient satisfaction questionnaire was conducted with patients that received the GD. **Results:** A total of 105 implants were placed in 100 patients and age ranged from 12 months to 88 years. Each dressing group contained 50 patients. In the MPD group, major complications occurred in 4.0% of cases and minor complications occurred in 10.0% of cases. These results are not statistically significantly different from the 2.0% major and 8.0% minor complication rate seen in the GD group. No statistically significant differences were seen when comparing individual major and minor complications between groups. Patients were very satisfied with the GD in terms of protection and comfort. **Conclusions:** CI is a safe procedure with a low complication rate, and the GD is an effective and well tolerated alternative to the MPD.

A214. Cochlear Structure and Hearing in Murine Congenital Hypothyroidism Caused by Targeted Mutations in the Mouse Dual Oxidase A1 and A2 Genes

Kedar A. Kakodkar, MD, Chicago, IL; Miriam-Saadia I. Redleaf, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the cochlear histopathology and hearing with relation to hypothyroidism using a new hypothyroid murine model with targeted dual oxidase A1 and A2 gene deletions.

Objectives: To demonstrate the cochlear structure and hearing of hypothyroid mice with targeted dual oxidase A1 and A2 gene deletions. **Study Design:** An audiometric and histologic characterization of murine ears in wild type and knockout mice. Investigations were performed in an animal care approved laboratory in a tertiary care academic institution. **Methods:** Twenty-two wild type and knockout mice underwent auditory brainstem response testing under general anesthesia. Twenty-five wild type and knockout mice underwent intracardiac perfusion under general anesthesia with cochlear harvest and histological evaluation. **Results:** Average wild type hearing threshold was 70 dB. Average knockout hearing threshold was 80 dB. No histologic differences were seen between wild type and knockout mice. **Conclusions:** Congenital hypothyroidism has been associated with hearing impairment and cochlear malformation. Previously studied mouse models have noted significantly increased hearing thresholds and reproducible histology when compared to controls. The dual oxidase A1 and A2 mutant mouse is associated with a higher degree of hypothyroidism, yet significant difference in hearing and cochlear development was not appreciated. In light of these findings in a severely hypothyroid animal, it is clear that the relationship between hypothyroidism and hearing loss is not well understood.

A215. Otologic Diagnoses in the Elderly: Current Utilization and Predicted Workload Increase

Harrison W. Lin, MD, Boston, MA; Neil Bhattacharyya, MD*, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the current outpatient workload for otologic conditions in the geriatric population and recognize the anticipated increase in the outpatient clinic workload based on a growing elderly population.

Objectives: To establish the current outpatient workload for otologic conditions in the elderly and to estimate its potential increase based on an anticipated aging population. **Study Design:** Cross-sectional analysis of a national database. **Methods:** All outpatient clinic visits for patients aged ≥ 65 years receiving one of 5 common otologic diagnoses from 2005-2007 in the United States were determined from the National Ambulatory Medical Care Survey. The distribution of the visits for these diagnoses across 15 specialties was assessed. The number of visits was projected to the 2020 population based on changes in population demographics predicted by the United States Census Bureau. **Results:** An estimated 8.85 ± 0.86 million clinic visits with an otologic issue as a coded diagnosis were conducted in 2005-2007 in patients aged ≥ 65 years. These consisted of 230,000 visits for benign positional paroxysmal vertigo, 263,000 visits for vestibular neuritis, 292,000 visits for Meniere's disease, 1.09 million visits for tinnitus, and 7.27 million visits for sensorineural hearing loss. Otolaryngology, family practice, internal medicine and cardiovascular medicine managed the most visits, seeing 27.9%, 34.9%, 23.3% and 6.1% of the cases, respectively. With expected changes in population demographics by 2020, annual clinic visits for an otologic diagnosis will increase from 2.95 ± 0.78 million to 4.22 million visits in the elderly, annualized, including 1.18 million visits to otolaryngology. **Conclusions:** These data quantify the current outpatient workload and predict a substantial increase for many specialties, including otolaryngology. Efforts to prepare for this increase including manpower planning and education appear imperative.

A216. Outcome of Cochlear Implantation in Children with Congenital Cytomegalovirus Infection and GJB2 Mutation in Relation to Developmental Disorder

Takamichi Matsui, MD, Fukushima, Japan; Hiroshi Ogawa, MD, Fukushima, Japan; Naoko Yamada, Fukushima, Japan; Yoko Baba, MD, Fukushima, Japan; Mika Nomoto, MD, Fukushima, Japan; Koichi Omori, MD, Fukushima, Japan

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

the effectiveness of cochlear implantation in children with congenital cytomegalovirus infection and GJB2 mutation in relation to developmental disorder.

Objectives: Congenital cytomegalovirus (CMV) infection accounts for approximately 25 percent of all cases of neonatal hearing loss. GJB2 mutation accounts for 30-50 percent of all cases of profound nonsyndromic hearing loss in many populations. Cochlear implantation was undertaken in profound sensorineural hearing loss (SNHL) children with congenital CMV infection or GJB2 mutations, and the postoperative performance for auditory behavior, speech perception skills and speech production intelligibility were compared between the two groups. **Study Design:** Focus group study. **Methods:** Five children with asymptomatic congenital CMV infection and 6 children with GJB2 mutation related SNHL underwent cochlear implantation. After operation we evaluated the hearing level and development with cochlear implantation, using the Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS), the Meaningful Use of Speech Scale (MUSS) and the test for language retardation based on Sign-Significate relations (S-S method). **Results:** The average hearing level with cochlear implantation was 36.5dB in the congenital CMV infection group and 36.8dB in the GJB2 mutation group. The score of IT-MAIS/MUSS in the congenital CMV infection continued to increase for 4 years after cochlear implantation. The score of S-S method in both groups gradually increased, however the children with mental retardation were low score. **Conclusions:** The performance after cochlear implantation in children with congenital CMV infection was almost equal with GJB2 mutation related SNHL. Although SNHL with additional disabilities is not contraindicated for cochlear implantation, some patients of those show the low level performance of auditory behavior, speech perception skills and speech production intelligibility after cochlear implantation.

A217. Characteristics of Patients with Spontaneous Cerebrospinal Fluid Otorrhea Treated with a Transmastoid Repair

Jonathan L. McJunkin, MD, Hinsdale, IL; Joyce Y. Kim, BA, Oak Brook, IL; Richard J. Wiet, MD*, Oak Brook, IL; Robert A. Battista, MD, Oak Brook, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to examine the relationship of body mass index (BMI) and the results of transmastoid repair of adult patients with spontaneous cerebrospinal fluid (CSF) otorrhea.

Objectives: To examine the relationship of body mass index (BMI) and the results of transmastoid repair of adult patients with spontaneous cerebrospinal fluid (CSF) otorrhea. **Study Design:** Retrospective case review. **Methods:** Patients presenting with spontaneous CSF otorrhea over a consecutive 8 year period were examined. All patients underwent transmastoid repair of the skull base defect(s). Clinic and operative records were reviewed to obtain the clinical presentation, examination findings, BMI, results of repair, location and size of skull base defect(s), and methods of repair. Preoperative MRIs were studied for evidence of empty sella and encephalocele. **Results:** Seventeen patients were included in the study. The mean age was 61 years and 9 patients were female. Average length of followup was 21 months. Average BMI was 34.7 kg/m2. Evidence of partial or empty sella was present in 82% of MRIs reviewed. Sixty-five percent of patients had an encephalocele. Forty-one percent had more than one bony defect along the tegmen tympani or mastoideum. All 17 patients were repaired initially using a transmastoid approach. The patient with the highest BMI (50.2 kg/m2) required revision surgery via a middle fossa approach 27 months after initial repair due to a recurrent leak. **Conclusions:** Spontaneous CSF otorrhea due to defects confined to the tegmen tympani or mastoideum can be managed appropriately using a transmastoid approach. Patients with body mass index greater than 50 kg/m2 may be better treated using a middle fossa approach.

A218. Cochlear Implantation of Patients with Meniere's Disease

Paul T. Mick, MD, Toronto, ON Canada; David E. Shipp, MA, Toronto, ON Canada; Vincent Y.W. Lin, MD, Toronto, ON Canada; Joseph M. Chen, MD, Toronto, ON Canada; Julian M. Nedzelski, MD*, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the benefit of cochlear implantation to appropriately selected patients with a history of Meniere's disease.

Objectives: The purpose of our study is to 1) determine whether their performance from cochlear implantation is similar to age and sex matched non-Meniere's afflicted individuals; and 2) assess impact postoperatively on balance, tinnitus and quality of life. **Study Design:** Retrospective case series and review of prospectively maintained cochlear implant database. **Methods:** Patients with a definite or probable diagnosis of Meniere disease who fit criteria for cochlear implantation and underwent the procedure were included. Outcome measures included CID/HINT, tinnitus handicap index (THI), and SF-36 scores, as well as questionnaire data pertaining to balance complications. Results were compared to those of age and sex matched individuals undergoing cochlear implantation for bilateral progressive idiopathic SNHL. **Results:** 22 patients were included. At surgery, the average age was 69.7 years, and the average time with disease was 26.7 years. 21 had bilateral Meniere's disease, and the other had unilateral Meniere's disease with a previously excised contralateral vestibular schwannoma. Three patients (14%) had previously undergone vestibular neurectomy or surgical labyrinthectomy. In the absence of audiological differences between left and right, the implant was placed on the side with the weaker caloric responses. Implants were not placed in ears that had previously undergone vestibular neurectomy or surgical labyrinthectomy. There were no significant differences between subjects and controls. The average pre- and postoperative CID/HINT scores were 25% and 82%, respectively, with a mean followup of 3.8 years. Tinnitus and quality of life improved. Four patients (18%) had temporary postoperative imbalance lasting longer than three months, but no one reported permanent imbalance as a consequence of surgery. **Conclusions:** Appropriately selected patients with Meniere's disease achieve significant benefit from cochlear implantation with minimal vestibular morbidity.

A219. The FLEXsoft Electrode and Hearing Preservation

Paul T. Mick, MD, Toronto, ON Canada; Jacek Szudek, MD, Edmonton, AB Canada; David E. Shipp, MA, Toronto, ON Canada; Vincent Y. Lin, MD, Toronto, ON Canada; Julian M. Nedzelski, MD*, Toronto, ON Canada; Joseph M. Chen, MD, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should understand hearing preservation outcomes in patients undergoing cochlear implantation with the full insertion of FLEXsoft electrodes.

Objectives: The objective was to determine the degree of postoperative hearing preservation in patients with residual low frequency hearing undergoing cochlear implantation with FLEXsoft electrodes. **Study Design:** Retrospective review of a prospectively gathered database. **Methods:** Twenty-two adult subjects with residual hearing in the low frequencies (<90 dB pure tone thresholds at 250, 500 and/or 1000 Hz) underwent cochlear implantation with the Med-El FLEXsoft electrode array. 1- to 1.2 mm anterior and inferior cochleostomies were performed and the electrodes were fully inserted (31.5 mm). Preoperative and 3 month postoperative pure tone audiometry and monosyllabic speech perception scores were compared. **Results:** The average preoperative pure tone thresholds at 250, 500 and 1000 Hz were 63, 75 and 80 dB, respectively. At three months post-fitting, the corresponding average thresholds had risen to 76, 95 and 100 dB, respectively. 67% of subjects had maintained pure tone thresholds within 20 dB of their preoperative levels (25% within 10 dB). Half of the patients had low frequency thresholds remaining less than 90 dB. The average preoperative monosyllabic word discrimination score (WDS) was 10%. The WDS dropped to 0 in all patients. **Conclusions:** Preservation of low frequency hearing at 3 months post-fitting is possible with full insertion of the FLEXsoft cochlear implant electrode. Longer followup is necessary to determine whether the results are maintained over time.

A220. Retrospective Analysis of Patients Presenting to Combined Dizzy Clinic to Shed Light on Current Diagnostic Practices

Anthony A. Mikulec, MD, St. Louis, MO; Michael D. Darley, MSIV, St. Louis, MO (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the symptoms and signs that are suggestive of vestibular migraine, discuss caloric testing and its role in evaluation of the dizzy patient, discuss findings of caloric testing in association with dizzy patients who do or do not have migraine headache symptoms.

Objectives: Investigate the utility of caloric testing and nystagmography in the dizzy patient in the context of diagnostic purposes for vestibular migraine. **Study Design:** Retrospective case series. **Methods:** Dizzy

patients who presented to a combined dizzy clinic responded to a migraine headache questionnaire which was previously shown to have a high sensitivity and specificity for diagnosis of migraine headache if > or = 2/3 questions were answered affirmatively. These patients also underwent warm and cold water caloric testing. The sum nystagmus speed was obtained for both ears with warm and cold water caloric testing. This data was then correlated with responses to the migraine questionnaire. **Results:** 13 dizzy patients who answered "yes" to two or more questions on the migraine questionnaire (migraine group) were compared with 16 patients that answered "yes" to less than two questions (non-migraine group). The nystagmus sum beat frequency including right and left ears with warm and cold water calorics was measured. Patients in the migraine group vs. patients in the non-migraine group had a mean nystagmus frequency of 97 and 93 beats respectively. In addition, it was observed that migraine patients were four times less likely to have a sum nystagmus frequency less than 50 than those in the non-migraine population. **Conclusions:** Nystagmus sum frequency was observed between the migraine and non-migraine group was similar, however the migraine group was four times less likely to have a sum frequency of less than 50. Further investigation is necessary in order to determine the utility and reproducibility of these findings.

A221. Three Flap Tympanoplasty

Saurav Sarkar, MBBS MS, Kolkata, WB India; B. K. Roychaudhuri, MBBS MS DLO, Kolkata, WB India

Educational Objective: At the conclusion of this presentation, the participants should be able to know a new method of performing tympanoplasty (3 flap tympanoplasty), which can be done in cases of subtotal or total perforations of the tympanic membrane, which is easy to perform and with very good postoperative results.

Objectives: To report our experience with 3 flap tympanoplasty, a modified overlay technique with a superiorly based skin flap, for the reconstruction of anterior, subtotal or total tympanic membrane (TM) perforations. **Study Design:** Prospective review of patients undergoing 3 flap tympanoplasty from May 2005 to May 2009 was performed. **Methods:** Prospective review of patients undergoing 3 flap tympanoplasty from May 2005 to May 2009 was performed. Eight hundred and fifty-eight patients who underwent 3 flap tympanoplasty and then followup visits at scheduled intervals for a period of 1 year after surgery are included in this study. Hearing test results were reported using a four frequency (0.5, 1, 2, and 3 kHz) pure tone average air bone gap. The outcome was considered successful if the TM was intact without lateralization or anterior blunting after the last followup visit. **Results:** There was a 97.89% success rate. There was no graft lateralization, anterior blunting, neocholesteatoma, or sensorineural hearing loss. The mean preoperative to postoperative four tone air bone gap improved from 23.5 to 8.1 dB, which is a mean gain of 15 dB; this was statistically significant ($p < 0.001$, paired sample t-test). **Conclusions:** The 3 flap technique is a safe and effective technique for reconstruction of anterior, subtotal or total TM perforations, with excellent graft take and significant improvement of hearing. It provides a precise replacement of the flap and a preserved healing plane.

A222. The Impact of Portable Digital Music Players on Hearing in High School and Middle School Students

Jeremy P. Schneck, East Setauket, NY; Daniel S. Dickstein, Livingston, NY; Rebecca A. Mendelsohn, MS, Providence, RI; Ghassan J. Samara, MD, Stony Brook, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to consider the potential impact that portable digital music players (PMP) may have on the hearing of children in the United States.

Objectives: With the advent of portable digital music players, such as IPods, teens routinely use earphones to listen to music. Devices sold in the U.S. have recorded noise levels as high as 115 dB, leading us to initiate research to determine the impact of such players on the hearing of children in the U.S. **Study Design:** Acute exposure to loud noise may result in a temporary shift or change in hearing, which heralds permanent hearing loss with continued exposure. To determine whether high school and middle school students listen to music at levels that may result in noise induced hearing loss, we tested students before and after they listened to their PMP and compared pre- and post-audiogram results. **Methods:** Thirty students completed a questionnaire and had hearing tests. A preliminary audiogram, after avoiding noise for a 14 hour period, was performed to assess

each student's baseline hearing. Students then listened to their PMP for 60 minutes and hearing was re-tested. **Results:** A significant number of subjects, 22 of 30 (relative risk of 1.47 with a confidence interval of 1.15 to 1.78) were found to have a temporary worsening of their hearing. Furthermore, fifty-six percent of the students didn't know that IPods have volume controls and only fifteen percent used them. **Conclusions:** Seventy-three percent of students tested had temporary worsening of their hearing, leading to concern that routine use of PMP's in teens may eventually result in permanent damage to their hearing.

A223. Long Term Hearing Stability after Stapedectomy

Jacob E. Smith, MD, Charleston, SC; Paul R. Lambert, MD*, Charleston, SC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss different surgical techniques and prostheses for the surgical management of otosclerosis. Also, they will be able to compare rates of hearing stability, successful ABG closure, and incus necrosis between types of prostheses.

Objectives: New prostheses have been developed over recent decades for the surgical management of otosclerosis. A primary concern has been the degradation of hearing over time secondary to incus necrosis. **Study Design:** A retrospective review was undertaken to analyze a single surgeon's stapedectomy results over the past decade using a standard partial stapedectomy technique with Robinson piston prostheses and to compare these results to the rates of hearing improvement and stability in the literature. **Methods:** Retrospective review of adult stapedectomies over the last 10 years. Audiometric data was obtained preoperatively, postoperatively, and at the most recent visit. Pure tone averages were calculated for air and bone conduction using 500Hz, 1000Hz, 2000Hz, and 4000Hz. Rates of ABG closure to d10dB were calculated and stability of results determined. **Results:** Of 240 surgeries, 156 ears (135 patients) had adequate postoperative audiometric data. A Robinson 4.0-4.5 piston prosthesis was used in 94% of cases and the rate of ABG closure was 87% in primary cases. Over 90% of patients maintained this level of hearing postoperatively (mean f/u of 3.2 yrs). **Conclusions:** Our technique for stapedectomy compares favorably to quoted ABG closure rates, with 87% of primary patients closing ABG to <10dB. 5 ears (3.2%) required revision surgery for recurrent or persistent CHL; however, none of these were found to have incus necrosis. Maintenance of incus integrity is expected with bucket handle prostheses. There were no major complications and hearing stability was excellent.

A224. In-Depth Investigation of Frequency Dependence of Nonlinearity in Human Cochlea Using DPOAE

Hwa J. Son, MD, Chicago, IL; Sumitrajit Dhar, PhD, Evanston, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the nature of nonlinearity in human cochlea and its dependence on frequency. Specifically, how its variance can be utilized in clinical setting to identify patients with outer hair cell hearing loss.

Objectives: This study attempts to extend results of past studies to answer whether the degree of nonlinearity in human cochlea increases with increasing characteristic frequencies. Once the frequency dependence of distortion product otoacoustic emissions (DPOAE) input output (I/O) function is determined in normal hearing subjects, this can potentially be used to diagnose early outer hair cell hearing loss in suspected population of patients. **Study Design:** DPOAE's were measured in 11 normal hearing subjects with variation in primary frequencies from 500 Hz to 13.5 kHz. I/O function was constructed by plotting input level from 15 to 105 dB SPL with DPOAE levels in dB SPL. **Methods:** Subjects were seated in a sound chamber with a single ear insert which served both as a transducer and microphone and instructed to quietly listen to the dual tones being played. Piecewise linear regression was used to fit a 2 line model to the scatter plot of I/O function for all subjects at each primary frequency. The "breakpoint" was used as a measure of nonlinearity. **Results:** There was an inverse relationship between the primary frequency and the "breakpoint" up to about 4 kHz. At higher frequencies, the DPOAE levels decreased at all levels. **Conclusions:** There was higher amount of compression toward the base of cochlea up to 4 kHz. Above that frequency, DPOAE's were reduced, presumably because of loss of outer hair cells from aging effect despite normal audiogram. Future studies involving infants or subjects without noise damage would provide useful adjunct to this study.

A225. Biallelic Mutations in SLC26A4 Are Associated with Additional Inner Ear Abnormalities

Angela C. Tsai, BA, Boston, MA; Olubunmi Ajose-Popoola, BA, Boston, MA; Lin Huang, PhD, Boston, MA; Sarah Steltz, MPH, Boston, MA; Abigail Wilkins, BA, Boston, MA; Margaret A. Kenna, MD MPH*, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand 1) the association between SLC26A4, enlarged vestibular aqueduct, and inner ear abnormalities; 2) the prognostic implications of genetic testing.

Objectives: To identify and characterize potential correlations between the SLC26A4 (PDS) genotype and longitudinal hearing loss in a cohort of patients with enlarged vestibular aqueduct (EVA) with or without additional inner ear anomalies. **Study Design:** Retrospective chart review at a tertiary care children's hospital. **Methods:** 53 individuals, aged 2 to 30 years with EVA in at least one ear were studied (84 affected ears). All subjects underwent genetic testing for SLC26A4. Statistical correlation between hearing loss, as measured by four frequency pure tone average (500, 1000, 2000, and 4000 Hz), number of mutant SLC26A4 alleles and presence of inner ear anomalies detected by computed tomography or magnetic resonance imaging was undertaken. The mean followup time was 18 months with a standard deviation of 14 months. **Results:** There were 18 males (34%) and 35 females (66%). 5 subjects (9.4%) had two pathogenic SLC26A4 mutations, 8 (15.1%) had one pathogenic mutation, and 40 had no mutations (75.5%). GEE model showed that biallelic SLC26A4 mutations were significantly correlated with a higher number of additional inner ear abnormalities (mean=3.1) compared to patients with one (mean=1.5) or no mutations (mean=1.63) (P=0.01). There was no correlation between the number of mutations and progression of hearing loss (P=0.28). Fluctuating hearing loss was not correlated with the presence of additional inner ear abnormalities (P=0.80) or the number of mutant alleles of SLC26A4 (P=0.43). **Conclusions:** The number of mutant alleles of SLC26A4 is significantly associated with the presence of additional inner ear anomalies but not with changes in hearing.

PEDIATRICS

A226. Sus Scrofa Piglets as an Animal Training Model for Pediatric Otolaryngology Fellows in the Management of Laryngotracheal Reconstruction

Faisal Abdulkader, BM, Toronto, ON Canada; Yamilet Tirado, MD, Toronto, ON Canada (Presenter); Paolo Campisi, MD FRCSC*, Toronto, ON Canada; Vito Forte, MD FRCSC, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to know the utility and availability of an animal model for fellowship training in the complex operative management of laryngotracheal reconstruction.

Objectives: The aim of this study is to describe the utility of the Sus scrofa pig as an animal model for fellowship training in the complex operative management of laryngotracheal reconstruction. **Study Design:** Descriptive study. **Methods:** Assessment of the Sus scrofa pig's neck anatomy was performed to identify anatomical similarities to the human neck. The following procedures were successfully performed: 1) anterior cricoid split with thyroid ala graft augmentation; 2) anterior and posterior cricoid split with costal cartilage augmentations; 3) partial cricotracheal resection; 4) tracheal resection with primary anastomosis; 5) cervical slide tracheoplasty reconstruction. **Results:** We described the Sus scrofa pig as a reliable animal model for the training of pediatric otolaryngology clinical fellows in training of the different procedures implicated and available for laryngotracheal reconstruction including the management of the airway during surgery. The anatomy and tissue quality was proven to be a realistic representation of the human neck and laryngeal structures. **Conclusions:** The Sus scrofa pig animal model will be able to fulfill the current deficits in training fellowships due to the relative rarity of this condition and trainee's limited exposure.

A227. Infratemporal Fossa Ganglioneuroma in a Pediatric Patient: A Case Report and Review of the Literature

Bob B. Armin, MD, Los Angeles, CA; Vishad Nabili, MD, Los Angeles, CA; Noah C. Federman, 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 describe a rare presentation of a pediatric ganglioneuroma in the infratemporal fossa and discuss the clinicopathologic and radiologic findings which raise suspicion for this benign tumor.

Objectives: Describe a rare presentation of a pediatric ganglioneuroma in the infratemporal fossa. Discuss the clinicopathologic and radiologic findings which raise suspicion for this benign tumor. **Study Design:** A case report. **Methods:** A case report with histopathologic and radiological details is described from a tertiary hospital. Background, incidence, disease course, and treatment options are presented. **Results:** We present the case of a 9 year old female who was noted to have a slowly increasing right facial swelling over a 2 year period. An MRI showed a large well encapsulated right infratemporal fossa mass extending medially towards the sphenoid sinus and pterygoid plates. A CT guided needle biopsy was consistent with a ganglioneuroma. She underwent an uncomplicated transcervical transparotid excision of the mass, and she did well postoperatively without any cranial nerve deficits. The permanent pathology confirmed the diagnosis of a mature ganglioneuroma. **Conclusions:** We describe a rare case of a ganglioneuroma of the infratemporal fossa in a pediatric patient. To our knowledge, this is the first reported case of a ganglioneuroma in this location. Such tumors need to be approached systematically with an initial FNA, imaging, and appropriate surgical planning. Surgical excision is the treatment of choice as it provides pathologic confirmation and prevention of mass effect on adjacent structures.

A228. Bilateral Second Branchial Cleft Sinuses: An Unusual Case Report and Review of the Literature

Brian S. Chen, MD, Tacoma, WA; Renee L. Makowski, MD, Tacoma, WA; Mark E. Boseley, MD, Tacoma, WA

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand the epidemiology, workup, and treatment of bilateral branchial cleft cysts.

Objectives: To present a case report of bilateral second branchial cleft sinuses in a non-syndromic child. **Study Design:** Case report from a military tertiary care referral center. **Methods:** Report of a unique pediatric case of bilateral second branchial cleft sinuses and a review of the existing literature. **Results:** A 4 year old female presented to the pediatric otolaryngology clinic for evaluation of bilateral pits on the front of her neck that were present since birth. Her parents were previously counseled that the lesions would eventually close, but they wanted a second opinion. They denied swelling, erythema or infection though they occasionally drained clear fluid. The pits were symmetric, located a few centimeters above her clavicles and resting just anterior to the sternocleidomastoid muscles bilaterally. Upon swallowing, the pits became more pronounced with elevation of the laryngeal structures beneath. There was no personal or family history of hearing or kidney problems. A preoperative CT scan was conducted to affirm our preoperative diagnosis and evaluate for possible thyroid involvement. The patient underwent direct laryngoscopy without evidence of piriform sinus pits. Both tracts were subsequently dissected superior to the hyoid bone where they tapered, consistent with a second arch anomaly. **Conclusions:** The incidence of bilateral branchial cleft anomalies is rare, occurring in only 2-3% of all branchial cleft cases. It is particularly unusual to identify this finding in patients without family history. This case report, with associated photographs and imaging studies, demonstrates a rare case of bilateral second cleft sinuses, the workup and treatment.

A229. Evidence of Biofilm on Adenoid and Sinus Mucosa in Pediatric Chronic Rhinosinusitis

Elizabeth A. Dunham, MD, Morgantown, WV; Hassan H. Ramadan, MD*, Morgantown, WV; Karen H. Martin, PhD, Morgantown, WV

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

stand the prevalence of biofilm in pediatric rhinosinusitis; 2) discuss the subjective nature of microscopy analysis; and 3) describe biofilm criteria used for confocal image analysis.

Objectives: Little data is available on biofilms in sinus samples in pediatric rhinosinusitis. This study attempts to analyze and quantify biofilm presence on pediatric adenoid and sinus samples from children with chronic rhinosinusitis, using confocal microscopy to evaluate specimens of adenoid and sinus mucosa from patients undergoing surgery for treatment of obstructive and/or infectious problems. **Study Design:** Prospective. **Methods:** Mucosal specimens from adenoid and sinus mucosa of 39 pediatric patients were harvested on the day of planned surgery, frozen sectioned, and then double stained for biofilm glycocalyx and eukaryotic DNA. Specimens were analyzed using confocal microscopy for presence of biofilm on mucosal epithelial surface. Findings were correlated to patient's diagnosis and basic demographic information. Severity of biofilm was graded on a 0-3 scale by two blinded observers. **Results:** 70% of sinus samples were positive for biofilm in the infectious group compared to none in the obstructive group. Adenoid samples showed 43% biofilm prevalence in the infectious group as compared to 47% in the obstructive group. **Conclusions:** Findings indicate a similar prevalence of biofilm on adenoid tissues using confocal microscopy regardless of infectious versus obstructive process, bringing into question the clinical significance of the presence of biofilm on pediatric adenoid mucosal samples. One possibility is that biofilms are fairly ubiquitous, and it is the individual's inflammatory response to the biofilm that dictates a disease pattern. Additionally, confocal imaging requires subjective interpretation of a small section of tissue, resulting in a high possibility of sampling error and bias. Biofilm identification criteria needs to be defined and standardized.

A230. Incidence of Anesthetic Related Complications in Children with Obstructive Sleep Apnea following Adenotonsillectomy

Jaime M. Eaglin, MD, Richmond, VA; Colleen G. Rodriquez, MD, Richmond, VA; Andrew S. Wang, BS, Richmond, VA; Jeannette F. Kierce, MD, Richmond, VA; Kelley M. Dodson, MD, Richmond, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss 1) the incidence and nature of adverse events following adenotonsillectomy in children with obstructive sleep apnea (OSA); 2) possible guidelines for postoperative observation in children with mild OSA following adenotonsillectomy; and 3) the differences in postoperative course in children with and without OSA following adenotonsillectomy.

Objectives: To review the incidence and nature of adverse events following pediatric adenotonsillectomy over a two year period. **Study Design:** An institutional review board (IRB) approved retrospective chart review. **Methods:** A chart review of 264 children undergoing adenotonsillectomy was conducted at our institution during a two year period. Data was collected on length of hospital and PACU stay. Incidence, timing, and nature of all adverse events following adenotonsillectomy were recorded and statistically analyzed. Adverse events were defined as oxygen desaturation below 90%, requirement of oxygen supplementation including continuous positive airway pressure and mask ventilation, requirement of diuretic therapy, intubations, and insertion of nasopharyngeal airway in the recovery room. Information on comorbidities, diagnosis of OSA, tonsil and adenoid grade were compared to postoperative course and incidence of adverse events. **Results:** Children with mild OSA and no comorbidities were less likely to experience an adverse event following adenotonsillectomy. Those children who did experience an adverse event were more likely to do so within the first few hours following surgery. Children with severe OSA were more likely to have an adverse event than children with mild OSA. **Conclusions:** Children with mild OSA and no comorbidities were less likely to experience adverse events following adenotonsillectomy. Overall, there was a low incidence of adverse events, with the majority occurring within the first few hours postoperatively. Short stay or outpatient surgery could be considered in these children with mild OSA and no comorbidities.

A231. Fibrodysplasia Ossificans Progressiva

Lindsay S. Eisler, MD, Minneapolis, MN; Robert J. Tibesar, MD, Minneapolis, MN; James D. Sidman, MD*, Minneapolis, MN

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

case of fibrodysplasia ossificans progressiva (FOP), identify the presenting symptoms and highlight the clinical relevance to the practicing otolaryngologist.

Objectives: To report a case of fibrodysplasia ossificans progressiva (FOP) initially presenting as a neck mass and highlight the clinical relevance to the practicing otolaryngologist. **Study Design:** Case report. **Methods:** Chart review. **Results:** A 2 year old male presented with a 5 week history of a firm and enlarging left posterior neck mass. CT scan showed a hypodense area infiltrating the posterior neck musculature. Infected lymphangioma was first considered and initial treatment consisted of antibiotics and oral steroids. On followup, the lesion was even larger. At surgical biopsy, the mass was pale, gray, firm, avascular, and infiltrating the soft tissues. The histopathologic results showed low grade fibromyxoid and adipose tissue favoring lipofibromatosis. Rheumatology service was consulted and made the diagnosis of FOP based on these pathological findings, bilateral great toe deformities, and stiff joints. Genetic testing confirmed the diagnosis. The patient was started on anti-inflammatories and steroids. **Conclusions:** FOP is a rare disease characterized by malformation of the great toes and heterotopic ossification of skeletal muscle and connective tissue. The chest cavity becomes restricted leading to an early death due to thoracic insufficiency syndrome. Surgical intervention leads to explosive flare-up and painful new bone growth. Knowledge of this disease can be valuable to otolaryngologists to facilitate early diagnosis and prevent aggressive surgical management which can lead to harmful progression of disease. As in our case, this rare condition can manifest primarily as a neck mass and present a diagnostic challenge for the practicing otolaryngologist.

A232. Angiolymphoid Hyperplasia with Eosinophilia Presenting as an External Auditory Canal Mass in a Two Year Old

Philip A. Gaudreau, MD, Portsmouth, VA; Theresa M. Gille, MD PharmD, Portsmouth, VA; Timothy L. Clenney, MD MPH, Portsmouth, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the incidence and management of angiolymphoid hyperplasia with eosinophilia and compare this to other histopathologic entities that may present as an external auditory canal mass in the pediatric population.

Objectives: Angiolymphoid hyperplasia with eosinophilia (ALHE) is a well recognized clinical entity that typically presents with recurrent benign subcutaneous nodules. Most commonly, ALHE is seen in young adults and is often seen in the head and neck. Management of ALHE includes steroid injection, surgical excision, radiation therapy, laser excision, and observation. We present the case of a two year old male with a 2 month history of a compressible, dome shaped mass within the left external auditory canal. Surgical excision with biopsy of the mass revealed typical histopathological findings consistent with ALHE. At one month followup the patient was found to have no additional lesions or evidence of recurrent disease. **Study Design:** A case report and literature search (Medline) for articles related to the presentation and management of ALHE was performed. **Methods:** Twenty-two articles were reviewed. **Results:** Of these, nine were found to be relevant and were included in this review. **Conclusions:** ALHE is uncommonly seen in the pediatric population and is clinically and histologically distinct from the more common pediatric entity of Kimura's disease. Differential diagnosis of an external auditory canal mass in a child should include ALHE, pyogenic granuloma, hemangioma, branchial cleft anomalies, and skin anomalies such as epidermal inclusion cysts. In a child, one should also consider a foreign body granuloma. There are multiple treatment options that have been shown to effectively manage patients with ALHE. Given the high rate of recurrence, patients with ALHE require long term followup.

A233. Rare Congenital Nasal Teratoma with Intracranial Extension

Jesse C. Knight, MD, Danville, PA; William Edward Wood, MD, Danville, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss this rare entity and explain potential endoscopic treatments. We will review and discuss our novel experience and recommended surgical approaches.

Objectives: Congenital teratomas are very rare and reports of their presence in the head and neck are a mere 2%. The finding of a nasal teratoma with intracranial extension is even less common. A review of the literature shows five reported cases in the English literature of congenital teratomas isolated to the sinonasal airway with

intracranial extension. We present a case report of a six month old male with initial presentation of chronic nasal obstruction who was treated successfully at our tertiary care hospital for a mature intranasal teratoma with intracranial extension. **Study Design:** Case report. **Methods:** After previous neurosurgical subfrontal removal of intracranial tumor and skull base reconstruction, endoscopic examination revealed an obstructing lesion attached mucosally to the inferior turbinate and septum with total choanal atresia. This extended posterosuperiorly to the skull base. The mass was released and mobilized with the Coblator needle and blunt dissection. The defect was packed with Duragen followed by FloSeal and a vascularized nasoseptal mucosal flap placed over the defect. **Results:** We describe the successful endoscopic removal of the nasal and skull base portion of a teratoma with intracranial extension. The patient has no evidence of residual or recurrent tumor to date and is free of any CSF leak. **Conclusions:** A rare intranasal teratoma with intracranial extension presented with isolated benign symptoms of nasal obstruction and rhinorrhea. We describe the successful treatment via combined endoscopic approach with external intracranial neurosurgical assistance.

A234. Fibroepithelial Polyp Arising in the Epiglottis

Bradley McIntyre, MD, Dallas, TX; Seckin O. Ulualp, MD, Dallas, TX; Sandra Cope-Yokoyama, MD, Dallas, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to describe clinical, radiologic, and histological features of a fibroepithelial polyp as a rare cause of epiglottis mass in children.

Objectives: Fibroepithelial polyp, a common type of tumor in the skin, vulva, and the neck of uterus, is very rare in the respiratory tract. We describe clinical, radiologic, and histological features of a fibroepithelial polyp as a rare cause of epiglottis mass in a child. **Study Design:** Chart review. **Methods:** Chart of an 11 year old female referred to a tertiary care pediatric hospital for assessment of epiglottic mass was reviewed. Data included relevant history and physical examination, diagnostic workup, and management. **Results:** The child presented with a two month history of intermittent sore throat. The sore throat progressed without a history of fever, hoarseness, difficulty swallowing, breathing difficulty, voice change, weight loss, night sweats, hemoptysis, and change in appetite. Physical examination revealed a mass located on the lingual surface of the epiglottis. MR imaging documented a non-lipomatous mass with no hemangioma or vascular malformation characteristics. There was no extension to the other laryngeal structures. The mass was removed using CO2 laser and histologic evaluation showed subepithelial fibroconnective tissue containing scattered blood vessels, occasional nerves, and mild mononuclear inflammation consistent with fibroepithelial polyp. Postoperatively, the surgical site was healed with no evidence of recurrent lesion. **Conclusions:** Fibroepithelial polyp, although uncommon, should be considered in the differential diagnosis of epiglottic mass in children.

A235. Temporal Bone Findings in Patients with CHARGE

Sean M. Miller, MD, St. Louis, MO; Jonathan J. Lusardi, BS, St. Louis, MO; Anita Jeyakumar, MD FACS, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to define CHARGE syndrome and discuss the implications of temporal bone findings in patients with CHARGE.

Objectives: The purpose of this study is to review radiological findings of temporal bone anatomy in CHARGE patients diagnosed at our institution, as compared with previous publications. **Study Design:** Retrospective chart and radiologic review. **Methods:** IRB approval was obtained. A retrospective chart review of all patients with an ICD-9 code of 759.89, corresponding to CHARGE syndrome, at a pediatric tertiary referral center from 2000-2010. **Results:** A total of 810 patients were identified. A total of 14 patients had a genetic diagnosis of CHARGE. CT temporal bone scans were available for 8 patients, resulting in 16 temporal bones that were analyzed. Ossicular chain abnormalities were noted in 87.5% temporal bones, 94% aplasia of the oval window, some degree of semicircular canal aplasia was present in 100% of the bones. 81% had a large emissary vein, and 87.5% had an aberrant course of the facial nerve. **Conclusions:** Patients with a diagnosis of CHARGE often have significant hearing and vestibular deficits. Understanding their temporal bone anatomy will help facilitate auditory and vestibular rehabilitation. Characterizing the anatomic abnormalities expected for these chil-

dren provides a guide for preoperative surgical planning of any otologic intervention. Additionally, the findings can serve as useful adjunct for children who are being evaluated for CHARGE syndrome.

A236. In vivo Durability and Safety of Rolled Acellular Dermis in a Submucosal Pocket in Pigs

Benjamin D. Powell, MD, Rochester, MN; Shelagh A. Cofer, MD, Rochester, MN; Joaquin J. Garcia, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential for submucosal augmentation using rolled acellular dermis and explain the safety and longevity of the implant.

Objectives: Our study aims to evaluate the persistence and safety of a submucosal implant of rolled acellular dermis in a piglet model. The future translational objective is augmentation of the pediatric nasopharynx for improvement of velopharyngeal insufficiency. **Study Design:** Prospective, controlled study of 12 implanted and 3 control pigs which were observed over a three month period and then evaluated. **Methods:** Twelve domestic piglets were implanted at age 5 weeks with a rolled sheet of acellular dermal matrix (Strattice©). Implants averaged 19.7 mm in length and 4.75 mm in diameter. They were inserted in a submucosal pocket in the soft palate. Three piglets underwent sham operations with creation of submucosal pockets without implantation. The animals were observed for 3 months, after which the palates were harvested for evaluation. Measurements and photographs were taken at time of implantation and harvest. The surgical sites were also evaluated histologically. **Results:** No piglets suffered any surgical complications. Grossly, persistence of bulk at the surgical site was noted at three months in 5 of the 12 implanted piglets. Histologically, persistence of the dermal matrix was noted with apparently minimal change in implant dimensions. Incorporation of the dermal matrix was observed with minimal host inflammation. **Conclusions:** In vivo experimental results demonstrate safety of a rolled acellular dermal implant in a submucosal location in a piglet model, without surgical complications or significant host inflammatory reaction, and with possible persistence of implant. These results may be analogous to use of a dermal matrix implant in a human nasopharynx.

A237. Pyriform Aperture Stenosis: Intranasal Dexamethasone Therapy

Rosser K. Powitzky, MD, Oklahoma City, OK; Benjamin A. Collins, MS, Oklahoma City, OK; Jessica A. Enix, MS, Oklahoma City, OK; Paul G. Digoy, MD FAAP, Oklahoma City, OK

Educational Objective: At the conclusion of this presentation, the participants should be able to quantify midnasal stenosis (MNS) and determine the therapeutic effectiveness of 1% ophthalmic dexamethasone drops intranasally (ODDI) in patients with pyriform aperture stenosis (PAS).

Objectives: To quantify midnasal stenosis (MNS) and evaluate the therapeutic effectiveness of 1% ophthalmic dexamethasone drops intranasally (ODDI) in patients with pyriform aperture stenosis (PAS). **Study Design:** Retrospective review. **Methods:** Children diagnosed with PAS at our tertiary referral center from 2006-2009 were reviewed retrospectively. Midnasal distance was measured between vertical uncinate processes with computed tomography. ODDI was utilized in all patients. The dosage began with 2 drops in each nostril twice daily and was then adjusted based on symptoms. Outcome measures included the improvement of airway obstruction, ability to taper steroid drops, and necessitation of surgical intervention. **Results:** Five children were reviewed. The median distance between vertical uncinate processes was 11.3mm (range of 10.6-12.3mm). All patients presented with apneic episodes and significant desaturations. Two patients were treated surgically for unstable apnea. Postoperatively, both patients had continual nasal obstruction that improved with ODDI postoperatively. The other three patients with PAS responded well to ODDI without requiring any surgical intervention and were weaned off steroid drops in 2-4 months. No adverse effects from ODDI were found in followup. **Conclusions:** Our study is the first to evaluate the effect of ODDI in patients with PAS and to quantify midnasal stenosis in these patients. MNS may occur in children with PAS, but its effect on treatment outcomes is unclear and requires further investigation. Our review suggests that ODDI may be a helpful adjunctive therapy to surgery and some patients with PAS may respond favorably to ODDI without requiring surgery. A larger controlled trial is warranted.

PLASTICS-AESTHETICS

A238. Lateral Nasal Artery Pedicled Island Flap for Repair of Nasal Alar Defects

Behrad B. Aynehchi, MD, Brooklyn, NY; Richard W. Westreich, MD, Brooklyn, NY

Educational Objective: At the conclusion of this presentation, the participants should be familiar with the analysis of lower nasal defects and indications for various reconstructive techniques with particular attention to vascular anatomy, structural support, and preservation of aesthetic landmarks.

Objectives: Defects of the nasal alar subunit pose unique corrective challenges due to natural folds and sharp transition lines that are difficult to reconstruct within a region devoid of cartilaginous support or freely dissectible planes. The lateral nasal artery island flap was designed for moderate alar lesions that do not involve the alar rim or supra-alar crease. This well vascularized flap performed in a single stage affords acceptable texture and color matches while avoiding violation of the supra-alar crease. Our initial experience with this new technique is described. **Study Design:** Case series. **Methods:** Three patients underwent the lateral nasal artery island flap between 2008 and 2010 and were followed for a period of up to one year with photo documentation. All three subjects had cartilage grafts for alar support as well. **Results:** All repairs yielded satisfactory results with no necrosis, alar notching, or flap loss. Overall symmetry in addition to symmetry of the alar base, tip, and donor site were intact. Color and texture match, including the alar-facial junction, were excellent as well. One patient required a postoperative steroid injection for pin cushioning. All patients were satisfied with the functional and aesthetic results. **Conclusions:** For alar defects up to 1.5 cm sparing the supra-alar crease and free alar margin, the lateral nasal artery pedicled island flap has been shown to provide acceptable repair with regards to color and texture match in a limited series of patients. We recommend this technique for its simple donor site closure and minimal effacement of the lower nasal landmarks.

A239. Perception of Facial Paralysis Deformities by Casual Observers

Andres N. Godoy, MD, Baltimore, MD; Masaru A. Ishii, MD, Baltimore, MD; Patrick J. Byrne, MD, Baltimore, MD; Kofi D. Boahene, MD, Baltimore, MD; Carlos O. Encarnacion, San Juan, PR; Lisa E. Ishii, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the perception of facial paralysis (FP) by normal observers.

Objectives: To explore the perception of facial paralysis (FP) by normal observers. We hypothesized that normal observers would regard faces with facial paralysis differently as compared to normals. **Study Design:** Randomized prospective cross-sectional. **Methods:** A group of forty subjects were asked to identify the presence or absence of facial paralysis, and to rate the attractiveness of the faces, and the region most affected by the facial paralysis. **Results:** ROC analysis of observer classification resulted in 91.67% sensitivity and 86.01% specificity for the ability to detect facial paralysis when present. The three most affected facial features in faces with FP were the mouth 31.6%, eyes 21.6% and nose 21.3%. The Kruskal Wallis performed to evaluate equality among the 4 groups (normal repose, normal smile, facial paralysis repose, and facial paralysis smile) was highly significant (χ^2 (3) = 296.959; p = 0.0001). Post hoc t-testing was performed with Bonferroni correction (p value for significance was 0.05/3 = 0.017) and showed statistically significant differences in attractiveness scores between normal faces in repose and smiling (p = 0.0014), but no significant difference in attractiveness scores between paralyzed faces in repose and smiling (p = 0.0488). The difference in attractiveness scores between normals and paralyzed subjects was highly statistically significant (p= 0.0000). **Conclusions:** Casual observers regard faces with facial paralysis differently as compared to normal faces. They are able to identify the abnormality and correctly label the side of the deformity the majority of the time and consistently regard those faces as less attractive than normals.

A240. Staged Interpolated Melolabial Flap for Reconstruction of Internal Lining in Full Thickness Nasal Defects

Garrett R. Griffin, MD, Ann Arbor, MI; Shan R. Baker, MD*, Ann Arbor, MI; Jeffrey S. Moyer, MD, Ann Arbor, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) compare

various techniques for reconstruction of internal nasal lining; 2) explain how to harvest the melolabial flap for internal lining; and 3) discuss the timing of melolabial flap takedown in the broader nasal reconstruction scheme.

Objectives: Report a novel method of obtaining reliable internal nasal lining for full thickness nasal defects. **Study Design:** Case series of patients having undergone reconstruction of internal lining using staged interpolated subcutaneous tissue pedicle melolabial flap. **Methods:** Full thickness nasal defects are a reconstructive challenge, requiring reconstitution of internal lining, structural support and external covering. Native endonasal mucosa is considered to be the ideal material to reconstitute internal lining, and can be harvested as a septal hinge, bipedicle advancement or inferior turbinate flap depending on the size and location of the defect. However, the nasal mucosa may be unavailable due to tumor involvement, traumatic loss or in revision cases. There are several alternatives to nasal mucosa, each with significant drawbacks. **Results:** In this retrospective report we describe for the first time the use of a staged interpolated melolabial flap for reconstruction of internal lining. This provides a relatively large, dependable skin paddle that can be aggressively thinned at second stage takedown. Interpolated forehead flaps are frequently used for external covering in these cases necessitating several stages anyway. The timing of melolabial flap takedown, and incorporation of this technique into the reconstructive algorithm for full thickness nasal defects, is discussed. **Conclusions:** Interpolated melolabial flaps provide a reliable and effective source of internal lining in cases where native endonasal mucosa is not available.

A241. Experience of Fat Repositioning in Lower Eyelid Blepharoplasty

Amy K. Hsu, MD, New York, NY; Albert Jen, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the technique for lower lid blepharoplasty utilizing fat repositioning and compare it to other techniques for lower eyelid rejuvenation.

Objectives: To report our experience utilizing suborbicularis fat repositioning in lower blepharoplasty to rejuvenate the lower eyelid and compare it to other techniques for lower eyelid rejuvenation. **Study Design:** Retrospective review of patients in a single private practice. **Methods:** Variable factors contribute to the aging of the lower eyelid, and many methods have been described to rejuvenate the lower eyelid. Resection of herniated suborbicularis fat in lower lid blepharoplasty may result in exacerbating the hollow appearance of the nasojugal groove. Fat injection has variable results and fillers are temporary. Fat repositioning techniques address the lower eyelid complex by repositioning the areas of excess fat to areas of deficiency, resulting in a smooth contour to the lower eyelid complex. We describe the results of a consecutive series of patients undergoing this procedure. **Results:** The records of 57 consecutive patients were reviewed. The median age was 49.2 (range: 27-78) years. The mean followup time was 12 months (range: 9 - 20). Complications included asymmetry in 5 patients (8.8%) and ectropion in 1 patient (1.8%). No patients experienced infection, bleeding, visual changes, or other complications. **Conclusions:** Fat repositioning in lower lid blepharoplasty results in an improved cosmetic appearance by addressing the variable anatomical conditions of the aging lower eyelid complex. Patients in our series successfully underwent this technique with favorable cosmetic result and a low incidence of complications.

A242. Mullerectomy for Upper Eyelid Retraction in Graves' Orbitopathy

Jonathan Liang, MD, Sacramento, CA; Laura T. Hetzler, MD, Baton Rouge, LA; Brian S. Orisek, MD, Sacramento, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the presentation of eyelid abnormalities in Graves' orbitopathy, and to discuss the surgical options for addressing eyelid retraction, with a detailed focus on the mullerectomy procedure.

Objectives: To review the presentation of eyelid abnormalities in Graves' orbitopathy. To review the surgical options for addressing eyelid retraction, with a detailed focus on the mullerectomy procedure. **Study Design:** Case report and review of literature. **Methods:** We describe a case of a 36 year old woman with Graves' disease who presents with exophthalmos and upper eyelid retraction. She was bothered by the appearance of

her “bulging eyes” and complained of dryness and irritation. She had no keratitis, diplopia, or evidence of optic neuropathy. **Results:** Patient underwent mullerectomy, or excision of Muller’s muscle. Hypertrophy of the muscle was noted. Mullerectomy was performed via a posterior-conjunctival approach. It involved delicate separation of Muller’s muscle from the underlying conjunctiva and overlying levator aponeurosis. Postoperative analysis showed improvement of upper eyelid position and patient comfort. **Conclusions:** Muller’s muscle is a sympathetically innervated muscle that inserts upon the upper border of the superior tarsal plate and provides 2 mm of lift. Eyelid retraction is the most common eyelid abnormality in Graves’ orbitopathy. Upper eyelid surgery involves lengthening or weakening of Muller’s muscle and/or the levator aponeurosis. The mullerectomy procedure has received little attention in the otolaryngology literature. Mullerectomy is a safe and effective procedure that has been shown to improve upper eyelid position, lagophthalmos, exposure keratopathy, and patient comfort. The failure rate is low and is most often due to under-correction. Otolaryngologists should consider mullerectomy as an option for addressing upper eyelid retraction in Graves’ orbitopathy.

A243. Integra Application for Reconstruction of Large Scalp Defects

Lauren E. McClain, BS, Jackson, MS; J. Randall Jordan, MD, Jackson, MS; W. Henry Barber, MD, Jackson, MS; Kimberly A. Donnellan, MD, Cleveland, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the indications for Integra placement to reconstruct large scalp defects. To recognize advantages and limitations of Integra with delayed skin grafting with regard to other reconstructive options.

Objectives: Large scalp defects can be a challenge for reconstructive surgeons. We propose a reconstructive method utilizing the application of Integra with an Allevyn bolster followed by delayed split thickness skin graft that is relatively simple to perform and provides good reconstructive results. **Study Design:** Retrospective chart review. **Methods:** 5 patients at our institution underwent reconstruction of scalp defects with Integra followed by delayed skin graft. All 5 patients were first taken to the operating room for wide local excision under general anesthesia. Integra was applied directly to the calvarium which had been denuded of periosteum during resection. An Allevyn dressing soaked in gentamicin was stapled in place on top of the Integra and was covered by a second Allevyn dressing. Both Allevyn dressings were removed in clinic after one week. Subsequent split thickness skin graft was performed at approximately 3 weeks after the initial procedure. **Results:** There were 5 patients in our series. The mean patient age was 67 years. The average surface area of the defect was 106 cm2 with a range from 36 to 224 cm2. There were 2 patients with malignant melanoma and 1 patient with each of the following: squamous cell carcinoma, basal cell carcinoma, and microcystic adnexal carcinoma. The average time between Integra placement and skin grafting was 21 days with a range of 20 to 24 days. Subsequent skin grafts showed adequate take in all 5 patients. There were 2 patients who underwent local radiation to their graft site. In both cases that received radiation, integrity of the graft site was maintained with mild radiation induced skin changes. **Conclusions:** The use of Integra for scalp reconstruction offers a simple and effective technique for the closure of large scalp defects. It also promotes a durable graft site that can subsequently be irradiated without consequence.

A244. A New Technique for Reconstruction of Large Defects of the Skull Base: The Posterior Pedicle Lateral Nasal Wall Flap

Carlos M. Rivera-Serrano, MD, Pittsburgh, PA; Luis H. Bassagaisteguy, MD, Provincia de Santa Fe, Argentina; Gustavo Hadad, MD, Provincia de Santa Fe, Argentina; Ricardo L. Carrau, MD*, Santa Monica, CA; Juan Fernandez-Miranda, MD, Pittsburgh, PA; Amin B. Kassam, MD, Santa Monica, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential of the posterior pedicle lateral nasal wall flap for reconstruction of large defects of the skull base.

Objectives: The last decade has seen a rapid expansion in the indications for expanded endoscopic approaches resulting in larger and more complex skull base defects. Reconstructive developments, however, have lagged our extirpative capabilities. As the clinical scenarios continue to challenge the current reconstructive strategies, we are compelled to develop alternative techniques. In this article we demonstrate the anatom-

ical basis for a new posterior pedicled lateral wall flap (C-H flap) for the reconstruction of median skull base defects and present our early clinical experience. **Study Design:** Anatomical description. Technical report. Feasibility. **Methods:** Using cadaveric dissections we designed and harvested a posterior pedicle mucoperiosteal flap composed by the inferolateral nasal wall and nasal floor. We applied the information gained in the laboratory to reconstruct four patients with defects resulting from the endoscopic endonasal resection of an extrasellar pituitary adenoma and three recurrent chordomas. **Results:** C-H flaps were designed, harvested and transposed into various defects of the planum sphenoidale, sella turcica, clivus and nasopharynx. We were able to adequately use the C-H flap to reconstruct all surgical defects. Clinically, the C-H flap was used to reconstruct defects of the clivus (n=3) and sella (1). All patients healed uneventfully. **Conclusions:** Our cadaveric dissections and early clinical experience support the use of the posterior pedicle lateral nasal wall flap for the vascularized reconstruction of large ventral cranial base defects in select patients.

A245. Anterior Pedicle Lateral Nasal Wall Flap: A Novel Technique for the Reconstruction of Anterior Skull Base Defects

Carlos M. Rivera-Serrano, MD, Pittsburgh, PA; Gustavo Hadad, MD, Provincia de Santa Fe, Argentina; Luis H. Bassagaisteguy, MD, Provincia de Santa Fe, Argentina; Ricardo L. Carrau, MD*, Santa Monica, CA; Juan Fernandez-Miranda, MD, Pittsburgh, PA; Amin B. Kassam, MD, Santa Monica, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential of the anterior pedicle lateral nasal wall flap in reconstruction of anterior skull base defects.

Objectives: Expansion of the clinical indications for ablative endoscopic endonasal approaches has behooved us to search for new reconstruction alternatives. We present the anatomic foundations of a novel anterior pedicled lateral wall flap (HB2 flap) for the vascularized reconstruction of anterior skull base defects. **Study Design:** Anatomical description. Feasibility study. Technical report. **Methods:** Using a cadaveric model, we investigated the feasibility of harvesting an anteriorly based mucoperiosteal flap from the lateral nasal wall. We then applied the techniques developed in the anatomical laboratory to reconstruct two patients with defects resulting from the endoscopic endonasal resection of esthesioneuroblastomas and one patient with an extensive meningoencephalocele of the anterior cranial fossa. **Results:** HB2 flaps were harvested and transposed to reconstruct anterior skull base defects in cadaveric specimens; and, subsequently, in three patients. The HB2 flap provided adequate coverage in the cadaveric model, as well as clinically in our three patients. Their postoperative healing was uneventful. **Conclusions:** The HB2 flap is a feasible alternative for the reconstruction of anterior skull base defects in select patients.

A246. Posterior Pedicle Nasoseptal Flap for Velopharyngeal Insufficiency: A Novel Flap for Pharyngoplasty, Palatoplasty, and Pharyngeal and Soft Palate Reconstruction

Carlos M. Rivera-Serrano, MD, Pittsburgh, PA; Carlos D. Pinheiro-Neto, MD, Pittsburgh, PA; Carl H. Snyderman, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential of the posterior pedicle nasoseptal flap in velopharyngeal reconstruction.

Objectives: We recently described the use of the posterior pedicle nasoseptal flap (NSF) for endoscopic reconstruction of skull base defects after expanded endonasal approaches. The NSF has been our workhorse for reconstruction of medium to large defects with excellent outcomes and minimal flap failures. We present the cadaveric foundations of the use of the pedicle nasoseptal flap for the surgical treatment of VPI and soft palate and pharyngeal reconstruction. **Study Design:** Feasibility. Cadaveric study. **Methods:** 3 fresh and 4 preserved cadavers were used. Posterior pedicle nasoseptal flaps were harvested and transposed. One preserved specimen was cut in the mid sagittal plane to demonstrate the relationships of the NSF flap with the nasopharyngeal and oropharyngeal structures. Photographs were taken 0° and 30° rod lens endoscopes coupled to a high definition camera and monitor. **Results:** A total of 9 posterior pedicle nasoseptal flaps (bilateral flaps in two specimens) were harvested and transposed into the nasopharynx and oropharynx. The most anterior aspect of the nasoseptal flap was seen transorally several millimeters inferior to the uvula in all specimens. All flaps were sutured transorally to the posterior pharyngeal wall. The width of the flap was significantly wider

than the width of the posterior naso/oropharyngeal wall in all specimens if the entire nasal septal mucosa was harvested. The nasoseptal flaps were easily tailored endoscopically and transorally with standard instrumentation to fit the width of the pharyngeal insetting area. **Conclusions:** The posterior pedicle nasoseptal flap completed proof-of-concept for transposition into nasopharynx and upper oropharynx, and it is a potential alternative to traditional palatopharyngoplasty flaps in selected patients.

SINUS-RHINOLOGY

A247. Effect of Topical Antibiotics on Chronic Sinusitis in Patients with Noninfectious Granulomatous Disease

Bradley B. Block, MD, Washington, DC; Kaelan D. Young, MS, Washington, DC; Suzette K. Mikula, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the safety and efficacy of culture directed topical antibiotic therapy on patient with chronic sinusitis in the setting of sinonasal sarcoidosis, Wegener's granulomatosis, or Churg-Strauss syndrome.

Objectives: To report the outcomes of topical antibiotics as an adjunctive treatment for chronic rhinosinusitis in patients with noninfectious granulomatous disease. **Study Design:** Retrospective case series. **Methods:** All patients with sinonasal sarcoidosis, Wegener's granulomatosis, or Churg-Strauss syndrome and a concurrent diagnosis of chronic rhinosinusitis were selected out of an outpatient, tertiary care rhinology practice database for inclusion into this study between September 1, 2006 and September 1, 2010. Outcome measures included overall symptomatic improvement on and off of therapy, systemic antibiotic use before and during treatment, and side effects. Culture results and topical antibiotics used were also recorded. Our null hypothesis was that systemic antibiotic use would be zero and patients would experience symptomatic improvement. **Results:** Ten patients were found to fit the inclusion criteria, including three with Churg-Strauss syndrome, three with sarcoidosis, and four with Wegener's granulomatosis. Pretherapy cultures included pseudomonas aeruginosa (4), methicillin resistant staphylococcus aureus (2), haemophilus influenza (1), Acinetobacter baumannii (1), Achromobacter denitrificans (1), and Citrobacter freundii (1). Culture directed therapy involved treatment with nebulized mupirocin, gentamicin, or vancomycin. Mean number of systemic antibiotic courses in the six months before treatment was 3.0 times (st dev 2.1); after treatment, this decreased to a mean of 0.67 times in 6 months (st dev 0.78). No side effects were reported. While on treatment, overall subjective improvement occurred in nine of ten patients, however, when therapy was stopped, three of eight had recurrence of symptoms. **Conclusions:** Topical antibiotics may decrease the need for systemic antibiotics in patients with chronic sinusitis in the setting of noninfectious, granulomatous disease.

A248. Improved Function of Prototype Clover Leaf Microdebrider Blade over Standard 4.0mm Medtronic TriCut Blade

John Luther Boone, MD, Lackland, TX; Brent Alan Feldt, MD, San Antonio, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to critically judge the new clover leaf designed prototype blade and its potential benefits in terms of decreased clogging and decreased operative time over the existing Medtronic 4.0mm TriCut blade in endoscopic sinus surgery.

Objectives: One significant limitation encountered with powered instrumentation is a tendency for the instrument to clog. Clogging requires significant time to remedy, disrupts surgical flow, and can theoretically increase blood loss. In light of these considerations, the standard commercially available 4.0mm Medtronic TriCut blade was tested against a new clover leaf blade in experimental surgical conditions to evaluate decreased operative time and clogging rate in the new clover leaf blade design. **Study Design:** Prospective randomized comparison. **Methods:** A prospective randomized comparison versus an experimental Medtronic clover leaf design cut blade versus the traditional 4.0mm TriCut blade was conducted using AFS and nasal polyp tissue model. Clogging rates and clearance times were measured for each blade and tissue model. Basic statistical analysis was performed to compare outcomes. **Results:** There was a statistically significant difference noted in the clog rate of the standard blade with NP analog (median 0 clogs) and AFS analog (median 4.5 clogs) (Mann-Whitney U: $p<0.0001$). There was no statistical difference in clog rate for the prototype blade for the polyp and AFS

analogs. **Conclusions:** The introduction of this new clover leaf designed prototype blade has potential benefits in terms of decreased clogging and decreased operative time; however, this excitement should be tempered by a cautious introduction as it clearly represents a significant change from current technology. Thorough intraoperative testing and training should occur to minimize any unintended surgical results.

A249. Sinonasal Disease in Polyostotic Fibrous Dysplasia and McCune-Albright Syndrome

Timothy R. DeKlotz, MD, Washington, DC; Marilyn H. Kelly, RN MS, Bethesda, MD; Michael T. Collins, MD, Bethesda, MD; Hung J. Kim, MD FACS, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the spectrum, natural history, and rate of progression of sinonasal fibrous dysplasia of bone (FD) and its association with endocrine dysfunction.

Objectives: To characterize the spectrum, symptoms, progression and effects of endocrine dysfunction or bisphosphonate treatment on sinonasal FD in polyostotic fibrous dysplasia (PFD) and McCune-Albright Syndrome (MAS). **Study Design:** Retrospective review of a cohort of subjects followed longitudinally in a natural history protocol for PFD/MAS. **Methods:** A cohort of PFD/MAS subjects underwent a comprehensive evaluation that included otolaryngologic and endocrine evaluation, and imaging studies. Head CT scans were analyzed, and the degree of sinonasal FD was graded using a modified Lund-MacKay scale. Those with greater than four years of followup were analyzed for FD progression. **Results:** A total of 106 patients meeting inclusion criteria were identified with craniofacial FD. A majority (92%) demonstrated sinonasal involvement. There were significant positive correlations between the sinonasal FD scale score and chronic congestion, hyposmia, growth hormone excess and hyperthyroidism ($p < 0.05$ for all). Significant correlations were not found for headache/facial pain or recurrent/chronic sinusitis. Thirty-one subjects met the criteria for longitudinal analysis (followup mean 6.3 years, range 4.4 - 9 years). Those demonstrating disease progression were significantly younger than those who did not (mean age = 11 vs. 25 years). Progression after age of 16 years was rare (n=3) and minimal. Concomitant endocrinopathy or bisphosphonate use did not have any significant effect on progression of disease. **Conclusions:** Sinonasal involvement of fibrous dysplasia in PFD/MAS is common. In spite of significant involvement, symptoms are usually few and mild, and disease progression occurs primarily in young subjects. Concomitant endocrinopathy is associated with disease severity, but not progression.

A250. Trauma Induced Complete Sinonasal Separation and Subsequent Frontoethmoid Mucocele Formation

Anthony G. Del Signore, MD PharmD, New York, NY; Hailun Wang, BS, Farmington, CT; Jeffrey Cheng, MD, New York, NY; Ben D. Malkin, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize trauma as a potential cause of sinus mucoceles and discuss the options for management.

Objectives: To highlight a unique presentation and subsequent management of a frontoethmoid mucocele caused by trauma. **Study Design:** Case report and literature review. **Methods:** The patient chart, including history, physical examination, radiologic imaging, operative report and pathologic results, was reviewed. A literature search was performed; appropriate English language papers were identified and reviewed. **Results:** The patient is a 40 year old woman who suffered a gunshot wound to the nasal region 15 years prior to presentation. At that time, she was managed surgically, including enucleation of one eye. She presently developed preseptal cellulitis of the remaining eye; a CT scan demonstrated a large frontoethmoid mucocele with complete sinonasal separation caused by scarring. Using a combined endoscopic and open approach, a drainage pathway was successfully created to the nasal cavity and a stent placed, with subsequent resolution of the infection. Although trauma is a known etiology of mucoceles, a literature review failed to find any other reported cases caused by such distinct separation of the nasal cavity and sinuses. **Conclusions:** This case represents a unique illustration of the pathogenesis of mucocele formation in the setting of complete separation of the frontal and ethmoid sinuses from nasal cavity. It emphasizes the importance of thorough evaluation and management of craniofacial trauma involving the paranasal sinuses. Surgical obliteration or serial imaging to monitor for mucocele formation should be performed for cases resulting in such significant derangement of the normal drainage pathways.

A251. Utility of Screening Sinus CT Scans in Hematopoietic Stem Cell Transplantation

Susan L. Fulmer, MD, Milwaukee, WI; Sung-won Kim, MD, Milwaukee, WI; Matthew E. Leach, BA, Milwaukee, WI; Todd A. Loehrl, MD, Milwaukee, WI; Christopher N. Bredeson, MD, Milwaukee, WI; David M. Poetker, MD, Milwaukee, WI

Educational Objective: At the conclusion of this presentation, participants should be able to discuss the applicability of a screening sinus CT scan in predicting the incidence and extent of sinus disease after hematopoietic stem cell transplantation (HSCT).

Objectives: To compare pre-HSCT sinus CT scans to post-HSCT sinus CT scans and to evaluate the relationship between the severity of pre-HSCT sinus CT scans and the incidence of otolaryngology consultation after HSCT. **Study Design:** Retrospective chart review. **Methods:** Charts of 228 adult HSCT patients, from January 2003 to June 2009, with pre-HSCT sinus CT scans, were reviewed. Data gathered included diagnosis, type of HSCT, survival at two years post-HSCT, and otolaryngology referral requests. Pre- and post-HSCT sinus CT scans were scored using the staging system introduced by Lund and Mackay (LM). **Results:** Seventy-four subjects had sinus CT scans performed within 3 months after the HSCT and 97 subjects had scans performed within 6 months after the HSCT. The pre-HSCT LM scores for those that did not have a post-HSCT were significantly lower than those subjects who did have post-HSCT scores (2.56 vs. 4.01, $p = 0.0097$). The pre-HSCT CT scan LM scores were not highly correlated with post-HSCT CT scans performed within 3 months or within 6 months after HSCT ($r = 0.290$ ($p= 0.0123$) and $r = 0.283$ (0.0050), respectively). The pre-HSCT CT scan LM score is not predictive of the need for otolaryngology consultation after HSCT ($p = 0.28$). **Conclusions:** Pre-HSCT sinus CTs were not highly predictive of the extent of post-HSCT sinus disease. The findings from this study may help elucidate the utility of pre-HSCT CT scans.

A252. Evaluation of Keros Score in Patients with Congenital Anosmia

Katherine I. Johnson, MD, Omaha, NE; William D. Leight, MD, Omaha, NE; Joshua W. Wood, BS, Omaha, NE; Donald A. Leopold, MD*, Omaha, NE

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) identify clinical features of Kallman's syndrome; 2) describe olfactory embryologic development; and 3) recognize clinical significance of skull base height and congenital anosmia.

Objectives: 1) Identify clinical features of Kallman's syndrome; 2) describe olfactory embryologic development; 3) recognize clinical significance of skull base height and congenital anosmia; and 4) describe the Keros classification. **Study Design:** Retrospective chart review of patients at a university based rhinology practice with a diagnosis of smell loss. Normal controls included rhinology patients without smell disturbances or evidence of polyposis, rhinosinusitis, or other nasal disturbances on imaging. **Methods:** All patients included in the study had either CT or MRI scans. These were analyzed using the Aquarius Net Viewer software. The olfactory cleft heights were recorded to the nearest one-hundredth of a centimeter. Results were compared between smell loss patients and normal controls. **Results:** We found a statistically significant difference in Keros score in patients with congenital anosmia when compared to normal controls. Patients with congenital anosmia had a flat olfactory cleft (low Keros score) when compared to normal controls. **Conclusions:** This is the first study specifically evaluating olfactory fossa height in patients with congenital anosmia. Patients with congenital anosmia have a lower Keros score when compared to normal controls. Development of normal olfactory epithelium and nerve rely on GnRH mediation, which is absent in Kallman's syndrome, a common cause of congenital anosmia. Further studies are needed, though it would appear that a similar pathway also mediates olfactory fossa development.

A253. Endonasal Surgeries without Nasal Packing or Splints - A Retrospective Review of Postoperative Bleeding Complications in 300 Patients

Sashikanth Jonnalagadda, MD, Boston, MA; Vivian M. Yu, MD, Boston, MA; Peter J. Catalano, MD, Boston, MA

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

that the incidence of postoperative bleeding complication following endonasal surgeries does not increase by avoiding nasal packing or splints.

Objectives: Nasal packing and splints have evolved over the years. Though effective in preventing postoperative bleeding complications, they are associated with significant morbidity and pain. The goal of this study is to review the postoperative bleeding complications in 300 endoscopic nasal surgeries wherein we use no nasal packing or splints. **Study Design:** Retrospective chart analysis. **Methods:** We retrospectively reviewed 300 cases of endoscopic nasal surgeries with no nasal packing or splints done at a tertiary care center. Data was collected regarding the patient demographics, the type of procedure done and the incidence of postoperative bleeding complications. **Results:** 300 patients were retrospectively analyzed with a male:female ratio of 1.57:1 and a mean age was 47. Of these 300 patients 294 patients had septoplasty with concomitant procedures that included inferior turbinate reduction in 234 (78%), synechia release in 33 (11%), excision of concha bullosa in 64 (21.3%) and FESS in 292 (97.3%). Five patients had septoplasty alone and one patient had nasal mass excision. Postoperative hemorrhage was seen in 8 patients (2.67%) and septal hematoma in 1 (0.003%). Only 2 of the 8 patients with postoperative hemorrhage underwent nasal packing subsequently to control bleeding. The incidence of bleeding complications was comparable to studies in literature in which nasal packing or splints were used. **Conclusions:** Our study shows that avoidance of nasal packing and splints does not increase the incidence of bleeding complications after intranasal surgeries while significantly decreasing the morbidity to the patients.

A254. Evolution of Eustachian Tube Surgery

Edward D. McCoul, MD MPH, New York, NY; Frank E. Lucente, MD*, Brooklyn, NY; Vijay K. Anand, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the evolution of interventions for eustachian tube dysfunction and the relevance for developing future surgical techniques.

Objectives: Eustachian tube dysfunction (ETD) is a common condition that lacks a widely accepted treatment. Minimally invasive endoscopic techniques are now under investigation, enabled by the armamentarium of the rhinologist. We present a comprehensive review of therapeutic interventions of the eustachian tube (ET) through the present day, with a focus on reasons for success and failure, and implications for the future of ET surgery. **Study Design:** Literature review. **Methods:** A Medline search was conducted for relevant terms. Secondary sources and the New York Academy of Medicine library were also consulted. **Results:** ET catheterization was introduced in the mid-1700s for the remedy of deafness. Irrigation, insufflation, and bougie dilation of the ET were widely practiced for over a century. Surgical enlargement by the otologic drill, ET obliteration, and shunting to bypass the ET entirely have all enjoyed limited popularity. Recently, endoscopic techniques using lasers and powered instrumentation have been investigated. The results of each historical procedure have been limited by either unsuccessful relief of symptoms or the risk of unacceptable adverse effects. Long term relief from symptoms after ET surgery has never been satisfactorily demonstrated. **Conclusions:** Attempts to address ETD surgically have spanned several centuries and have often fallen short of success. Historical attempts at intervention of the ET overlooked the complex physiologic role of this dynamic organ. While the ideal treatment remains speculative, recent advances in the understanding of ET function has brought us closer to the effective management of this common disorder.

A255. Acute Invasive Fungal Rhinosinusitis: A 15 Year Experience with 28 Patients

Marcus M. Monroe, MD, Portland, OR; Nathan B. Sautter, MD, Portland, OR; Timothy L. Smith, MD MPH*, Portland, OR; Peter E. Andersen, MD, Portland, OR; Mark K. Wax, MD, Portland, OR; Neil D. Gross, MD, Portland, OR

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the typical risk factors, presentation, treatment options and factors predictive of a poor outcome in patients with acute invasive fungal rhinosinusitis.

Objectives: 1) To document our 15 year experience with 28 cases of acute invasive fungal rhinosinusitis (AIFRS); and 2) to evaluate factors predictive of survival in this population. **Study Design:** Case series with chart review. **Methods:** Patients were identified by review of departmental billing records between 1995 and 2010. Medical records were reviewed for patient demographics, clinical course including surgical and medical therapy and treatment outcomes. **Results:** 28 patients with AIFRS were identified. Causes of immunosuppression included hematologic malignancy (n=16), diabetes (n=10), medication (n=4) and AIDS (n=1). Facial pain and swelling and orbital symptoms were the most common presenting symptoms. Fungal organisms included Mucorales (n=17) and aspergillus (n=10) species, with one patient infected with both. Patients dying from AIFRS trended towards more advanced extent of disease at presentation (p=0.07). Intracranial (p=0.003), orbital (p=0.05) and skull base (p=0.004) involvement were predictors of short term disease related mortality. Female gender (p=0.05) and orbital involvement (p=0.05) were also associated with overall survival <6 months. Disease specific survival (DSS) from AIFRS was 57%. Overall survival (OS) at 6 months was 18%. Of the 5 patients surviving >6 months, 2 developed long term major sinonasal complications. **Conclusions:** DSS and OS remain low for patients with AIFRS. Female gender, increased extent of disease at presentation and extension outside of the sinonasal cavity are associated with increased mortality. Extensive surgical resection in patients with these poor prognostic signs should be considered carefully in light of their poor survival. Long term survivors are at significant risk of sinonasal complications and should be followed closely.

A256. The Surgical Correction of Frontal Sinus Pneumoceles

Eunice E. Park, MD MPH, New York, NY; Chaz L. Stucken, MD, New York, NY; William Lawson, MD DDS*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the characteristics of frontal sinus pneumocele, evaluate different treatment options and discuss the surgical management of the condition.

Objectives: Frontal sinus pneumocele is a rare condition characterized by abnormal expansion of the air containing sinus beyond the normal margins of the frontal bone. The etiology remains unclear but has been associated with developmental, neoplastic, inflammatory, and post-traumatic causes. Few reports in the literature describe the surgical management of frontal sinus pneumocele. We focus on describing the evaluation, workup and surgical treatment of this condition. **Study Design:** A comprehensive review of the literature and retrospective case series of 3 patients with frontal sinus pneumocele. **Methods:** A case series and literature review on the surgical management of frontal sinus pneumocele. **Results:** We present a case series of patients who presented with frontal sinus pneumocele in which there was thinning of the overlying anterior table of the frontal bone. Conventional methods that aim to contour the external surface of the frontal bone cannot be applied in this clinical situation. We describe a surgical method in which correction of frontal bossing was performed by the creation of an osteoplastic flap with recession of the anterior table into the sinus and fat obliteration of the remaining cavity. **Conclusions:** Frontal sinus pneumocele is a rare condition that presents a diagnostic and surgical challenge. Few reports in the literature describe the surgical management of the cosmetic deformity. We describe a novel technique of surgical correction utilizing the osteoplastic flap and recession of the anterior table of the frontal sinus.

A257. A Prospective Trial Comparing the Use of Canine Fossa Trephine to Standard Middle Meatal Antrostomy

Kristin Ann Seiberling, MD, Loma Linda, CA; Michelle G. Ghostine, MD, Loma Linda, CA (Presenter); Chris C. Church, MD, Loma Linda, CA; Dennis F. Chang, MD, Redlands, CA; Marc T. Tewfik, MD, Toronto, CA Canada; Andrew B. Foreman, MD, Adelaide, SA Australia; Peter John J. Wormald, MD, Adelaide, SA Australia

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the results of a canine fossa trephine to standard middle meatal antrostomy in those patients with the severely diseased maxillary sinus.

Objectives: Canine fossa trephine (CFT) is an adjunctive technique to endoscopic sinus surgery in patients with recalcitrant maxillary sinusitis. CFT allows for disease clearance around the anterior and lateral walls of

the maxillary sinus, areas that are hard to reach with standard endoscopic techniques. The objective of this study was to compare the surgical outcome of CFT to standard middle meatal antrostomy (MMA) in matched patients with the severely diseased maxillary sinus. **Study Design:** Prospective clinical trial. **Methods:** Patients were split into two groups, those who underwent a CFT and those who underwent a standard MMA. All patients in both groups had nasal polyps, Lund Mackay score of 2 in the maxillary sinus, and nasal endoscopy showing the maxillary sinus to be full of polyps or polypoid tissue. The patients were followed and the maxillary sinus was graded endoscopically at 3, 6 and 12 months after the surgery. Length of surgery, disease recurrence and need for revision surgery was documented. **Results:** A total of 31 CFT maxillary sinuses were compared to 34 MMA. At 6 and 12 months the CFT group demonstrated a statistically significant improvement in nasal endoscopy scores. Five patients (total of 10 sides) recurred by the one year mark in the MMA group, 4 of which underwent revision surgery during the study period. In the CFT group only 1 patient required revision surgery and underwent a unilateral revision CFT. Furthermore the average time of disease clearance in the maxillary sinus using the CFT was half that found with the MMA (7.5 minutes compared to 15 minutes). **Conclusions:** CFT allows for complete clearance of all gross disease in the maxillary sinus and appears to improve postoperative outcome at 6 and 12 months and decrease the need for revision surgery.

A258. Xylitol Nasal Irrigation in the Management of Chronic Rhinosinusitis

Joshua D. Weissman, MD, Stanford, CA; Francesca Fernandez, MD, Stanford, CA; Peter H. Hwang, MD*, Stanford, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the nature of xylitol and its potential utility in the management of chronic rhinosinusitis as a nasal irrigant.

Objectives: To determine the tolerability of xylitol mixed with water as a nasal irrigant, and to evaluate if xylitol nasal irrigation results in symptomatic improvement of subjects with chronic rhinosinusitis. **Study Design:** A prospective, randomized, double blinded, placebo controlled crossover pilot study. **Methods:** Twenty subjects were instructed to perform ten day courses of daily xylitol and saline irrigations in a randomized fashion, with a three day washout irrigation rest period at the start of each. Collected data included patient characteristics, along with Sino-Nasal Outcome Test 20 (SNOT-20) and Visual Analog Scale (VAS) scores reported at the beginning and end of each irrigation course. **Results:** Fourteen of the twenty subjects (70%) returned their SNOT-20 and VAS data for analysis. There was a significant reduction in SNOT-20 score during the xylitol phase of irrigation as compared to the saline phase, indicating improved sinonasal symptoms (P=0.0437). There was no difference in VAS scores. No patient stopped performing the irrigations due to intolerance of the xylitol, though its sweet taste was not preferred by three subjects (21%). **Conclusions:** Xylitol is a well tolerated agent for sinonasal irrigation when mixed with water, with no reported noncompliance and only one report of some very transient stinging. A small portion of the subjects reported an aversion to the xylitol irrigation, mostly due to the sweet flavor. Despite the short course of treatment, there was significant reduction in SNOT-20 scores indicating improvement of chronic rhinosinusitis symptoms during the xylitol irrigation, as compared to during the saline irrigation.

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* 1908 . . . . . .Ewing W. Day, MD
* 1909 . . . . . .Christian R. Holmes, MD
* 1910 . . . . . .James F. McKenna, MD
* 1911 . . . . . .Chevalier Jackson, MD
* 1912 . . . . . .G. Hudson Jakuen, MD
* 1913 . . . . . .H. Holbrook Curtis, MD
* 1914 . . . . . .Joseph A. White, MD
* 1915 . . . . . .Robert Levy, MD
* 1916 . . . . . .S. MacCuen Smith, MD
* 1917 . . . . . .Thomas J. Harris, MD
* 1918 . . . . . .George L. Richards, MD
* 1919 . . . . . .Herbert S. Birkett, MD
* 1920 . . . . . .Harris P. Mosher, MD
* 1921 . . . . . .Lee Wallace Dean, MD
* 1922 . . . . . .Lewis A. Coffin, MD
* 1923 . . . . . .Dunbar Roy, MD
* 1924 . . . . . .Hanau W. Loeb, MD
* 1925 . . . . . .William H. Haskin, MD
* 1926 . . . . . .John M. Ingersoll, MD
* 1927 . . . . . .Burt R. Shurly, MD
* 1928 . . . . . .John F. Barnhill, MD
* 1929 . . . . . .Hill Hastings, MD
* 1930 . . . . . .Ross Hall Skillern, MD
* 1931 . . . . . .Max A. Goldstein, MD
* 1932 . . . . . .Edmund Prince Fowler, MD
* 1933 . . . . . .Joseph C. Beck, MD
* 1934 . . . . . .J.W. Jervey, MD
* 1935 . . . . . .Perry G. Goldsmith, MD
* 1936 . . . . . .Thomas E. Carmody, MD
* 1937 . . . . . .George M. Coates, MD
* 1938 . . . . . .Samuel J. Kopetzky, MD
* 1939 . . . . . .Harold I. Lillie, MD
* 1940 . . . . . .Lee M. Hurd, MD
* 1941 . . . . . .J. Mackenzie Brown, MD
* 1942 . . . . . .James A. Babbitt, MD
* 1943 . . . . . .James G. Dwyer, MD
* 1944 . . . . . .H. Marshall Taylor, MD
* 1945 . . . . . .Albert C. Furstenberg, MD

* denotes deceased Presidents

Presidents (cont'd)

* 1946 . . . . . .Albert C. Furstenberg, MD
* 1947 . . . . . .Harry W. Lyman, MD
* 1948 . . . . . .Lyman G. Richards, MD
* 1949 . . . . . .John J. Shea, MD
* 1950 . . . . . .Robert C. Martin, MD
* 1951 . . . . . .Louis H. Clerf, MD
* 1952 . . . . . .C. Steward Nash, MD
* 1953 . . . . . .Francis E. LeJeune, MD
* 1954 . . . . . .Leroy A. Schall, MD
* 1955 . . . . . .Kenneth M. Day, MD
* 1956 . . . . . .Dean M. Lierle, MD
* 1957 . . . . . .Percy E. Ireland, MD
* 1958 . . . . . .Lawrence R. Boies, MD
* 1959 . . . . . .Gordon D. Hoople, MD
* 1960 . . . . . .Theodore E. Walsh, MD
* 1961 . . . . . .Fletcher D. Woodward, MD
* 1962 . . . . . .John R. Lindsay, MD
* 1963 . . . . . .Howard P. House, MD
* 1964 . . . . . .John E. Bordley, MD
* 1965 . . . . . .George E. Shambaugh, Jr., MD
* 1966 . . . . . .Francis W. Davison, MD
* 1967 . . . . . .Shirley H. Baron, MD
* 1968 . . . . . .G. Slaughter Fitz-Hugh, MD
* 1969 . . . . . .Jerome A. Hilger, MD
* 1970 . . . . . .Joseph L. Goldman, MD
* 1971 . . . . . .Victor Goodhill, MD
* 1972 . . . . . .Victor R. Alfaro, MD
* 1973 . . . . . .Walter P. Work, MD
* 1974 . . . . . .Raymond E. Jordan, MD
* 1974 . . . . . .Louis E. Silcox, MD
* 1975 . . . . . .David D. DeWeese, MD
* 1976 . . . . . .James A. Harrill, MD
* 1977 . . . . . .Joseph H. Ogura, MD
* 1978 . . . . . .Daniel Miller, MD
* 1979 . . . . . .Francis A. Sooy, MD
* 1980 . . . . . .Beverly W. Armstrong, MD
* 1981 . . . . . .G. O'Neill Proud, MD
1982 . . . . . .John A. Kirchner, MD
* 1983 . . . . . .Robin Michelson, MD
* 1984 . . . . . .Carl N. Patterson, MD
1985 . . . . . .William H. Saunders, MD
1986 . . . . . .Wesley H. Bradley, MD
1987 . . . . . .Roger Boles, MD
* 1988 . . . . . .Harold G. Tabb, MD
1989 . . . . . .Malcolm H. Stroud, MD
1990 . . . . . .M. Stuart Strong, MD
1991 . . . . . .Paul H. Ward, MD
1992 . . . . . .A. Paul Keller, Jr., MD
* 1993 . . . . . .Frank N. Ritter, MD
1994 . . . . . .Richard R. Gacek, MD
* 1995 . . . . . .Patrick J. Doyle, MD
1996 . . . . . .William R. Hudson, MD
1997 . . . . . .H. Bryan Neel, MD
1998 . . . . . .Stanley M. Blaugrund, MD
1999 . . . . . .Mansfield F. W. Smith, MD
2000 . . . . . .Charles W. Gross, MD
2001 . . . . . .Edward L. Applebaum, MD
2002 . . . . . .Gerald B. Healy, MD
2003 . . . . . .Roger L. Crumley, MD
2004 . . . . . .Robert A. Jahrsdoerfer, MD
2005 . . . . . .Patrick E. Brookhouser, MD
2006 . . . . . .Stanley M. Shapshay, MD
2007 . . . . . .David F. Wilson, MD
2008 . . . . . .Harold C. Pillsbury, MD
2009 . . . . . .Myles L. Pensak, MD
2010 . . . . . .Frank E. Lucente, MD
2011 . . . . . .Gerald S. Berke, MD

Guests of Honor Since 1947

1947 . . . . . .J. McKenzie Brown, MD
1948 . . . . . .Harold Walker, MD
1949 . . . . . .Claude C. Cody, Jr., MD
1950 . . . . . .Harris P. Mosher, MD
1951 . . . . . .Duncan McPherson, MD
1952 . . . . . .D.C. Jarvis, MD
1953 . . . . . .Charles A. Thigpan, MD
1954 . . . . . .J. Parsons Schaeffer, MD
1955 . . . . . .Edward P. Fowler, MD
1956 . . . . . .Harold L. Lillie, MD
1957 . . . . . .Not Available
1958 . . . . . .Arnold S. Diehl, MD
1959 . . . . . .Frederick T. Hill, MD
1960 . . . . . .Terence Cawthorne, MD
1961 . . . . . .Milton J. Robb, MD
1962 . . . . . .Thomas C. Galloway, MD
1963 . . . . . .Robert C. Martin, MD
1964 . . . . . .C. Stewart Nash, MD
1965 . . . . . .Georges Portmann, MD
1966 . . . . . .Gordon D. Hoople, MD
1967 . . . . . .Albery C. Furstenberg, MD
1968 . . . . . .Francis E. LeJeune, MD
1969 . . . . . .Lawrence R. Boies, MD
1970 . . . . . .Victor Alfaro, MD
1971 . . . . . .Vern O. Knudsen, PhD
1972 . . . . . .Carlos Munoz-MacCormick, MD
1973 . . . . . .Dean Lierle, MD
1974 . . . . . .Raymond Jordon, MD
1975 . . . . . .Frank Lathrop, MD
1976 . . . . . .John Bordley, MD
1977 . . . . . .Max Soni, MD
. . . . . .W.E.N. Harrison, MD
1978 . . . . . .Moses Lurie, MD
1979 . . . . . .Shirley Baron, MD

Guests of Honor Since 1947 (cont'd)

1980 . . . . . .Frank Lathrop, MD
. . . . . .Harry Rosen-Wasser, MD
1981 . . . . . .Ben Senturia, MD
1982 . . . . . .Harold Schuknecht, MD
. . . . . .Ugo Fisch, MD
1983 . . . . . .Walter Work, MD
. . . . . .Roy B. Cohn, MD
1984 . . . . . .Beverly Armstrong, MD
1985 . . . . . .G.O. Proud, MD
1986 . . . . . .Daniel Miller, MD
1987 . . . . . .Paul Ebert, MD
1988 . . . . . .Robert W. Brown, MD
1989 . . . . . .Hallowell Davis, MD
1990 . . . . . .George Reed, MD
1991 . . . . . .Victor Goodhill, MD
1992 . . . . . .Roger Boles, MD
1993 . . . . . .C. Ryan Chandler, MD
1994 . . . . . .John Conley, MD
1995 . . . . . .Paul H. Ward, MD
1996 . . . . . .Bobby Ray Alford, MD
1997 . . . . . .Robert Cantrell, MD
1998 . . . . . .Patrick J. Doyle, MD
1999 . . . . . .Richard L. Goode, MD
2000 . . . . . .A. Paul Keller, MD
2001 . . . . . .Charles W. Cummings, MD
2002 . . . . . .Stanley M. Shapshay, MD
2003 . . . . . .Brian F. McCabe, MD
2004 . . . . . .Byron J. Bailey, MD
2005 . . . . . .Robert H. Miller, MD MBA
2006 . . . . . .Gerald B. Healy, MD
2007 . . . . . .William F. House, MD
2008 . . . . . .Patrick E. Brookhouser, MD
2009 . . . . . .Harry R. van Loveren, MD
2010 . . . . . .Gady Har-El, MD
2011 . . . . . .Harold C. Pillsbury, MD

Ogura Lecturers

1986 . . . . . .Hugh F. Biller, MD
1987 . . . . . .Paul H. Ward, MD
1988 . . . . . .John Conley, MD
1989 . . . . . .George A. Sisson, MD
1990 . . . . . .Sir Donald F.N. Harrison
1991 . . . . . .Robert W. Cantrell, MD
1992 . . . . . .Michael E. Johns, MD
1993 . . . . . .John A. Kirchner, MD
1994 . . . . . .John Lewis, MD
1995 . . . . . .Eugene Myers, MD
1996 . . . . . .Charles W. Cummings, MD
1997 . . . . . .Harold C. Pillsbury III, MD
1998 . . . . . .Frank E. Lucente, MD
1999 . . . . . .Haskins Kashima, MD
2000 . . . . . .Christopher Perry, MD
2001 . . . . . .Richard R. Gacek, MD
2002 . . . . . .David G. Nathan, MD
2003 . . . . . .Arnold G. D. Maran, MD
2004 . . . . . .Ernest A. Weymuller, Jr., MD
2005 . . . . . .Gerald B. Healy, MD
2006 . . . . . .Jonas T. Johnson, MD
2007 . . . . . .Byron J. Bailey, MD
2008 . . . . . .Paul A. Levine, MD
2009 . . . . . .Robin T. Cotton, MD
2010 . . . . . .Marvin P. Fried, MD
2011 . . . . . .Lord Bernard
. . . . . .Ribeiro Kt CBE FRCS FACS (Hon.)

Fifty Year Club

1947
Russell I. Williams, MD . . . . . .Cheyenne, WY

1948
Edgar A. Thacker, MD . . . . . .Everett, WA

1949
Ernest R.V. Anderson, MD . . . . . .Camarillo, CA
Robert E. Boswell, MD . . . . . .West Palm Beach, FL
F. Johnson Putney, MD . . . . . .Charleston, SC
Julio Quevedo, MD . . . . . .Guatemala City
Gerhard D. Straus, MD . . . . . .Palm Beach, FL
Merrill Wattles, MD . . . . . .Orlando, FL

1950
Milton L. Jennes, MD . . . . . .Waterbury, CT
Arthur L. Juers, MD . . . . . .Ivins, UT
Robert B. Lewy, MD . . . . . .Chicago, IL

1951
Howard C. High, Jr., MD . . . . . .Milwaukee, WI
James A. Moore, MD . . . . . .New York, NY

1953
Bert A. De Bord, Jr., MD . . . . . .Temple, TX
Leland R. House, MD . . . . . .Orange, CA

1954
William B. Barry, MD . . . . . .Kansas City, MO
Timothy L. Curran, MD . . . . . .Avon, CT
Alfred A. Dorenbusch, MD . . . . . .Charlotte, NC
Loring W. Pratt, MD FACS . . . . . .Fairfield, ME
Clarence H. Steele, MD . . . . . .Green Valley, AZ
Jules G. Waltner, MD . . . . . .New York, NY

1955
David W. Brewer, MD . . . . . .Liverpool, NY
Francis O. Morris, MD . . . . . .Whittier, CA
G. Dekle Taylor, MD . . . . . .Jacksonville, FL
Samuel Zurik, MD . . . . . .New Orleans, LA

1956
David E. Brown, MD . . . . . .Monterey, CA
J.H. Thomas Rambo, MD . . . . . .New York, NY

1957
John J. Ballenger, MD . . . . . .Natick, MA
Irving I. Cramer, MD . . . . . .Scarsdale, NY
William Skokan, MD . . . . . .Fort Worth, TX

1958
Wesley H. Bradley, MD FACS . . . . . .Glenmont, NY
Hershel H. Burston, MD . . . . . .Studio City, CA
J. Allan Fields, MD FACS . . . . .Fort Lauderdale, FL
James F. Gardner, MD . . . . . .Pittsford, NY
Jack Hough, MD . . . . . .Oklahoma City, OK
John A. Kirchner, MD . . . . . .Hamden, CT
Jack W. Pou, MD . . . . . .Shreveport, LA
Lyle G. Waggoner, MD . . . . . .Grosse Point Park, MI
Chester M. Weseman, MD FACS . . . . .Berkeley, CA

1959
Seymour J. Brockman, MD . . . . . .Beverly Hills, CA
L. Reed Cranmer, MD FACS . . . . . .Toledo, OH
Morris Davidson, MD . . . . . .St. Lous, MO
Richard L. Ruggles, MD . . . . . .Chagrin Falls, OH
Peter A. Wallenborn, Jr., MD . . . . . .Roanoke, VA
Warren E. Wiesinger, MD . . . . . .Oakland, CA

1960
John R. Ausband, MD . . . . . .Atlanta, GA
John T. Bickmore, MD . . . . . .Bonita Springs, FL
James M. Cole, MD . . . . . .Danville, PA
Walter A. Petryshyn, MD FACS . . . . . .Sarasota, FL
James M. Timmons, MD . . . . . .Lexington, SC
Alex Weisskopf, MD . . . . . .Prescott, AZ

1961
Richard A. Buckingham, MD . . . . . .Wilmette, IL
Richard T. Farrior, MD FACS . . . . . .Tampa, FL
Irwin Harris, MD FACS . . . . . .Los Angeles, CA
William F. House, MD . . . . . .Aurora, OR
Harry Kolson, MD . . . . . .Pompano Beach, FL
Fred H. Linthicum Jr., MD . . . . . .Los Angeles, CA
Ludwig A. Michael, MD FACS . . . . . .Dallas, TX
William F. Robbett, MD . . . . . .Manhasset, NY
Wallace Rubin, MD . . . . . .Metairie, LA
William H. Saunders, MD . . . . . .Columbus, OH

Please report discrepancies to historian

In Memoriam

The following deaths have been reported to the Administrative Office since the publication of the 2010 Annual Program:

Name	Elected	Died
David F. Austin, MD Idaho Falls, ID	1977	2006
John P. Frazer, MD Rochester, NY	1953	2010
Ronald C. Hamaker, MD Zionsville, IN	1981	2005
Thomas M. Irwin, MD Jacksonville, FL	1952	2006
Haskins K. Kashima, MD Baltimore, MD	1983	2010
A. Paul Keller, MD Athens, GA	1958	2010
Charles P. Lebo, MD Rancho Mirage, CA	1958	2010
David L. Poushter, MD Rochester, NY	1961	2010
Frank N. Ritter, MD Baltimore, MD	1967	2010
Robert L. Rogers, MD Shawnee Mission, KS	1976	2009
Burns C. Steele, MD Sherman Oaks, CA	1967	2011

Fellows by Section available at
http://www.triological.org/membership.htm

Elliot Abemayor, MD FACS
Eugenio A. Aguilar III, MD FACS
James C. Alex, MD FACS
Kenneth W. Altman, MD PhD FACS
Ronald G. Amedee, MD FACS
Vijay K. Anand, MD FACS
Vinod K. Anand, MD FACS
Simon I. Angeli, MD
Jack B. Anon, MD FACS
Philip F. Anthony, MD
Patrick J. Antonelli, MD FACS
William B. Armstrong, MD FACS
Moises A. Arriaga, MD FACS
Jonathan E. Aviv, MD FACS
Douglas D. Backous, MD FACS
Thomas J. Balkany, MD FACS
Stephen F. Bansberg, MD
Soly Baredes, MD FACS
David M. Barrs, MD FACS
Loren J. Bartels, MD FACS
Carol A. Bauer, MD FACS
Charles W. Beatty, MD FACS
Stephen P. Becker, MD FACS
Peter C. Belafsky, MD
James E. Benecke Jr., MD FACS
Michael S. Benninger, MD FACS
John P. Bent III, MD
Leonard P. Berenholz, MD
Gerald S. Berke, MD FACS
Wayne E. Berryhill, MD
Neil Bhattacharyya, MD FACS
Michael J. Biavati, MD FACS
Merrill A. Biel, MD FACS
Steven A. Bielamowicz, MD FACS
Brian W. Blakley, MD PhD FACS
Andrew Blitzer, MD DDS FACS
Derald E. Brackmann, MD
Linda Brodsky, MD FACS
Michael Broniatowski, MD FACS
Patrick E. Brookhouser, MD FACS
Dale H. Brown, MD
Jimmy J. Brown, MD FACS
J. Dale Browne, MD FACS
Craig Alan Buchman, MD FACS
Jeffrey M. Bumpous, MD FACS
Lawrence P. A. Burgess, MD FACS
James A. Burns, MD FACS
Nicolas Y. BuSaba, MD FACS
David D. Caldarelli, MD FACS
Karen H. Calhoun, MD FACS
Bruce H. Campbell, MD FACS
Paolo Campisi, MD
C. Ron Cannon, MD FACS
Ricardo Carrau, MD FACS
Roy R. Casiano, MD FACS
John D. Casler, MD FACS
Margaretha L. Casselbrant, MD PhD
Dan Joshua Castro, MD FACS
Kenny H. Chan, MD FACS
Sujana S. Chandrasekhar, MD
Douglas A. Chen, MD FACS
Steven W. Cheung, MD FACS
Dinesh K. Chhetri, MD
Richard A. Chole, MD PhD
Daniel I. Choo, MD FACS
Francisco J. Civantos, MD FACS
Keith F. Clark, MD PhD FACS
Lanny Garth Close, MD FACS
Seth M. Cohen, MD
Sharon L. Collins, MD FACS
Stephen F. Conley, MD FACS
Steven P. Cook, MD FACS
Robin T. Cotton, MD FACS
Stanley W. Coulthard, MD FACS
Mark S. Courey, MD
Roger L. Crumley, MD MBA FACS
Roberto A. Cueva, MD FACS
Michael J. Cunningham, MD FACS
Seth H. Dailey, MD
Edward J. Damrose, MD FACS
C. Phillip Daspit, MD FACS
Louise Davies, MD MS
Fructuoso M. De Souza, MD FACS
Ziad E. Deeb, MD FACS
John M. DelGaudio, MD FACS
M. Jennifer Derebery, MD FACS
John R. E. Dickins, MD FACS
Laurence J. DiNardo, MD FACS
Elizabeth A. Dinces, MD
Robert A. Dobie, MD
H. Peter Doble II, MD FACS
Donald T. Donovan, MD FACS
John L. Dornhoffer, MD FACS
Karen J. Doyle, MD PhD
Amelia F. Drake, MD FACS
Sigsbee Walter Duck, MD FACS
Larry G. Duckert, MD PhD FACS
James A. Duncavage, MD FACS
Robert K. Dyer Jr., MD
Roland D. Eavey, MD FACS
Thomas L. Eby, MD FACS
David R. Edelstein, MD FACS
Charles V. Edmond Jr., MD FACS
David E. Eibling, MD FACS

David W. Eisele, MD FACS
Ravindhra G. Elluru, MD PhD FACS
John R. Emmett, MD
Joel A. Ernster, MD FACS
Richard D. Fantozzi, MD FACS
Joseph B. Farrior III
Russell Allen Faust, MD PhD
Jose N. Fayad, MD
Willard E. Fee Jr., MD FACS
Joseph G. Feghali, MD FACS
Berrylin J. Ferguson, MD FACS
Bruce L. Fetterman, MD FACS
Douglas G. Finn, MD FACS
Cynthia B. Fisher, MD
Samuel R. Fisher, MD FACS
Valerie A. Flanary, MD FACS
Paul W. Flint, MD
Ramon A. Franco Jr., MD
Marvin P. Fried, MD FACS
David R. Friedland, MD PhD
Ellen M. Friedman, MD FACS
Michael Friedman, MD FACS
Rick A. Friedman, MD
Michael H. Fritsch, MD FACS
Thomas J. Gal, MD FACS
Bruce J. Gantz, MD FACS
C. Gaelyn Garrett, MD
Eric M. Genden, MD FACS
Gerard J. Gianoli, MD FACS
Paul W. Gidley, MD FACS
William Giles, MD
Douglas A. Girod, MD FACS
Lyon L. Gleich, MD FACS
George Goding Jr., MD FACS
Joel A. Goebel, MD FACS
Andrew N. Goldberg, MD MSCE FACS
Carlos Gonzalez, MD FACS
W. Jarrard Goodwin, MD FACS
Christine G. Gourin, MD FACS
Jennifer Rubin Grandis, MD FACS
J. Douglas Green Jr., MD FACS
Kenneth M. Grundfast, MD FACS
Patrick J. Gullane, MD FACS
A. Julianna Gulya, MD FACS
Thomas J. Haberkamp, MD FACS
Joseph Haddad Jr., MD FACS
Theresa A. Hadlock, MD
Stephen F. Hall, MD
Paul E. Hammerschlag, MD FACS
Steven D. Handler, MD MBE FACS
Marlan R. Hansen, MD
Gady Har-El, MD FACS
Willard C. Harrill, MD FACS
Jeffrey P. Harris, MD PhD FACS
Christopher J. Hartnick, MD FACS
George T. Hashisaki, MD FACS
Richard E. Hayden, MD FACS
David S. Haynes, MD
Gerald B. Healy, MD FACS
Yolanda D. Heman-Ackah, MD FACS
Robert A. Hendrix, MD FACS
Arthur S. Hengerer, MD FACS
Douglas G. Hetzler, MD FACS
Wesley Hicks Jr., MD FACS
Kevin M. Higgins, MD
Allen D. Hillel, MD FACS
Raymond L. Hilsinger Jr., MD FACS
Keiko Hirose, MD
Michael E. Hoffer, MD FACS
Henry T. Hoffman, MD FACS
Ronald A. Hoffman, MD
Lauren D. Holinger, MD FACS
G. Richard Holt, MD
James J. Holt, MD FACS
David B. Hom, MD FACS
Larry A. Hoover, MD FACS
Karl L. Horn, MD
John W. House, MD
Steven M. Houser, MD FACS
Gordon B. Hughes, MD FACS
Peter H. Hwang, MD FACS
Glenn C. Isaacson, MD FACS
Carol A. Jackson, MD
John R. Jacobs, MD FACS
Joseph B. Jacobs, MD
Anthony F. Jahn, MD FACS
Adrian L. James, MD
Herman A. Jenkins, MD FACS
Michael M.E. Johns, MD
Jonas T. Johnson, MD FACS
Gary D. Josephson, MD FACS
Timothy T. K. Jung, MD PhD
Ashutosh Kacker, MD FACS
Jan L. Kasperbauer, MD FACS
George P. Katsantonis, MD
David M. Kaylie, MD FACS
William M. Keane, MD FACS
Robert M. Kellman, MD FACS
James H. Kelly, MD FACS
Margaret A. Kenna, MD FACS
David W. Kennedy, MD FACS
Thomas L. Kennedy, MD FACS
Robert C. Kern, MD FACS
Joseph E. Kerschner, MD FACS
Bradley W. Kesser, MD
Harold H. Kim, MD
Barry P. Kimberley, MD
Charles P. Kimmelman, MD MBA FACS
Glenn Knox, MD FACS
Wayne M. Koch, MD FACS

Arnold Komisar, MD DDS MS FACS
Richard D. Kopke, MD FACS
Alan D. Kornblut, MD FACS
Harold W. Korol, MD FACS
Karen M. Kost, MD
Jamie Koufman, MD FACS
Stilianos E. Kountakis, MD PhD FACS
Dennis H. Kraus, MD FACS
Greg A. Krempl, MD FACS
Yosef P. Krespi, MD FACS
Keith L. Kreutziger, MD FACS
John H. Krouse, MD PhD FACS
Wesley W. O. Krueger, MD FACS
John F. Kveton, MD FACS
Robert F. Labadie, MD PhD
Anil K. Lalwani, MD FACS
Paul R. Lambert, MD FACS
Howard B. Lampe, MD
Andrew P. Lane, MD
Wayne F. Larrabee Jr., MD FACS
Pierre Lavertu, MD FACS
William Lawson, MD FACS
Joseph L. Leach, MD FACS
John P. Leonetti, MD
Donald A. Leopold, MD FACS
Mark J. Levenson, MD FACS
Roger J. Levin, MD FACS
Paul A. Levine, MD FACS
Samuel C. Levine, MD FACS
Kasey K. Li, MD FACS
William H. Lindsey, MD FACS
Christopher J. Linstrom, MD FACS
Stephen L. Liston, MD FACS
Philip D. Littlefield, MD
Frank E. Lucente, MD FACS
Larry B. Lundy, MD
Rodney P. Lusk, MD
Corey S. Maas, MD FACS
Carol J. MacArthur, MD FACS
John Maddalozzo, MD FACS
Jeffery Scott Magnuson, MD FACS
Robert H. Maisel, MD FACS
Aditi H. Mandpe, MD FACS
Charles A. Mangham Jr., MD
Scott C. Manning, MD FACS
Nicolas E. Maragos, MD FACS
Steven C. Marks, MD FACS
Serge A. Martinez, MD JD FACS
Sam J. Marzo, MD FACS
Douglas E. Mattox, MD
Michael D. Maves, MD MBA FACS
Judith C. McCaffrey, MD FACS
Thomas V. McCaffrey, MD PhD FACS
John T. McElveen Jr., MD
Michael McGee, MD
W. Fred McGuirt Sr., MD FACS
Jesus E. Medina, MD FACS
Cliff A. Megerian, MD FACS
Albert L. Merati, MD FACS
Saumil N. Merchant, MD
Anna Hopeman Messner, MD
Ralph B. Metson, MD FACS
Alan G. Micco, MD FACS
Steven J. Millen, MD
Robert H. Miller, MD MBA FACS
Lloyd B. Minor, MD FACS
Natasha Mirza, MD FACS
Ron B. Mitchell, MD
Richard T. Miyamoto, MD FACS
Kris S. Moe, MD FACS
Edwin M. Monsell, MD PhD
Eric J. Moore, MD FACS
Gary F. Moore, MD FACS
William H. Moretz Jr., MD
Murray D. Morrison, MD
Randall P. Morton, MD
J. Paul Moxham, MD
Terrence P. Murphy, MD FACS
Andrew H. Murr, MD FACS
George L. Murrell, MD
Kamil Muzaffar, MBBS
Charles M. Myer III, MD FACS
David Myssiorek, MD FACS
Robert M. Naclerio, MD FACS
Joseph B. Nadol Jr., MD FACS
Cherie-Ann Nathan, MD FACS
Julian M. Nedzelski, MD
H. Bryan Neel III, MD PhD FACS
Erik G. Nelson, MD FACS
James L. Netterville, MD FACS
Shawn D. Newlands, MD PhD FACS
John Kim Niparko, MD
Jacob Pieter Noordzij, MD
Brian Nussenbaum, MD FACS
Paul F. Odell, MD
John S. Oghalai, MD FACS
Kerry D. Olsen, MD FACS
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