



TRIOLOGICAL SOCIETY

122ND ANNUAL MEETING AT COSM
MAY 4-5, 2019

JW MARRIOTT AUSTIN
AUSTIN, TEXAS

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MAY 4-5, 2019 • JW MARRIOTT • AUSTIN, TEXAS

Triological Society's Mission Statement and Goals

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

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

Mission

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

Goals

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

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

In 2018, the Triological Society awarded:

- \$480,000 in grant funds to otolaryngologist-head and neck surgeons to 1) help facilitate research career development in young otolaryngologists; and 2) further support otolaryngology clinical scientists with new or existing K08/K23 awards;
- \$170,250 in travel awards to residents, medical students and Fellows who presented podium and poster presentations at the Society's meetings;
- \$16,750 to residents, medical students, and Fellows who presented research award winning papers and posters at the Society's meetings.

Learning Objectives for This Activity

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

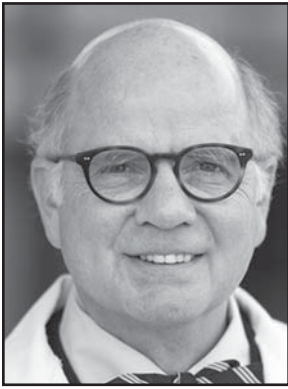
- Demonstrate an understanding of the importance and role of immunotherapy in the current management of head and neck cancer.
- Design a treatment algorithm for patients with chronic rhinosinusitis which includes the appropriate delivery of biologic therapy in select patients.
- Assess children with hearing loss and create an evaluation and management scheme which accounts for the role of congenital etiologies in childhood hearing loss.

Exhibits

We encourage attendees to visit more than 100 exhibitors in the exhibit hall Thursday through Saturday. Exhibitor arrangements are in compliance with the Accreditation Council for Continuing Medical Education (ACCME) Standards for Commercial Support.

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

Message from the President, Sigsbee W. Duck, MD FACS



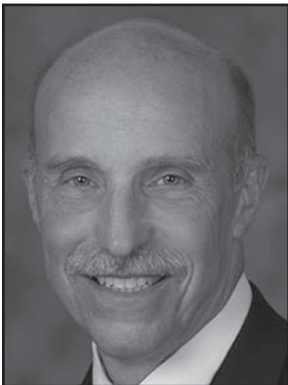
I would like to take this opportunity to wholeheartedly welcome everyone to the 122nd Annual Meeting of the Triological Society. In 1896 our annual meeting tradition began at the home of Dr. Robert Myles in NYC and has now evolved to the JW Marriott in Austin, Texas. It has been a distinct honor and privilege to serve as your President over the past year, a humbling experience that will not be forgotten. The Triological Society is committed to supporting the best and the brightest in otolaryngology research. Last year, our Society funded over \$630,000 in research awards (TRIO Career Development, Clinical Scientist, TRIO/ACS Clinical Scientist, meetings-travel, meetings-poster, resident research and Thesis awards.) This is a fact of which we can all be incredibly proud as Triological Fellows. Having the opportunity to meet and interact with many of these incredible young researchers has been an experience that makes me realize the future of our Society is in great hands. The Laryngoscope and Laryngoscope Investigational Otolaryngology continue to be the two best journals in otolaryngology. I want to recognize Dr. Mickey Stewart for his outstanding leadership as his tenure as Laryngoscope Editor draws

to an end. I would be remiss if I did not thank the Triological staff for their support, patience and many kindnesses over the past year; Gail Binderup, Marsha Holbert and Beth Slovinski. Our Executive Vice President, Myles Pensak, MD, works tirelessly to keep our Society at its very best. Thank you, Myles, for your continued leadership and diligence. Please enjoy the meeting and some Texas hospitality!

Triological Society Honorees

JOSEPH H. OGURA, MD, LECTURER

James P. Bagian, MD PE



Dr. James Bagian is the founding Director of the Center for Healthcare Engineering and Patient Safety, and is a Professor in the Department of Anesthesiology and in the College of Engineering, all at the University of Michigan.

He previously served as the first and founding director of the Veterans Administration's National Center for Patient Safety and as the VA's first Chief Patient Safety Officer, where he developed numerous patient safety related tools and programs that have been adopted nationally and internationally.

A NASA astronaut for more than 15 years, he is a veteran of two Space Shuttle missions including as the lead mission specialist for the first dedicated Life Sciences Spacelab mission. Following the 1986 Challenger space shuttle explosion, he dove and supervised the capsule's recovery from the ocean floor and was one of the leaders of the development of the Space Shuttle

Escape System. He served as the Chief Flight Surgeon and Medical Consultant for the Space Shuttle Columbia Accident Investigation Board.

Dr. Bagian was elected to two terms as the Chair of the Joint Commission's Patient Safety Advisory Group and was the founding Co-Chair of the ACGME Clinical Learning Environment Review Committee. He has served on numerous boards and has received several honors throughout his career, including an award for outstanding public service in the advancement of public health from the AMA, the first Innovations Award from the AAMC, as well as recognition as a federal physician who has made the most significant contribution to healthcare in the U.S and a Service to America Medal which was awarded to him for his significant lifetime achievement in public service.

GUEST OF HONOR
Harold C. Pillsbury, MD FACS



Harold C. Pillsbury, MD FACS, in June 2018 became Emeritus Chair of the UNC Department of Otolaryngology/Head and Surgery.

A native of Baltimore, Maryland, Dr. Pillsbury earned his BA and MD 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 SOM 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 at which time UNC Otolaryngology-HNS officially became a department for which he led as Chair for 36 years. In August of 2018, Dr. Pillsbury was the recipient of "The Order of the Long Leaf Pine" for his dedication and service to the patients of the State of North Carolina.

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 past President 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 500 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
Gerald S. Berke, MD FACS



Dr. Gerald Berke is professor of surgery, and Chair Emeritus of the Department of UCLA Head and Neck Surgery in the David Geffen School of Medicine and the UCLA Health System. Dr. Berke, who is a highly respected researcher and clinician, served as Chair of the department he founded from 2012 - 2017 and was the prior Chief of the division since 1992. He also is the director of the UCLA Voice Center for Medicine and the Arts, which he founded.

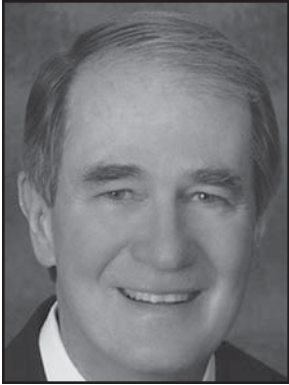
Dr. Berke has authored over 200 manuscripts and has been on 30 grants, both NIH and VA Merit with 10 of them as PI, based on laryngeal physiology and voice disorders in addition to mentoring numerous research fellows. He performed the first functioning larynx transplant in animals and developed the only surgical treatment for adductor spasmodic dysphonia. Dr. Berke has also pioneered many of the techniques now used by laryngologists to treat patients in an office setting. He is considered by his peers to be an international authority on laryngeal physiology and one of Dr. Berke's main clinical and research focuses has been laryngeal function.

Born and raised in Southern California, he currently has 13 published songs and began developing his interest in the voice and ultimately his medical specialty, as a rock musician and songwriter. Dr. Berke came to UCLA in 1979 to complete his surgical residency, after graduating from both undergraduate and medical school at the University of Southern California. He became an assistant professor in 1984, then advanced to become professor and chair of head and neck surgery in 1992.

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

PRESIDENTIAL CITATION AWARDEE

Paul W.F. Coughlin, MD FACS



Dr. Coughlin is a native of Asheville, North Carolina. He completed his undergraduate degree in 1974 and his medical degree in 1978, both from the University of North Carolina, Chapel Hill. In 1984 he completed his urology residency at Duke University where he was awarded the American Cancer Society Fellowship in Prostate Cancer. In 1984 he entered private practice in High Point, North Carolina where he continues full time practice.

In 1987, Dr. Coughlin founded the American Lithotripsy Society to educate and certify urologists around the country in the delivery of outpatient lithotripsy, and twice served as the society's President. He has also served as President of the NC Urological Association, the Southern Society of Urological Surgeons, and the Urology Society of America. He is currently the Executive Director of the Southern Society of Urological Surgeons and serves on the board of the American Urological Association and on the executive committee of the Southeastern Section of the American Urological Association, where he serves as their Historian.

Dr. Coughlin has been married to his wife Barbara for 42 years and they are blessed with four daughters and five grandchildren. Dr. Coughlin states that one of his great fortunes in life is the lifelong friendship and the professional inspiration he has received from Sigsbee Duck.

PRESIDENTIAL CITATION AWARDEE

Thomas Hall, RPh



Tommy Hall, RPh grew up in Eastern Kentucky, graduated from Eastern Kentucky University in Richmond, KY and Mercer University Southern School of Pharmacy, where he met Sigsbee.

Tommy practiced as a contract pharmacist for 10 years before purchasing his family's funeral home in 1986, which he still owns today. In addition to the funeral home he was a founding member of "The First Guaranty Bank" a local community bank, and is current founder of a local Chevrolet, Buick, Cadillac dealership, Pops Chevrolet, in Prestonsburg, KY.

Tommy is married to Burnetta Hall, DDS and maintains his business interest in Eastern Kentucky. He and Sigsbee have maintained a close friendship since meeting at Mercer School of Pharmacy.

PRESIDENTIAL CITATION AWARDEE

Kenneth E. Hornowski, DDS



Ken Hornowski grew up in Asheville where he was and is a lifetime friend of Sigsbee. He attended UNC Chapel Hill where he earned his undergraduate and DDS degree.

Ken practiced general dentistry in Asheville for twenty years while also lecturing on all aspects of practice management in the dental field. He gave lectures on “The Business of Dentistry” to national and international audiences.

He spent the last fifteen years as an Adjunct Professor at UNC Chapel Hill where he led the practice management curriculum for the residents in the Advanced Education in General Dentistry Residency.

Ken has been married to Mary for forty-three years and has two daughters, two sons-in-law and four beautiful grandchildren. His life focus has now become centered around all that they have to offer which is more than a person could ever ask for.

PRESIDENTIAL CITATION AWARDEE

P. Ashley Wackym, MD FACS



Dr. P. Ashley Wackym is a seasoned administrator, investigator and surgical otologist-neurotologist and skull base surgeon. He is currently the Chair of Otolaryngology-Head Neck Surgery at the Rutgers Robert Wood Johnson Medical School and Chancellor Scholar of Rutgers Biomedical Health Sciences. His thesis received the Edmund Prince Fowler Award in 1996 when he became a member of the Triological Society. He also served as the Vice President for the Middle Section in 2007-2008. In addition to committee service, he has served the Triological Society as a member of either The Laryngoscope or Laryngoscope Investigative Otolaryngology Editorial Boards for an aggregate of 19 years.

After completing his medical education at the Vanderbilt University School of Medicine, residency training at the UCLA School of Medicine and his otology and neurologic skull base surgery fellowship at the University of Iowa, he served on the faculties of the UCLA School of Medicine, the Mount Sinai School of Medicine in New York and the Medical College of Wisconsin where he served as the Chairman of the Department of Otolaryngology and Communication Sciences for over a decade. Prior to his relocation to the Rutgers Robert Wood Johnson Medical School in 2016, his two decades of service in academic healthcare were complemented by serving for seven years in corporate healthcare as the Vice President of Research for Legacy Health, the largest healthcare system in Oregon and Washington, and by directing the Legacy Research Institute in Portland, Oregon.

Dr. Wackym’s clinical emphasis is on cochlear implantation and skull base surgery as well as other hearing and balance disorders. He is particularly well-known for the surgical management of patients with superior semicircular canal dehiscence.

His basic research was funded by the National Institutes of Health for over two decades in the area of gene discovery in the inner ear. Currently his research is focused on: cognitive dysfunction before and after surgical management of third window syndrome; cochlear implantation; outcomes of gamma knife surgery; balance disorders and the development of new biomedical engineering technologies - the NIH currently funds one of these. He has published over 170 papers, 60 book chapters, 20 video productions and edited three books, including the 18th edition of Ballenger’s Otorhinolaryngology Head and Neck Surgery, which is over 1,400 pages and two volumes.

PRESIDENTIAL CITATION AWARDEE
David F. Wilson, MD (Posthumous)



Dr. David Wilson enjoyed his private practice in otology and neurotology in Portland, Oregon since completion of a House Ear Institute Fellowship in 1972. He served on the Triological Society Council for ten years. He was the Western Section Vice President in 1997 and his most cherished honor was serving as President of the Society in 2006-2007. Dr. Wilson made valuable contributions to otology and neurotology in several ways. He participated in innumerable professional and scientific organizations as well as lectureships, seminars and panel presentations, not to mention dozens of publications. He was a fabulous friend and mentor to all of us as Triological Fellows. He loved the Triological Society, especially because of the lifelong friendships he treasured. He and his wife, Leigh, attended the Triological Society meetings every year where he continued to be a wonderful advocate for the Society.

PROGRAM PLANNING AND ADVISORY COMMITTEE

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Rock Springs, WY

Program Chair

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Bronx, NY

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Miami, FL

Travis T. Tollefson, MD MPH FACS

Sacramento, CA

Mark A. Varvares, MD FACS

Boston, MA

2019 THESIS AWARD WINNERS

Harris P. Mosher Award

David P. Goldstein, MD MSc FRCSC FACS, University of Toronto

Frailty as a Predictor of Outcomes in Patients Undergoing Major Surgery for Head and Neck Cancer: A Prospective Cohort Study

Edmund Prince Fowler Award

Amber U. Luong, MD PhD FACS, University of TX McGovern Medical School

Aspergillus Fumigatus Induction of IL-33 Expression in Chronic Rhinosinusitis with Nasal Polyps is Protease Activated Receptor 2-Dependent

Maureen Hannley Award for Alternative Science Award

Alexander J. Langerman, MD FACS, Vanderbilt University

Patient Values and Preferences Regarding Surgeon Presence, Trainee Participation, and Overlapping Surgery

Honorable Mention for Basic Science Award

Ravi N. Samy, MD FACS, Cincinnati Children's Hosp Med Center

Engineered Oncolytic Virus for the Treatment of Cholesteatoma: A Pilot in vivo Study

Honorable Mention for Clinical Research Award

Hadi Seikaly, MD, University of Alberta

Occlusion Driven and Digitally Based Jaw Reconstruction with Immediate Osseointegrated Implant Installation

With Distinction Award

Mark J. Jameson, MD PhD FACS, University of Virginia Health System

Antitumor Effect of Insulin-Like Growth Factor -1 Receptor Inhibition in Head and Neck Squamous Cell Carcinoma

NEW FELLOWS TO BE INDUCTED

New Fellow Ceremonies followed by the reception with Triological Fellows is scheduled on Friday, May 3rd from 7:00 am to 7:50 am in Grand Ballroom 6

Simon R.A. Best, MD FACS	Baltimore, MD
John R. Craig, MD	Farmington Hills, MI
Sandra L. Ettema, MD PhD	Chatham, IL
David P. Goldstein, MD MSc FRCSC FACS	Toronto, ON Canada
Mark J. Jameson, MD PhD FACS	Charlottesville, VA
Niels C.T. Kokot, MD FACS	Los Angeles, CA
Alexander J. Langerman, MD FACS	Nashville, TN
Harrison W. Lin, MD	Orange, CA
Jeffrey C.J Liu, MD FACS	Philadelphia, PA
Xue Z. Liu, MD PhD FACS	Miami, FL
Amber U. Luong, MD PhD FACS	Houston, TX
Sonya Malekzadeh, MD FACS	Washington, DC
Laura A. Matrka, MD	Columbus, OH
Michael E. McCormick, MD	Milwaukee, WI
Edward D. McCoul, MD MPH FACS	New Orleans, LA
Lindsay S. Reder, MD	Baldwin Park, CA
Austin S. Rose, MD	Chapel Hill, NC
Ravi N. Samy, MD FACS	Cincinnati, OH
Hadi Seikaly, MD	Edmonton, AB Canada
Jennifer J. Shin, MD	Boston, MA
David C. Shonka Jr., MD FACS	Charlottesville, VA
Kathleen C.Y. Sie, MD FACS	Seattle, WA
Douglas J. Van Daele, MD FACS	Iowa City, IA
Sunil P. Verma, MD	Orange, CA
Katherine C. Yung, MD FACS	San Francisco, CA

Harris P. Mosher Award

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

Harris P. Mosher • 1867-1954

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

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

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

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

Mosher Award Recipients

1957	Harold G. Tabb, MD	1988	Thomas V. McCaffrey, MD
1958	Jack V.D. Hough, MD	1989	Arnold Komisar, MD
	John A. Kirchner, MD		Bernard R. Marsh, MD
1959	Maurice Schiff, MD	1990	Patrick J. Gullane, MD
1960	Walter A. Petryshyn, MD	1991	Robin T. Cotton, MD
	Alex Weisskopf, MD	1992	Myles L. Pensak, MD
1961	Godfrey E. Arnold, MD	1993	Ronald A. Hoffman, MD
1962	Wesley E. Compere, MD	1994	Robert Sofferan, MD
1963	Edward G. McCoy, MD	1995	Fred Herzon, MD
	William W. Montgomery, MD	1996	Stimson P. Schantz, MD
	Henry J. Rubin, MD	1997	Scott C. Manning, MD
1964	Hugh O. Barber, MD	1998	No award
1965	Brian F. McCabe, MD	1999	Dennis S. Poe, MD
1966	No award	2000	Lyon L. Gleich, MD
1967	Frank N. Ritter, MD		David J. Terris, MD
	George T. Singleton, MD	2001	Joseph G. Feghali, MD
1968	Leslie Bernstein, MD	2002	Wendell G. Yarbrough, MD
1969	David A. Hilding, MD	2003	Edwin M. Monsell, MD PhD
	Lindsay L. Pratt, MD	2004	Craig A. Buchman, MD
1970	Herbert H. Dedo, MD	2005	Francisco J. Civantos, MD
1971	Byron J. Bailey, MD	2006	Henry T. Hoffman, MD
1972	Hugh F. Biller, MD		Dana M. Thompson, MD
1973	Mark May, MD	2007	Erin D. Wright, MD
	Andrew W. Miglets, MD	2008	Robert C. O'Reilly, MD
1974	Robert W. Cantrell, MD	2009	Steven J. Wang, MD
1975	Donald G. Sessions, MD	2010	Adrian L. James, MD
1976	No award	2011	Robert L. Ferris, MD PhD
1977	Donald B. Hawkins, MD	2012	Nira A. Goldstein, MD MPH
1978	Robert A. Jahrsdoerfer, MD		Judith E.C. Lieu, MD MSPH
1979	Arnold M. Noyek, MD	2013	Joseph M. Chen, MD
1980	H. Bryan Neel III, MD PhD		Adam M. Zanation, MD
1981	Bruce A. Feldman, MD	2014	George B. Wanna, MD FACS
1982	Roger L. Crumley, MD	2015	Lisa E. Ishii, MD MHS
1983	S. George Lesinski, MD	2016	Giovana R. Thomas, MD FACS
1984	Irwin F. Stewart, MD	2017	Jonathan M. Bock, MD
1985	Frank E. Lucente, MD	2018	Aaron C. Moberly, MD
1986	Harold C. Pillsbury, MD	2019	David P. Goldstein, MD MSc FRCSC FACS
1987	James N. Thompson, MD		

Edmund Prince Fowler Award

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

Edmund Prince Fowler • 1872-1966

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

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

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

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

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

Fowler Award Recipients

1971	Richard R. Gacek, MD	1995	Michael Pratt, MD
1972	Duane W. Nagle, MD	1996	P. Ashley Wackym, MD
	Raimund G. Rueger, MD	1997	Allen Hillel, MD
1973	Robert J. Ruben, MD		D. Bradley Welling, MD
1974	Robert I. Kohut, MD	1998	No award
	Willard B. Moran, Jr., MD	1999	Debra L. Tucci, MD
	Gershon J. Spector, MD	2000	Rick A. Friedman, MD
1975	Gregory J. Matz, MD		Michael D. Seidman, MD
	Richard L. Vorhees, MD	2001	J. Christopher Post, MD
1976	Shokri Radpour, MD	2002	Richard D. Kopke, MD
1977	LaVonne Bergstrom, MD	2003	Chung-Ku Rhee, MD PhD
1978	Diran O. Mikaelian, MD	2004	Shawn D. Newlands, MD
1979	William L. Meyerhoff, MD	2005	Steven W. Cheung, MD
	Clarence T. Sasaki, MD	2006	Alan G. Micco, MD
1980	Robert A. Schindler, MD	2007	Bradley W. Kesser, MD
1981	Don E. Gebhart, MD	2008	Eric M. Genden, MD
1982	Michael E. Johns, MD		Marlan R. Hansen, MD
1983	Bruce W. Jafek, MD	2009	Ravindhra G. Elluru, MD PhD
1984	David E. Schuller, MD		Andrew P. Lane, MD
1985	Marvin P. Fried, MD	2010	Philip D. Littlefield, MD
1986	Michael Friedman, MD	2011	Stacey L. Halum, MD
1987	Stanley M. Shapshay, MD	2012	Quyên T. Nguyen, MD PhD
1988	Timothy T.K. Jung, MD	2013	Subinoy Das, MD FACS
1989	Robert T. Sataloff, MD	2014	Hinrich Staecker, MD PhD
1990	Soly Baredes, MD	2015	Bradford A. Woodworth, MD
1991	Douglas E. Mattox, MD	2016	Gregory A. Grillone, MD FACS
1992	Vanessa G. Schweitzer, MD	2017	Syed F. Ahsan, MD FACS
1993	Ralph F. Wetmore, MD	2018	Murugappan Ramanathan, MD FACS
1994	Paul Lambert, MD	2019	Amber U. Luong, MD PhD FACS

Maureen Hannley Award

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

Maureen Hannley • 1942-2015

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

Maureen Hannley, PhD received her M.A. from the University of Arizona and a Ph.D. in Hearing Science and Biocommunication from Baylor College of Medicine. Throughout her academic and research career, she held appointments at Louisiana State University, Kresge Hearing Research Laboratory, Stanford University School of Medicine, Duke University, Medical College of Wisconsin and, most recently, was a Professor in the Department of Otolaryngology at University of Arizona. Dr. Hannley held many administrative appointments, including that of Chief Research Officer at the AAO-HNSF and Health Services Administrator and Director of the Hearing Research Program at NIDCD. She lent her expertise to numerous advisory boards including NIH, ARO, SUO, and Boys Town National Research Hospital, to name a few. She was elected as an Honorary Triological Society Fellow in 2009.

Hannley Award Recipients

2016	Paul Hong, MD FRCSC
2017	Kofi D. Boahene, MD FACS
2018	James C. Denny, MD FACS
2019	Alexander J. Langerman, MD FACS

Honorable Mention for Basic Science Award

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

1998	Perry M. Santos, MD, MS	2008	No Award
1999	Saumil N. Merchant, MD	2009	No Award
2000	Jennifer R. Grandis, MD	2010	Seth H. Dailey, MD
2001	William H. Lindsey, MD	2011	Norman D. Hogikyan, MD FACS
2002	No Award		Maie A. St. John, MD
2003	Sujana S. Chandrasekhar, MD	2012	Adrien Eshraghi, MD, MSC
2004	Joseph Sniezek, MD	2013	John D. Macias, MD FACS
2005	Cliff A. Megerian, MD	2014	Kenneth H. Lee, MD PhD
	Brian Nussenbaum, MD	2015	Eunice Y. Chen, MD PhD
2006	Eben Rosenthal, MD		Ian N. Jacobs, MD FACS
	Richard L. Scher, MD	2016	Lamont R.D. Jones, MD
2007	Joseph E. Kerschner, MD	2017	Devraj Basu, MD PhD FACS
	J. Paul Moxham, MD	2018	Alexander T. Hillel, MD
		2019	Ravi N. Samy, MD FACS

Honorable Mention for Clinical Research Award

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

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1999	Randal Paniello, MD		Gregory J. Wiet, MD FACS
2000	Seth I. Rosenberg, MD	2012	Bruce H. Haughey, MBChB FACS
2001	Mark S. Courey, MD	2013	Amy Y. Chen, MD FACS
2002	Christopher J. Linstrom, MD		Sam J. Daniel, MD MSC
2003	Phillip K. Pellitteri, DO		Tanya K. Meyer, MD BS
	James C. Alex, MD	2014	Andrew R. Scott, MD FACS
2004	Donald T. Weed, MD	2015	Oliver F. Adunka, MD
2005	George T. Hashisaki, MD		Hamid R. Djalilian, MD
	Judith C. McCaffrey, MD		Brett A. Miles, MD DDS FACS
2006	Neil Bhattacharyya, MD	2016	No Award
2007	Joel A. Ernster, MD	2017	Daniel H. Coelho, MD FACS
	Natasha Mirza, MD	2018	Paul C. Bryson, MD FACS
2008	Marshall E. Smith, MD	2019	Hadi Seikaly, MD
2009	Stephen F. Conley, MD FACS		
	David R. Friedland, MD PhD		
2010	Peter C. Belafsky, MD PhD		
	Seth M. Cohen, MD MPH		
	Jeffrey H. Spiegel, MD		

Honorable Mention Award

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

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

With Distinction Award

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

2011	Julie L. Wei, MD	2016	No Award
2012	Daniel D. Lydiatt, DDS MD FACS	2017	Matthew L. Bush, MD FACS
2013	Joseph A. Brennan, MD FACS		David Goldenberg, MD FACS
2014	Howard W. Francis, MD	2018	David J. Eisenman, MD
2015	Wade W. Chien, MD		Jose P. Zevallos, MD MPH FACS
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Dept of OTO-HNS
PO Box 800713
Charlottesville, VA 22908-0713

Research Liaison

Gerald S. Berke, MD FACS
UCLA Medical Center
Div of Head & Neck Surgery
10833 Le Conte Ave 62-132 CHS
Los Angeles, CA 90095

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Div of Laryngology
1540 Alcazar St Ste 204M
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University of California
Div of HNS CHS 62-132
10833 LeConte Ave
Los Angeles, CA 90095

Members of the Council cont'd

Thesis Chair

Dana M. Thompson, MD FACS
Ann & Robert H. Lurie Children's Hospital of Chicago
Dept of Otolaryngology Box 25
225 E Chicago Ave
Chicago, IL 60611

Laryngoscope Editor-in-Chief

Michael G. Stewart, MD MPH FACS
Weill Medical College of Cornell University
Dept of Otolaryngology-HNS
1305 York Ave 5th Floor
New York, NY 10021

Laryngoscope Investigative Otolaryngology

Editor-in-Chief

D. Bradley Welling, MD PhD FACS
Massachusetts Eye and Ear
243 Charles St Ste 815
Boston, MA 02114

The Laryngoscope

Editor

Michael G. Stewart, MD MPH FACS
Weill Medical College of Cornell University
Dept of Otolaryngology-HNS
1305 York Ave 5th Floor
New York, NY 10021

Questions should be referred to Mary Clements
Email: thelaryngoscope@gmail.com
Phone: 919-267-6831

Website: www.laryngoscope.com

Member Subscriptions Email: beth@triological.org
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ENTtoday

Physician Editor

Alexander G. Chiu, MD
University of Kansas
Dept of Otolaryngology-HNS
3901 Rainbow Blvd MS 3010
Kansas City, KS 66160

Editor

Samara E. Kuehne
Wiley Blackwell
111 River St
Hoboken, NJ 07030
Email: enttoday@wiley.com

Website: www.enttoday.org

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ENTtoday Physician Editor

Alexander Guang-Yu Chiu, MD
University of Kansas
Dept of Otolaryngology-HNS
3901 Rainbow Blvd MS 3010
Kansas City, KS 66160

Military Liaison

Michael E. Hoffer, MD FACS
University of Miami
Dept of Otolaryngology
1120 NW 14th St
Miami, FL 33136

Laryngoscope Investigative Otolaryngology

Editor

D. Bradley Welling, MD PhD FACS
Massachusetts Eye and Ear
243 Charles St Suite 815
Boston, MA 02114

Questions should be referred to Mary Clements
Email: thelaryngoscope@gmail.com
Phone: 919-267-6831

Website: www.investigativeoto.com

Society Contacts

Gail Binderup - Administrator
Marsha Holbert
Beth Slovinski
13930 Gold Circle Suite 103
Omaha, NE 68144
Phone: 531-355-8900
Fax: 531-355-8905
Email: info@triological.org

Website: www.triological.org

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122ND ANNUAL MEETING AT COSM
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FRIDAY, MAY 3, 2019

GRAND BALLROOM 6

- 7:00 - 7:50** **Business Meeting (Triological Fellows only)**
New Fellow Ceremony and Reception
- 7:55** **Welcome and Introductions by President**
Sigsbee W. Duck, MD FACS, Rock Springs, WY
- Presidential Citations**
Gerald S. Berke, MD FACS, Los Angeles, CA
Paul W.F. Coughlin, MD FACS, High Point, NC
Thomas Hall, RPh, Martin, KY
Kenneth E. Hornowski, DDS, Asheville, NC
P. Ashley Wackym, MD FACS, New Brunswick, NJ
David F. Wilson, MD (Posthumous)
- Introduction of Guest of Honor and Remarks**
Harold C. Pillsbury, MD FACS, Chapel Hill, NC
- 8:15** **Presidential Address**
The Patient's Perspective on Head and Neck Cancer - My Personal Experience
Sigsbee W. Duck, MD FACS, Rock Springs, WY
- 8:30 - 9:05** **Introduction of Joseph H. Ogura, MD Annual Lecturer**
Patient Safety: It's Not Rocket Science
James P. Bagian, MD PE, Ann Arbor, MI
Physician, engineer and veteran NASA astronaut
- Introduction of 2019 Thesis Award Presenters**
Dana M. Thompson, MD FACS, Chicago, IL
- 9:06** **2019 Harris P. Mosher Award for Clinical Research - Thesis Presentation**
Frailty as a Predictor of Outcomes in Patients Undergoing Major Surgery for Head and Neck Cancer: A Prospective Cohort Study
David P. Goldstein, MD MSc FRCSC FACS, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand the role frailty plays in predicting surgical outcomes in older patients undergoing major head and neck surgery.

Objectives: The primary objective of this thesis was to evaluate whether frailty and functional measures are independent predictors of perioperative complications and length of hospital stay in patients undergoing major head and neck cancer surgery. Study Design: A prospective cohort study. Methods: Patients 50 years and older undergoing major head and neck cancer surgery underwent pre-operative frailty assessment (Fried's Frailty Index) and functional assessment (Lawton-Brody questionnaire, Barthel Index, Vulnerable Elders Survey). Primary outcome measures were postoperative complications, including severity and type of complication, and length of hospital stay (LOS). Predictor variables for these respective outcomes were analyzed using multivariable logistic and linear regression models. Results: 274 patients were prospectively recruited, of whom 105 were aged 50 to 64 and 169 aged 65 and older. 119 were defined as non-frail, 132 as pre-frail and 23 were considered frail. Patients 65 years and greater had a higher frequency of being prefrail/frail compared with younger age groups, with a trend towards statistical significance ($p=0.08$). Complications occurred in 114 (42%) patients. Frailty score and functional measures were not significant predictors of overall complications. Frailty score (OR=1.36; 95% CI 1.04, 1.78, $p=0.025$) was a significant predictor of medical complications independent of age and comorbidity, while functional

measures were not significant predictors of medical complications on multivariable analysis. Predictors of Clavien-Dindo grade 3 or higher complications on UVA (Table 10) included frailty score ($p=0.0029$), grip strength ($p=0.0041$), exhaustion ($p=0.048$), sex ($p=0.048$), and alcohol ($p=0.043$). For LOS frailty score ($b=1.07$; 95% CI 1.02, 1.12, $p=0.0025$) and less independence on the Lawton Brody ($b= -0.08$; 95% CI -0.11, -0.05, $p<0.001$) and Barthel Index ($b= -0.12$; 95% CI -0.19, -0.06, $p<0.001$) were independent predictors of increased LOS on multivariable analysis. Conclusions: Frailty as measured by Fried's frailty score was a predictor of medical complications, severity of complications and length of hospital stay independent of age and comorbidities. Functional measures, such as the Lawton-Brody and Barthel Index, are important predictors of length of stay but not complications. Frailty and functional assessment can help surgeons identify patients at risk of negative postoperative outcomes and thus aid in counselling patients as well as identifying patients that may benefit from comprehensive geriatric assessment and enrollment in studies evaluating interventions for older frail patients.

9:14 **2019 Edmund Prince Fowler Award for Basic Research - Thesis Presentation**
Aspergillus Fumigatus Induction of IL-33 Expression in Chronic Rhinosinusitis with Nasal Polyps is Protease Activated Receptor 2-Dependent
Amber U. Luong, MD PhD FACS, Houston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss molecular pathways by which fungi signal to increase IL-33 expression in sinonasal respiratory cells from CRS patients.

Objectives: In the pathophysiology of chronic rhinosinusitis with nasal polyps (CRSwNP), *Aspergillus fumigatus* (*A. fumigatus*) can upregulate IL-33 from human sinonasal epithelial cells (SNECs), which then activates innate lymphoid cells causing release of IL-13, an important driver of allergic inflammation. However, the mechanism by which *A. fumigatus* mediates the induction of IL-33 expression remains to be elucidated. The objectives of this study were to determine the specific fungal component and the receptor responsible for mediating the *A. fumigatus* induced increase in IL-33 expression in SNECs from patients with CRSwNP. Methods: SNECs from CRSwNP patients were cultured and stimulated with various fungal components in the absence or presence of 4-(2-Aminoethyl) benzene sulfonyl fluoride hydrochloride, an irreversible serine protease inhibitor, or GB83, a reversible protease activated receptor 2 (PAR2) inhibitor. IL-33 expression was evaluated using quantitative real-time polymerase chain reaction. PAR2 expression was examined in inflamed mucosa from nonatopic control and CRSwNP patients. Results: Elevation of IL-33 expression in primary SNECs was found in response to fungal protease but not fungal cell wall components. PAR2 expression was elevated in inflamed mucosa from CRSwNP patients in comparison to controls. The *A. fumigatus* fungal protease mediated elevation in IL-33 expression by human sinonasal epithelial cells was serine protease- and PAR2-dependent. Conclusions: These data suggest that serine protease activity of *A. fumigatus* is capable of inducing IL-33 expression in CRSwNP SNECs via PAR2, a potential therapeutic target in the treatment of CRSwNP.

9:22 **2019 Maureen Hannley Award for Alternative Science - Thesis Presentation**
Patient Values and Preferences Regarding Surgeon Presence, Trainee Participation, and Overlapping Surgery
Alexander J. Langerman, MD FACS, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the relationship between patient values and their perceptions regarding overlapping surgery, and be able to consider strategies to improve patient comfort with trainee participation in surgery.

Objectives: To identify patient values and preferences associated with comfort consenting to surgical scenarios involving trainee participation, attending absence, and overlapping surgery with a covering attending. Study Design: Mixed methods (qualitative and quantitative). Prospective. Methods: We conducted qualitative interviews with patients that included a quantitative rating on a visual analogue scale (VAS) of comfort consenting to three surgical scenarios, including overlapping surgery, with cognitive debriefing to elicit themes related to comfort and sensitivity to tradeoffs (convenience, cost). Based on this qualitative analysis, we designed a survey of patient preferences and values that also included the same VAS scenarios and administered this to a sample from the general public. From this survey data, we identified domains of preference questions and examined their association with comfort ratings, past experiences with healthcare, and demographics. Results: Forty interviews and 225 surveys were included in this analysis. We identified three subgroups of patients based on the patterns of VAS responses in both the interviews and the surveys. Demographics were not predictive of subgroup. Subjects that were more comfortable with overlapping surgery were more trusting of the medical system. Those that were uncomfortable expressed a strong desire to know who (other than the attending) would be operating on them, and a desire for control over their surgical process. A subset of questions related to trust in trainees and delegation were strongly associated with VAS responses. Past experiences in healthcare (positive and negative) were associated with multiple domains of trust (in trainees, surgeons, and the healthcare system). Conclusions: Patients have a diverse range of comfort with overlapping surgery, and this is not associated with demographics. Past negative experiences have an impact on trust in the healthcare system overall, and trust in trainees and delegation specifically predicts comfort with attending absence from the operating room. Strategies to enhance patients' knowledge about the process of surgery and a sense of control over their own care may improve comfort with overlapping surgery.

9:30 **Q&A**

9:35 - 9:55 **Break in Exhibit Hall/View Posters**

9:55 - 12:00 CONCURRENT SCIENTIFIC SESSIONS

CONCURRENT SESSION 1 - GRAND BALLROOM 6
HEAD AND NECK AND LARYNGOLOGY

9:55 - 10:35

HEAD AND NECK PANEL: EVOLVING TOPICS IN HEAD AND NECK SURGERY

Moderator: Giovana R. Thomas, MD FACS, Miami, FL

Panelists: Melanoma-MLST-2

Larry L. Myers, MD FACS, Dallas, TX

Immunotherapy in Head and Neck Cancer

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

New Molecular and Genetic Tools in Head and Neck

Jose P. Zevallos, MD MPH FACS, St. Louis, MO

Moderators: Adam S. Jacobson, MD BS FACS, New York, NY

William R. Ryan, MD FACS, San Francisco, CA

10:35

Insurance Status as a Social Determinant of Health and Its Impact on Treatment and Survival of Sinonasal Cancer Patients

Pratima Agarwal, BA, Boston, MA; Eric A. Jones, BS, Boston, MA; Anand K. Devaiah, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the impact of socioeconomic status on sinonasal cancer treatment and survival outcomes.

Objectives: To understand the impact of socioeconomic status on sinonasal cancer treatment and survival outcomes.
Study Design: Retrospective cohort study using the Surveillance, Epidemiology, and End Results (SEER) database.
Methods: Data regarding patient characteristics, tumor characteristics and location, clinical stage at diagnosis, treatment, and survival data for 1,365 patients diagnosed with sinonasal cancers was extracted from the SEER 18 Regs Research Data including Hurricane Katrina impacted Louisiana cases from 1973-2014. All statistical analyses were performed using SAS 9.5. Associations between insurance status and other variables such as patient demographics, county level statistics, tumor characteristics at presentation, treatment, and survival outcomes were assessed for. **Results:** Medicaid patients were more likely to live in counties with more people having less than a 9th grade education (8.32% of Medicaid patients, 6.46% of private insurance patients, $p < .0001$) and lower median household incomes (\$56,316 in the Medicaid group, \$60,284 in the private insurance group, $p = 0.0004$). Tumors included in this study most commonly arose from the nasal cavity (56.85%) and most commonly had squamous cell (63.52%), or adenoma (12.75%), or epithelial cell (8.21%) origins. Medicaid patients were associated with presentation with T3-T4 stage disease (69.82% in Medicaid vs. 63.43% in private insurance, $p = 0.0007$) and larger tumor size (46.28 mm) than patients with private insurance (39.06 mm), $p = 0.0111$. Medicaid patients presented with more nodal involvement than those with private insurance (12.61% vs. 6.56%, $p = 0.0146$). There was no significant difference between metastatic disease at diagnosis between the two groups. Medicaid patients, however, were less likely to receive cancer directed surgery (29.28% vs. 79.62%, $p = 0.0033$ receiving surgery). Cancer specific average survival time was 28.9071 months in the Medicaid group and 39.3345 months in the private insurance group. Patients in the Medicaid group were more likely to die from their sinonasal tumor diagnosis or competing event (i.e. other medical comorbidity) than those with private insurance. **Conclusions:** This is the first and largest study to examine how Medicaid status may impact treatment and outcomes in sinonasal tumors. Patients with Medicaid and lower SES present with larger sinonasal tumors, are less likely to receive definitive cancer directed surgery, and have significantly worse overall survival than those with private insurance. This suggests the need for further emphasis on improving health literacy in populations with limited access to healthcare.

10:40

Occupational Exposure of Oropharyngeal HPV amongst Otolaryngologists

Rahul S. Subbarayan, MD, Kansas City, KS; Matthew Shew, MD, Kansas City, KS; Johnathan Enders, BS, Kansas City, KS; Sufi Thomas, PhD, Kansas City, KS

Educational Objective: At the conclusion of this presentation, the participants should be able to determine if HPV DNA transmission via Bovie electrocautery fumes places otolaryngologists at risk for exposure.

Objectives: Human papillomavirus (HPV) is known to cause cancer in multiple sites, including the oropharynx. Although sexual transmission has been established as the primary role of HPV acquisition, some preliminary data studies suggest that HPV may be transmitted through occupational exposure from medical instruments and surgical fumes. We assess if aerosolization of HPV DNA via Bovie electrocautery places otolaryngologists at risk for exposure. **Study Design:** Basic science lab research. **Methods:** HPV16E6E7 plasmid DNA was transformed into DH5 alpha E. coli cells using the heat shock method. Miniprep and maxiprep purification of transformed DNA with subsequent restriction enzyme double digestion confirmed production of targeted plasmid DNA. 2 ug of plasmid DNA in 20 ul TE buffer were then injected intradermally into

rat tail and cauterized with Bovie. Vapor produced was exposed to Whatman filter paper which was placed in 100 ul TE buffer. In addition, patients with p16 positive and p16 negative oropharyngeal tumors undergoing TORS for tumor resection were identified. Intraoperatively, Whatman filter paper was exposed to electrocautery fumes then placed in 100 ul TE buffer. Additional samples were collected from suction tubing filter, suction tubing, surgical mask of surgeon and robot arm. All samples were tested by HPV PCR with an assay sensitivity of 1.5 ug. Results: A total of 30 samples were collected from 3 p16 positive and 3 p16 negative patients and 3 laboratory samples were compared to positive controls. HPV DNA was not detected in any of the specimens. Conclusions: We found that there is likely minimal risk of occupational exposure to HPV via Bovie electrocautery fumes.

10:45 Opioid Prescribing Practices for Postoperative Patients in Otolaryngology: A Multiphasic Quality Improvement Project in a Single Large Institution

Sophia Dang, BA, Philadelphia, PA; Jonathan C. Li, BS, Philadelphia, PA; Zachary Gandee, BA, Philadelphia, PA; Alexander Duffy, BS, Philadelphia, PA; Elizabeth Cottrill, MD, Philadelphia, PA; David M. Cognetti, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss the over-prescription of postoperative opioids in otolaryngology; 2) compare current prescribing practices to patient reported opiate use in the management of postoperative pain; and 3) consider implementing changes to their current opioid prescribing practices using evidence based guidelines.

Objectives: In otolaryngology, postoperative pain management lacks guidelines. We investigated opioid prescription and consumption for common procedures to develop prescribing guidelines at our institution. Study Design: Prospective, survey study. Methods: Patients who underwent surgery between July and September were surveyed at first followup visit. We assessed opioid usage and pain using the visual analog scale throughout the postoperative period. Opioid prescriptions were converted to a standardized unit of 5 mg oxycodone pills for reporting. Four procedures (transoral robotic surgery resection [TORS], sialendoscopy, parathyroidectomy/thyroidectomy, and parotidectomy) were selected for isolated analysis. Results: Of the 80 surveys that met criteria for inclusion for analysis, a total of 1,954.0 pills were prescribed, with 300.3 pills (15.4%) reported having been used by patients, leaving 1,653.7 pills (84.5%) unused. TORS (n=12) average pills used: 4.9 ± 5.9 (95% CI: 1.6-8.3); total % pills unused: 89.3%. Sialendoscopy (n=13) average pills used: 4.2 ± 5.1 (95% CI: 1.1-7.4); total % pills unused: 72.5%. Parathyroidectomy/thyroidectomy (n=22) average pills used: 3.1 ± 4.4 (95% CI: 1.7-5.5); total % pills unused: 79.2%. Parotidectomy (n=12) average pills used: 1.3 ± 2.5 (95% CI: 0.7-4.3); total % pills unused: 94.7%. Conclusions: At our institution, opioids for postoperative otolaryngology patients were prescribed in excess with 84.5% reported as unused. Procedure specific opioid diversion ranged from 72.5%-94.7%. Our findings provide a foundation for procedure specific evidence based opioid prescription guidelines.

10:50 Targeting of Apoptosis in Head and Neck Squamous Cell Carcinoma Requires Overcoming Redundant Pro-Survival Mechanisms

Thomas Julian Ow, MD MS, Bronx, NY; Andrea López, BA, Bronx, NY; Cory D. Fulcher, MD, Bronx, NY; Jianhong Chen, PhD, Buffalo, NY; Nicolas F. Schlecht, PhD, Buffalo, NY; Evripidis Gavathiotis, PhD, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the various BCL family proteins expressed in head and neck squamous carcinoma and discuss potential therapeutic options targeting these molecules.

Objectives: This report examines expression of BCL family proteins and studies several strategies for targeting apoptosis in HNSCC. Study Design: Translational research project examining gene expression in head and neck squamous tumors, and drug responses in head and neck squamous cancer cell lines. Methods: Illumina® HumanHT-12-v3 Expression BeadChip array data acquired from 182 HNSCC tumors, and RNAseq data from The Cancer Genome Atlas (TCGA), were examined to assess levels of BCL-xL, MCL-1 and BCL-2. HNSCC cell lines (HN30, HN31, HN5, MDA686LN, and UMSCC47) were used to examine expression of BCL-family proteins, and response to agents targeting apoptosis signaling molecules, including ABT-263 (BCL-2, BCL-xL inhibitor), BTSA1 (a BAX trigger site activator), A1210477 (MCL-1 inhibitor), and Bortezomib (a proteasome inhibitor that prevents degradation of several pro-apoptotic factors). Responses were examined using cell viability assays and annexin staining. Results: Median expression of BCL-xL and MCL-1 was significantly higher than, and inversely correlated with, BCL-2 expression in HNSCC tumors. Targeted treatment with ABT-263 and BTSA1 showed limited activity (average IC50 ABT-263 and BTSA1 =7.42 uM and 32.83uM, respectively). Combined inhibition of pro-survival proteins with ABT-263 and A1210477 (targeting BCL-2/BCL-xL and MCL-1) was necessary to optimize apoptosis response, resulting in a 2.3 - 4.7 fold increase in apoptosis compared to ABT-263 alone. Treatment of the cell line panel with Bortezomib was also highly effective (average IC50 Bortezomib 0.0097 uM). Conclusions: HNSCC depends on multiple redundant anti-apoptotic mechanisms, but intact apoptosis machinery can still be harnessed for therapeutic benefit with a strategy targeting redundant anti-apoptotic pathways.

10:55

Clinical Application of Fluorescence Guided Surgery in Head and Neck Cancer: Successes and Limitations

Stan Van Keulen, MD, Palo Alto, CA; Nynke S. Van den Berg, PhD, Palo Alto, CA; Naoki Nishio, MD PhD, Palo Alto, CA; Guolan Lu, PhD, Palo Alto, CA; Quan Zhou, PhD, Palo Alto, CA; Eben L. Rosenthal, MD, Palo Alto, CA

Educational Objective: At the conclusion of this presentation, the participants should have the knowledge to discuss what future endpoints should be for clinical trial design concerning intraoperative imaging.

Objectives: Although surgical resection has been the treatment of solid tumors for decades, surgeons still rely on their vision and palpation to delineate healthy from cancerous tissue. This may in fact contribute to the high rate (up to 30%) of positive margins found in head and neck cancer patients. Margin status in these patients is the most important prognostic factor for overall survival. Study Design: Consenting head and neck cancer patients (n=14) scheduled for curative resection were enrolled in a clinical trial evaluating panitumumab-IRDye800 (NCT02415881). Methods: Open field fluorescence imaging was performed immediately prior, during and after the resection of the primary tumor. The fluorescence signal was quantified, and signal to background ratios were used to characterize the fluorescence contrast of regions of interest relative to background (i.e. tongue, buccal mucosal and gingival tissue). Results: Use of the open field system immediately before and during the resection demonstrated potential to guide intraoperative decision making. Prior to resection, fluorescence imaging was able to visualize all primary tumors with an average signal to background ratio 5 times greater than post-resection wound cavities (2.1 ± 0.4 vs. 0.4 ± 0.2 , respectively). Fluorescence imaging was able to improve surgical decision making in three cases (21.4%). Conclusions: This study successfully illustrates the clinical value of open field systems to assist intraoperative decision making and provides a next step towards routine integration of real time fluorescence guidance in oncologic head and neck surgery.

11:00

Performance Characteristics of Computed Tomography in Predicting Extranodal Extension in HPV Positive Oropharyngeal Carcinoma

Farhoud Faraji, MD PhD, San Diego, CA; Nafi Aygun, MD, Baltimore, MD; Stephanie F. Coquia, MD, Baltimore, MD; Christine G. Gourin, MD, Baltimore, MD; David W. Eisele, MD, Baltimore, MD; Carole Fakhry, MD MPH, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the accuracy of specific computed tomography imaging characteristics in predicting extranodal extension in lymph node metastases from HPV positive oropharyngeal carcinoma.

Objectives: To determine the performance characteristics of seven predetermined imaging features on pretreatment computed tomography (CT) in identifying extranodal extension (ENE) in cervical lymph node metastases from HPV positive oropharyngeal carcinoma (HPV-OPC). Study Design: Retrospective cohort study. Methods: Seventy-three patients diagnosed with HPV-OPC who underwent primary surgical treatment and cervical lymph node dissection were included. Seven imaging features were defined prior to imaging analysis and included the presence of: 1) indistinct capsular contours; 2) irregular nodal margins; 3) perinodal fat stranding; 4) perinodal fat planes; 5) nodal necrosis; 6) intranodal cysts; and 7) nodal matting. Preoperative contrast enhanced CT imaging was evaluated by two radiologists blinded to pathological results. Logistic regression was employed to determine radiologist specific odds ratios (OR) of predicting ENE positivity for each imaging feature and radiologist specific receiver operating characteristic curves (sensitivity [Sn], specificity [Sp], area under the curve [AUC], positive predictive value [PPV], negative predictive value [NPV]) for each imaging feature. Results: Thirty-two (44%) patients had ENE positive lymph nodes. The presence of irregular margins ($OR_1=12.3$, $95\%CI_1=2.3-65.9$; $OR_2=7.0$, $95\%CI_2=1.4-36.3$) and absence of perinodal fat plane ($OR_1=6.8$, $95\%CI_1=2.0-23.3$; $OR_2=14.2$, $95\%CI_2=1.7-120.5$) were significantly associated with ENE positivity for each radiologist. Irregular nodal margin status was most specific for ENE positivity ($Sn_1=45\%$, $Sp_1=94\%$, $AUC_1=69\%$, $PPV=82\%$, $NPV=73\%$; $Sn_2=28\%$, $Sp_2=95\%$, $AUC_2=61\%$, $PPV=80\%$, $NPV=64\%$). Absence of perinodal fat plane was most sensitive for ENE positivity ($Sn_1=87\%$, $Sp_1=50\%$, $AUC_1=69\%$, $PPV=59\%$, $NPV=62\%$; $Sn_2=96\%$, $Sp_2=34\%$, $AUC_2=65\%$, $PPV=53\%$, $NPV=63\%$). Conclusions: Of the seven predetermined imaging features hypothesized to be associated with ENE status, irregular nodal margin status and absence of perinodal fat plane were the most specific and sensitive features, respectively.

11:05

RNA in Situ Hybridization for HPV Detection in Oropharyngeal Squamous Cell Carcinoma: Our Institution's Experience and a Review of the Literature

Krish Suresh, BA, Chicago, IL; Sydney Coates, BS, Chicago, IL; Borislav Alexiev, MD, Chicago, IL; Sandeep Samant, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the value of RNA-ISH for HPV detection in oropharyngeal cancer and compare it with other detection methods.

Objectives: To validate RNA in situ hybridization (RNA-ISH) for detection of human papillomavirus (HPV) infection in oropharyngeal squamous cell carcinoma (OPSCC). To review the literature on HPV detection methods and compare with RNA-ISH. Study Design: Retrospective chart review, literature review. Methods: Compiled data on OPSCC specimens processed at our institution between 2010 - 2018. RNA-ISH was performed on fresh frozen paraffin embedded tissue. Sensitivity and specificity of RNA-ISH were calculated with reference to p16. The Kaplan Meier method was used to analyze

disease free survival (DFS). For the literature review, we searched PubMed for studies on HPV detection methods including p16, RNA-ISH, DNA-ISH, and PCR, and compiled test parameters. Results: Our cohort comprised 59 cases of OPSCC (median age 65, 93.2% male). The most common location was tonsils (n = 38) followed by tongue base (n = 20). RNA-ISH had a sensitivity and specificity of 98% and 100%. Concordance with p16 was 98%. By RNA-ISH, disease free survival (DFS) was 30 vs. 50 months for negative vs. positive specimens (p = 0.11). By p16, DFS was 10 vs. 50 months (p = 0.05). Our literature review found consistently high sensitivity and specificity reported for RNA-ISH, ranging from 88-98% and 90-100% respectively. In comparison, the specificity of p16 was 85-95%. DNA-ISH lacked sensitivity, ranging from 65-85%. Conclusions: Our report validates the use of RNA-ISH for detection of HPV infection in OPSCC. Furthermore, we argue that RNA-ISH is superior to p16 because it is easier to interpret and more specific. Lastly, our data shows that RNA-ISH is a promising prognostic marker.

11:10 **Q&A**

11:15 - 12:00 **LARYNGOLOGY PANEL: DIFFICULT ISSUES IN LARYNGOLOGY**

Moderator: Albert L. Merati, MD FACS, Seattle, WA

Panelists: Joel H. Blumin, MD FACS, Milwaukee, WI
Michael M. Johns III, MD, Los Angeles, CA
Laura A. Matrka, MD, Columbus, OH
Libby J. Smith, DO, Pittsburgh, PA
Lucian Sulica, MD, New York, NY

12:00 **Adjourn**

TRIOLOGICAL SOCIETY - NO AFTERNOON SCIENTIFIC SESSIONS

5:30 - 7:00 **TRIO, ANS, AOS, ASPO MEET THE AUTHORS POSTER RECEPTION**

CONCURRENT SESSION 2 - GRAND BALLROOM 5
OTOLOGY/NEUROTOLOGY AND PEDIATRIC OTOLARYNGOLOGY

**Moderators: Jennifer L. Maw, MD, San Jose, CA
Mia E. Miller, MD, Los Angeles, CA**

9:55 Effects of Ganciclovir Treatment in a Murine Model of Cytomegalovirus Induced Hearing Loss

Travis J. Haller, BS, Salt Lake City, UT; Melissa S. Price, BS, Salt Lake City, UT;
Spencer R. Lindsay, BS, Salt Lake City, UT; Matthew A. Firpo, PhD, Salt Lake City, UT;
Albert H. Park, MD, Salt Lake City, UT

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the effects of ganciclovir on both viral load and sensorineural hearing loss in murine populations infected with cytomegalovirus.

Objectives: Goals of the study were to 1) determine whether ganciclovir (GCV) treatment reduces sensorineural hearing loss (SNHL) in cytomegalovirus (CMV) infected mice; and 2) to evaluate the effects of GCV on viral load. Study Design: Prospective experimental animal study. Methods: Infected BALB/c mice were inoculated with murine CMV (mCMV) on postnatal day 3. Those treated with GCV received an intraperitoneal injection BID for 14 days. Auditory thresholds were assessed using distortion product otoacoustic emission (DPOAE) and auditory brainstem response (ABR) testing 4 weeks after inoculation. Temporal bones from each group were harvested and used for determination of viral load by quantitative polymerase chain reaction. Results: GCV treated mCMV infected mice had lower ABR ($P < 0.0001$ by Kruskal-Wallis test) and DPOAE ($P < 0.0001$) thresholds compared to mCMV infected untreated mice, indicating that GCV protected mice from mCMV induced hearing loss. Viral load in infected populations undergoing GCV treatment was significantly decreased ($P = 0.02$) relative to untreated mice indicating GCV interfered with viral replication. GCV treatment alone had no effect on ABR and DPOAE compared to untreated, uninfected controls ($P = 0.1$, $P = 0.24$ respectively). Conclusions: Ganciclovir effectively ameliorated SNHL in a preclinical model of congenital CMV infection seemingly by reducing viral load.

10:00 Quantitative Analysis of Narcotics Prescribed and Used after Ear Surgery

Stephany J. Ngombu, BA, Columbus, OH; Jameson K. Mattingly, MD, Columbus, OH;
Alexander N. Rock, MD, Columbus, OH; Stephen J. Nogan, MD, Columbus, OH;
Aaron C. Moberly, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to compare quantities of opiates being distributed versus those being used by patients after otologic surgery and discuss ways to change surgeon prescribing habits.

Objectives: Opiates are the preferred method to manage postoperative pain, despite their known potential for abuse. It remains unknown how much pain medication is typically required by otologic patients after surgery. Our primary objective was to assess the amount of narcotic medication dispensed to versus used by patients after ear surgery. Study Design: Comparative retrospective chart review series and telephone interview. Methods: One hundred adult patients who underwent otologic surgeries from January 2018-June 2018 were selected for phone interview or electronic survey. Patients were excluded for history of known narcotic or substance abuse. Results: Among the 10 preliminary participants that completed the telephone survey so far, the mean (SD) number of tablets prescribed was 19.2 (11.8), amounting to 102.5 (58.4) morphine milligram equivalents (MME), while the mean number of tablets consumed was 7.7 (8.9), amounting to 45.0 (52.6) MME. A paired t-test demonstrated that the mean MME prescribed was significantly greater than the mean MME consumed ($t = 4.7$, $p = .001$). In addition, 1/10 patients did not need to fill their narcotic prescription at all, and 10/10 participants stated that their pain was well controlled. Conclusions: Based on preliminary data, there was clear evidence of patients consuming less narcotic medication than prescribed. This suggests that physician prescribing habits can be adjusted to decrease the overall amount of narcotic medications given to patients undergoing otologic surgery.

10:05 Quantifying Tinnitus Suppression in Cochlear Implantation Using a Novel Audiologic Sequence: Tinnitus Interval Limited Tracking (TILT)

Jonathan R. Mallen, MD, Farmington, CT; Jerlon Chiu, BS, Farmington, CT; Hillary Marquis, AuD, Farmington, CT; Chia-Ling Kuo, PhD, Farmington, CT; Steven R. Otto, MA, Los Angeles, CA;
Daniel S. Roberts, MD PhD, Farmington, CT

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the relative and absolute contributions of electrical stimulation and masking towards acute reduction of tinnitus symptom burden in patients utilizing cochlear implants; 2) describe a novel audiologic sequence used to quantify and isolate the effects of cochlear implants in suppressing tinnitus.

Objectives: To quantify the effects of cochlear implants (CI) on tinnitus suppression in patients with previous cochlear implantation using a novel audiologic sequence - Tinnitus Interval Limited Tracking (TILT). Study Design: Prospective cohort study. Methods: Consecutive patients with tinnitus and previous cochlear implantation for profound hearing loss underwent an audiologic testing sequence called Tinnitus Interval Limited Tracking (TILT). Patients rated tinnitus severity

using the validated Tinnitus Handicap Inventory as well as a Visual Analog Scale (VAS) at baseline and in a variety of audiologic scenarios. Changes in tinnitus severity between scenarios allow for the isolation of the effects of masking and electrical stimulation on the reduction of tinnitus. **Results:** Patients had an acute decrease in tinnitus severity when their CIs were turned on even in the absence of noise, in a soundproof booth. This effect reversed once the CIs were turned off. This effect was greater in magnitude than that seen with masking that occurred with the presentation of soft speech. Acute tinnitus severity was inversely correlated to level of presented speech as expected. **Conclusions:** Acute tinnitus suppression in patients using cochlear implants is multifactorial. Masking plays a role in the process however it cannot sufficiently account for the totality of symptom improvement experienced by CI patients. Quantifiable tinnitus suppression observed when a CI is turned on, even in the absence of audiologic stimulation, suggests electrical stimulation is involved in the mechanism of symptom improvement in these patients.

10:10

Sensorineural Hearing Loss Pattern in Patients with Idiopathic Intracranial Hypertension

Sunny S. Kim, BA, Washington, DC; Timothy Shim, BS, Washington, DC; Andrew D. Sparks, MS, Washington, DC; Ashkan Monfared, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the presentation and pattern of sensorineural hearing loss (SNHL) in patients with intracranial hypertension (IIH).

Objectives: To determine the presentation and pattern of sensorineural hearing loss (SNHL) in patients with intracranial hypertension (IIH). **Study Design:** Retrospective chart review of IIH patients (lumbar puncture opening pressure ≥ 200 mm H₂O) who had available audiograms. **Methods:** Otologic complaints, hearing threshold and opening pressures were documented before and after intervention. Correlations between opening pressure and hearing thresholds were analyzed using Spearman's rank correlation coefficient due to the nonparametric nature of our data. **Results:** Forty-three patients (mean age = 42.5) were included in the study, 35 (81%) of whom were female. Patients with hearing loss due to known etiologies such as noise induced, congenital, radiation, surgery or tumors were excluded. The most commonly reported otologic symptoms were tinnitus in 24 (56%, 16 pulsatile and 8 nonpulsatile), aural fullness in 9 (21%), vertigo in 6 (14%), and facial spasms in 3 (7%) patients. Twenty-eight patients (65%) had some form of hearing loss (threshold over 20dB) of which 19 (44%) were bilateral. The hearing ranged from normal to profound hearing loss, and no specific pattern (low, central, high frequency or flat) was statistically significant in unilateral or bilateral patients. Two patients presented with sudden SNHL and four had normal retinal examination despite elevated pressure. In patients who had a followup audiogram after resolution of their intracranial hypertension, 50% had improved hearing. **Conclusions:** IIH does not present with any particular pattern of hearing loss and may present as unilateral, bilateral, mild to profound or even as sudden SNHL. Early identification and treatment may reverse or improve hearing loss.

10:15

Impact of Comorbidities on Speech Perception Abilities in CI Patients

Nedim Durakovic, MD, St. Louis, MO; Jonathan L. McJunkin, MD, St. Louis, MO; Jacques Herzog, MD, St. Louis, MO; Dorina Kallogjeri, MD MPH, St. Louis, MO; Craig A. Buchman, MD, St. Louis, MO; Wick C. Cameron, MD, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the association between preoperative comorbidities and cochlear implant outcomes.

Objectives: To examine the association between preoperative comorbidities and cochlear implant (CI) outcomes. **Study Design:** Retrospective study in a tertiary academic center. **Methods:** Adult CI candidates underwent a preoperative comorbidity severity assessment across twelve domains. Their comorbidities were calculated using a validated 4 point scale termed the Adult Comorbidity Evaluation-27 (ACE-27). All patients received the same CI device. Postoperative speech perception testing, including consonant nucleus consonant (CNC) words and AzBio sentence scores in quiet, were performed at 3, 6 and 12 months. All patients underwent postoperative computed tomography (CT) reconstruction to localize electrode scalar location within the cochlea. A mixed model analysis was used to analyze performance from pre-implantation versus 3, 6, and 12 months post-implantation while accounting for electrode location and comorbidities. **Results:** Forty-nine adult CI patients with a median age of 65 (range 23 to 92) were analyzed. Preoperative median CNC word scores were 6% (range 0-63) and AzBio sentence scores were 3% (range 0-60). After 12-months the median CNC scores improved to 66% (range 26-90) and AzBio scores improved to 77% (range 2-97). Two translocations were identified on CT reconstruction. Comorbidity severity scores aligned with CI performance. At 3 months, the 5 sickest patients (ACE-27 category 3) had a mean improvement of only 13%, while the 4 healthiest patients (ACE-27 category 0) improved by 55%. This trend continued out to 12 months. **Conclusions:** Comorbidity severity is an important and novel factor in adult CI outcomes. Validation of CI specific comorbidity indexes may improve predictive value.

10:20

Hospital Volume and Acoustic Neuroma Resection Outcomes

Nicholas S. Andresen, MD, Baltimore, MD; Charles M. Stewart, MD PhD, Baltimore, MD; Christine G. Gourin, MD, Baltimore, MD; Daniel Q. Sun, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the relationship between hospital volume and outcomes following acoustic neuroma resection.

Objectives: To investigate the relationship between hospital volume and complications, mortality, and failure to rescue (FTR) rates in patients undergoing vestibular schwannoma (VS) surgery. **Study Design:** Retrospective database review.

Methods: The Nationwide Inpatient Sample was used to identify 44,336 patients who underwent VS surgery in 1995-2011. Annual case volumes were stratified by quintiles and defined as very low (≤ 5 cases/year), low (6-12 cases/year) medium (13-22 cases/year), high (23-37 cases/year) and very high-volume (≥ 38 cases/year). Relationships between hospital volume and in-hospital mortality, postoperative complications, as well as failure to rescue (FTR), defined as death after a major complication, were examined using multivariate regression analysis. Results: Postoperative medical and surgical complications occurred in 5.4% and 14.6% of cases, respectively, and did not differ significantly across volume quintiles. In-hospital mortality decreased with increasing hospital volume, with an incidence of 1.4% for hospitals in the lowest volume quintile compared to 0.1% for hospitals in the top volume quintile. After controlling for all other variables, the odds of in-hospital mortality was lower for medium (OR=0.19 [0.04-0.93]), and very high-volume hospitals (OR=0.07 [0.01-0.53]), but not high-volume hospitals (OR=0.43 [0.05-3.77]). There was no association between hospital volume and the odds of postoperative surgical complications. FTR was associated with hospital volume, with decreasing odds for medium volume (OR=0.15 [0.02-0.93]), high volume (OR=0.17 [0.04-0.74]), and very high volume (OR=0.07 [0.04-0.74]) hospitals. Conclusions: Hospital volume does not appear to be associated with complication rates but is associated with decreased likelihood of FTR after VS surgery.

10:25 Barometric Pressure and the Incidence of Benign Paroxysmal Positional Vertigo

Jonathan R. Korpon, BS, Richmond, VA; Daniel H. Coelho, MD, Richmond, VA (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand the relationship between atmospheric variables, particular barometric pressure, as a possible contributing factor in BPPV.

Objectives: To investigate the relationship between barometric pressure and the incidence of benign paroxysmal positional vertigo (BPPV). Study Design: Retrospective case series review. Methods: 181 patients diagnosed with classic BPPV seen between 2011-2016 were identified. Demographic information, data of onset, and date of presentation were recorded. Historical barometric data for each of the 60 months were recorded. In addition, monthly counts of other atmospheric, infectious, and allergic variables for that time period were recorded. Correlation analysis compared monthly incidence of BPPV with absolute and relative changes in atmospheric conditions. Results: The incidence of BPPV onset demonstrated a statistically significant positive correlation with barometric pressure, where every one unit increase in barometric pressure leads to an expected increase of 6.1 diagnoses ($p = 0.0008$). The correlation coefficient (r) between barometric pressure and BPPV diagnoses was 0.66 (95% CI 0.14-0.90) with a p -value of 0.0131. Other seasonal variables demonstrated correlation, though none as strong as barometric pressure. Conclusions: Barometric pressure has been long been associated with conditions of the inner ear, though its relationship to the pathogenesis of BPPV has not been investigated. Monthly changes in barometric pressure, rather than the absolute value, may be responsible for the observed changes in incidence. These findings demonstrate a clear association between barometric pressure and BPPV that may help to explain both the etiology of BPPV and its possible connection to migraine related conditions.

10:30 Relationship of Overall Cardiovascular Health and Hearing Loss in an African-American Population

Steven A. Curti, MD, Jackson, MS; Joseph A. Degruy, MD, Jackson, MS;
Christopher S. Spankovich, AuD PhD MPH, Jackson, MS; John M. Schweinfurth, MD, Jackson, MS

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the relationship of hearing loss to a popular marker for overall cardiovascular health, the life's simple 7 tool.

Objectives: To evaluate the relationships among the overall cardiovascular health scoring tool, life's simple 7, and hearing in an African-American cardiovascular study cohort. Study Design: Cross-sectional analysis. Methods: Using our heart study's cohort of African-Americans, the relationships between the life's simple 7 (LS7) scoring metric and hearing of 1,314 individuals were assessed. Standard audiometric data was collected and hearing loss was defined as a four frequency average of 500, 1000, 2000, and 4000 Hz greater than 25 dBHL. Measures of tinnitus and dizziness were also collected. The LS7 scoring tool, which consists of seven individual categories (smoking status, body mass index, physical activity, healthy diet score, total cholesterol, blood pressure, and fasting glucose level), was used as measure of overall cardiovascular health. Each category of the LS7 was broken down into poor, intermediate, and ideal subgroups as in accordance with the American Heart Association Strategic Planning Task Force and Statistics Committee. Unadjusted and adjusted gamma regression and logistic regression models were constructed for determining relationships between participant characteristics of interest and hearing loss. Results: Higher total LS7 scores (per 1 unit increase) were associated with lower PTA4 scores in gamma regression analyses. This held true even after adjustments for age, sex and education. Using logistic regression analyses to compare LS7 scores to presence of hearing loss, tinnitus, and vertigo only hearing loss showed a statically significant relationship after adjustments for age, sex and education. Conclusions: This study shows a significant, graded association between higher life 's simple 7 scores and lower incidence of hearing loss.

10:35 The Cartilage Cuffed T-Tube Tympanoplasty

Alex Bradley Labby, MD, Chicago, IL; Miriam I. Redleaf, MD, Chicago, IL; Jeffrey W. Yu, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to understand how to craft and place a cartilage cuffed T-tube and understand the outcomes of our experience using them.

Objectives: To create a durable method of middle ear ventilation and evaluate hearing outcomes and clinical outcomes of this method. **Study Design:** Retrospective case review of tertiary care center otology/neurotology clinic. **Methods:** The cartilage cuffed T-tube (CCT) is made by crafting a cuff of cartilage for a standard ventilating T-tube and is placed posterior to the tympanic membrane via myringotomy. Pre and postoperative audiograms were analyzed and patients have been followed in perpetuity to assess ongoing clinical findings including patency and condition of the CCT. **Results:** Since 2015, thirteen patients and eighteen ears underwent CCT placement. Five patients had history of cleft palate. Ears had a median of 4 prior sets of tympanostomy tubes. The mean age of patients who underwent CCT was 35.6 years with a range of 13 to 63 years. There was a mean improvement of 13.8 dB and median of 16.7 dB in air pure tone average hearing levels following CCT. Three ears had worse hearing postoperatively. The longest duration a CCT has been visualized in place and patent appearing is nearly 2.8 years since placement. Of the eighteen CCT placed only three have extruded, eleven were in place after one year, including five in place after two years. **Conclusions:** The cartilage cuffed T-tube can provide long lasting ventilation of the middle ear, with the majority of patients having clinically relevant improvement in hearing levels following placement.

10:40 Q&A

**10:45 - 11:30 COLLABORATIVE PANEL: TRIOLOGICAL SOCIETY AND AMERICAN OTOLOGICAL SOCIETY
OTOLOGICAL MANIFESTATIONS OF INTRACRANIAL HYPERTENSION**

Moderator: Seilesh C. Babu, MD, Warren, MI

Panelists: Joni K. Doherty, MD PhD FACS, Seal Beach, CA
Soha N. Ghossaini, MD FACS, New York, NY
Michael E. Hoffer, MD FACS, Miami, FL
Joe W. Kutz, MD FACS, Dallas, TX

PEDIATRIC OTOLARYNGOLOGY

**Moderators: Alessandro de Alarcon, MD MPH, Cincinnati, OH
Romaine F. Johnson, MD MPH, Dallas, TX**

11:30 Intraoperative Intravenous Ibuprofen Use Is not Associated with Increased Post-Tonsillectomy Bleeding

Nikunj K. Patel, BA, Bronx, NY; Sharan J. Shah, BS, Bronx, NY; Nam K. Lee, BS, Brooklyn, NY; Hoon B. Shim, MD PhD, Manhattan, NY; Veronica P. Carullo, MD, Bronx, NY; Christina J. Yang, MD, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss observed bleeding rates in pediatric tonsillectomy patients who received intraoperative intravenous ibuprofen.

Objectives: Intravenous ibuprofen was approved by the FDA for use in pediatric patients in November 2015. The objective of this study was to compare bleeding rates in pediatric tonsillectomy patients who received intraoperative intravenous ibuprofen versus those who did not. **Study Design:** Retrospective chart review. **Methods:** Charts were reviewed for all patients 0-18 years of age who underwent a tonsillectomy with or without adenoidectomy at a tertiary care children's hospital from 1/1/2017 through 5/21/2018. Demographic information and perioperative medications including the use of intraoperative intravenous ibuprofen were recorded. ED visits and OR takebacks for bleeding were tracked for up to 30 days after surgery. **Results:** 1415 charts were analyzed. Intraoperative intravenous ibuprofen was used in 145 cases (10.2%). 3 (2.07%) of 145 patients who received IV Ibuprofen, and 53 (4.17%) of 1217 patients who did not receive IV Ibuprofen returned to the ED for bleeding. No statistical difference was found between the two groups ($p = 0.22$). 1 (0.69%) of 145 patients from the IV Ibuprofen cohort and 21 (1.65%) of 1270 patients from the non-IV Ibuprofen cohort were taken to the OR to manage bleeding. **Conclusions:** The observed bleeding rate after pediatric tonsillectomy was not statistically different in patients who received intraoperative ibuprofen than those who did not receive this medication.

11:35 Postoperative Prescriptions and Corresponding Opioid Consumption after Tonsillectomy

Stephanie L. Choo, BS, Columbus, OH; Laura A. Matka, MD, Columbus, OH; Stephen J. Nogan, MD, Columbus, OH; Alexander N. Rock, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participant should be able to avoid overprescription of narcotics after tonsillectomy and understand current patterns of overprescription in a cohort of patients with benign disease.

Objectives: Despite increased concern with the opioid epidemic, literature remains scant regarding the relationship between amount of narcotic prescribed and that utilized by patients following tonsillectomy. **Study Design:** Retrospective cohort study and telephone interview. **Methods:** A chart review from January to August 2018 evaluated the difference between prescribed amounts of narcotic and patient reported usage following tonsillectomy (CPT codes 42421 and 42826). Patients using opioids for chronic pain, with history of chronic opioid use or substance abuse, or undergoing tonsillectomy to exclude malignancy were excluded. A telephone interview assessed opioid usage and pain control postoperatively, including amount and form of narcotics remaining. **Results:** Sixty-four patients were enrolled, a mean of 4.47 months after

tonsillectomy. The mean (+/-SD) prescribed morphine milligram equivalent (MME) was 456.07 (281.67); with only 302.82 (206.17) consumed. The mean MME prescribed per day was 74.12 (44.80), and average days of narcotic usage postoperatively was 9.61 (4.58), correlating with a mean MME per day of 32.29 (18.22) if assumed that the maximum prescribed dose per day was consumed. Fifty-four (84.38%) patients reported pain as well controlled. Forty-three (67.19%) patients reported residual narcotic medication, with 228.09 (208.56) MMEs remaining per patient. Narcotic solutions were more completely consumed than tablet forms, with 23.11% and 44.00% remaining, respectively. Patients cited uncertainty about safe disposal and safeguarding for future use as reasons for keeping residual narcotic. Conclusions: Patient reported narcotic use is significantly lower than the amount prescribed after tonsillectomy for benign disease. Providers can use this data to adjust narcotic prescribing patterns while maintaining appropriate pain management for patients undergoing tonsillectomy.

11:40 Implementation of Electronic Pediatric Tracheostomy Care Module to Improve Provider Confidence

Catherina Yang, BA, Bronx, NY; Danielle Bottalico, MD, Bronx, NY; Esther Matta-Arroyo, RRT, Bronx, NY; Christina J. Yang, MD, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the educational value of an electronic module for teaching providers about pediatric tracheostomy care.

Objectives: To describe the effect of a multimedia educational module on provider attitudes towards pediatric tracheostomy care. We will also describe the process of module development and dissemination at our children's hospital. Study Design: Prospective study of an educational intervention. Methods: The pediatric airway committee at our hospital worked with the talent management team to develop an evidence based multimedia pediatric tracheostomy care module. All hospital staff and employees caring for pediatric patients with tracheostomies were eligible. Nurses, physician extenders, respiratory therapists, residents, fellows and attendings from pediatric floors, PICU, NICU, ED, pulmonology, and otolaryngology units and departments were identified and recruited by their clinical supervisors to complete the pediatric tracheostomy care electronic modules, pre- and post-assessment knowledge tests and surveys. The module was also available as a "just-in-time" resource on our hospital intranet. We hypothesize that implementation of the tracheostomy care multimedia training module will result in improved clinical knowledge, confidence, and competence with tracheostomy care. Results: A total of 312 participants completed the pre- and post-module survey, and a total of 151 participants completed the education module in a two month period. Participants included NICU fellows, NICU nurses, PICU fellows, PICU nurses, pediatric hospitalist attendings, and otolaryngology residents. Surveys demonstrated a significant reduction in the average percentage of participants indicating a neutral, not confident, and not at all confident score with regards to changing an established tracheostomy, responding to accidental decannulation of established tracheostomy, and responding to accidental decannulation of fresh tracheostomy (p-value 0.04). Further analysis of module assessments is to be determined. Conclusions: A multimedia educational module is an effective tool to improve provider confidence with management of pediatric tracheostomies.

11:45 Optimizing International Short Term Otolaryngology Service Trips: Perceptions from Learners versus Volunteers

Cameron P. Worden, BS, Roanoke, VA; Elizabeth D. Stephenson, BA, Chapel Hill, NC; Brent A. Senior, MD, Chapel Hill, NC

Educational Objective: Readers should be able to discuss the services that Vietnamese healthcare practitioners perceived most beneficial in short-term medical service trips. Additionally, readers should be able to compare and contrast the viewpoints of the learner versus the volunteer on the value of medical service trips in order to optimize future trips.

Objectives: Optimizing value of medical service trips (MST) requires alignment of the services provided with the needs and desires of hosts. Our aim was to understand which MST services Vietnamese otolaryngologists find most beneficial and contrast to those believed most important by volunteers. Study Design: Cross-sectional study. Methods: Otolaryngologists from a tertiary care institution travel to Vietnam yearly. In March 2018, surveys were distributed to Vietnamese otolaryngology physicians, residents, and volunteers. The value of 11 MST services was graded on a 5 point Likert scale. Services included: observing volunteers perform surgery, volunteer lectures, paper/electronic lecture material, instrument donation, mini-fellowships in the US, among others. Physicians also voted for the single most important service. Responses were analyzed via Kruskal-Wallis ANOVA and Wilcoxon rank sum test. Results: 153 survey responses were recorded, with 59.5% non-professor physicians, 27% residents, and 6.8% professor physicians. 52% identified as male and 39% female. The highest valued services by Vietnamese otolaryngology physicians were didactic lectures given by visiting US physicians (4.6/5 +/-0.6), and reviewing cases with volunteers in clinic (4.4/5 +/-0.9). Least important services were instrument donation and seeing volunteers assist with surgery (<= 4.1/5). Highest value services perceived by US volunteers were reviewing cases in clinic and sponsoring mini-fellowships (4.9 +/-0.4). Vietnamese physicians perceived the single most important service to be US physician lectures (20/74 votes), while Vietnamese residents perceived mini-fellowships to be most important (13/34 votes). Conclusions: Vietnamese otolaryngologists desire an education focused relationship with US physician volunteers, with didactic lectures and sponsored US fellowships having highest value, while performance of actual surgeries having less value.

11:50

Frequency of Post-Tonsillectomy Hemorrhage Relative to Time of Day

Sun Joo Kim, BS, Baltimore, MD; Andrew H. Lee, MD, Baltimore, MD; Ji Soo Kim, MS, Baltimore, MD; Jonathan Walsh, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the rates of post-tonsillectomy hemorrhage relative to time of day.

Objectives: Postoperative hemorrhage is a serious complication of tonsillectomy, with secondary bleeding rates affecting up to 10.4% of patients. While secondary bleed timing has been studied in relation to postoperative days, the occurrence of hemorrhage relative to time of day has not been investigated. The purpose of this study was to assess the frequency of post-tonsillectomy hemorrhage relative to the time of day and determine its association with method of management. Study Design: Retrospective chart review. Methods: Retrospective chart review of tonsillectomy patients seen at a tertiary care hospital between 5/2008-5/2018, with a diagnosis code of post-procedural hemorrhage (ICD-9 998.11, ICD-10 J95.830) was conducted. Patient demographics, time of bleed, and method of hemorrhage control were abstracted. Patients without a recorded bleeding time were excluded. Time of bleed was categorized as morning (6:01am-12pm), afternoon (12:01pm-6pm), evening (6:01pm-12am), or overnight (12:01am-6am). Chi-square goodness of fit test was used to assess the distribution of hemorrhage timing (Pd0.05 significance level). Results: Data were abstracted for 149 patients, from which 60 (mean age 16.4 years) met inclusion criteria. Secondary bleeds occurred in the morning (4, 6.7%), afternoon (12, 20%), evening (18, 30%), and overnight (26, 43.3%) (p=0.0006). N=38 (63.3%) of bleeds required hemorrhage control in the OR, while 22 (36.7%) were observed in the ED. There was no significant association between hemorrhage timing and method of management, age, or gender. Conclusions: Post-tonsillectomy hemorrhage occurred most frequently overnight. These findings confirm our anecdotal experience, provide data in setting caregiver expectations, and may also point to additional physiologic etiologies behind secondary tonsillectomy bleeds.

11:55

Lateral Cervical Abscesses: What NSQIP-P Reveals Regarding Length of Stay, Readmission, and Reoperation

Vijay A. Patel, MD, Hershey, PA; Christopher A. Roberts, MD, Morgantown, WV; Jad Ramadan, MS, Morgantown, WV; Michele M. Carr, DDS MD PhD FRCSC, Morgantown, WV

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the modern perioperative sequelae of lateral cervical abscess incision and drainage among children and compare predictive factors for adverse surgical outcomes.

Objectives: Identify risk factors and determine perioperative morbidity of children undergoing lateral cervical abscess incision and drainage. Study Design: Retrospective analysis of the American College of Surgeons NSQIP-P database. Methods: Patients who underwent lateral cervical abscess incision and drainage at age 1-18 years at the time of surgery were queried via the ACS-NSQIP-P database (2012-2016) using current procedural terminology code 21501. Analyzed outcomes include age, total length of stay, medical comorbidities, operative time, readmission, and reoperation. Results: A total of 1917 children were identified, with a mean age at the time of surgery of 4.05 years (95% CI 3.86-4.25). The mean number of days from hospital admission to surgery was 1.24 days (95% CI 1.16-1.31), with a mean total length of stay (LOS) of 3.64 days (95% CI 3.46-3.82). The mean number of days from hospital admission to surgery was significantly lengthened in younger children (regression coefficient 0.31, p<0.001); however, LOS (p=0.719), readmission (p=0.681), and reoperation (p=0.203) were not statistically significant with respect to age. Furthermore, children in septic shock not only had a prolonged time to surgery but also in parallel a significantly prolonged LOS (p<0.001). Finally, a persistent requirement for postoperative mechanical ventilation was found to be related to a prolonged LOS (p<0.001). Conclusions: Younger children are more likely to have delays from hospital admission to definitive surgical intervention but this does not appear to affect LOS. Recognition of pertinent clinical factors may assist in optimizing perioperative risk assessment and promote safe as well as timely procedural planning in this patient population.

12:00

Low Cost, Easy to Replicate Ventilation Tube Insertion Training System

Nicole L. Molin, MD, Philadelphia, PA; Jerlon Chiu, BS, Farmington, CT; Glenn C. Isaacson, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to construct a low cost ventilation tube insertion training model for use in medical student and resident training.

Objectives: Academic otolaryngologists have described and tested several models for ventilation tube insertion (VTI) training. A recent review by Mahalingam et al. found 11 VTI simulation models, of which only 5 were feasible to replicate. While each has proven useful, none are widely used - partly because of the difficulty and expense of constructing these devices. We aim to present details for construction of a low cost, do it yourself VTI training system and describe its effectiveness in medical student and resident training. Study Design: IRB approved prospective study. Methods: A VTI simulation model was constructed using a 110 mm, resin and hard rubber bocce ball and a laser printed tympanic membrane (TM) target. It was built in a home workshop using consumer grade power tools and less than \$30 USD of materials. The model was used to train senior medical students and junior otolaryngology residents in the basic skills of VTI. These included head positioning, aiming/focusing the operating microscope on a TM target, myringotomy knife radial incision and insertion of an Armstrong tympanostomy tube with micro cup forceps and a curved pick. Performance was evaluated by a single pediatric otolaryngologist using the Dalhousie Tympanostomy Tube Global Performance Scale. Results: After a 30 minute training

session, residents and medical students demonstrated an increase in Dalhousie scores and greater confidence in the operating room. Conclusions: We describe a low cost, do it yourself VTI simulation model for medical students and residents to practice in a safe, low stress environment. We provide the equipment list, materials, construction details, and TM images necessary to reproduce the model.

12:05 **Q&A**

12:10 **Adjourn**

NO AFTERNOON SCIENTIFIC SESSIONS

5:30 - 7:00 **TRIO, ANS, AOS, ASPO MEET THE AUTHORS POSTER RECEPTION**

SATURDAY, MAY 4, 2019

GRAND BALLROOM 6

7:00 - 7:50 **Annual Business Meeting (Triological Fellows only)**

8:00 - 12:00 SCIENTIFIC SESSION

8:00 **Announcements**

FACIAL PLASTIC/RECONSTRUCTIVE SURGERY

8:05 - 8:50 **PLASTIC/RECONSTRUCTIVE SURGERY PANEL: CURRENT TREATMENT OPTIONS FOR FACIAL PARALYSIS**

Moderator: J. Madison Clark II, MD FACS, Chapel Hill, NC

Panelists: Nate Jowett, MD FRCSC, Boston, MA

Jennifer C. Kim, MD, Ann Arbor, MI

Travis T. Tollefson, MD MPH FACS, Sacramento, CA

Moderators: Robert H. Deeb, MD, Detroit, MI

Mark A. Varvares, MD FACS, Boston, MA

8:50 **The Septal Swell Body and Septal Perforation Repair**

Saba Ghorab, MD, Phoenix, AZ; Cullen M. Taylor, MD, Phoenix, AZ; Stephen F. Bansberg, MD, Phoenix, AZ

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the structural and functional characteristics of the septal swell body and its potential role in postoperative nasal obstruction following septal perforation repair.

Objectives: 1) Present our technique for perforation repair utilizing bilateral septal mucosal flaps and an interposition graft; 2) discuss the structural and functional implications of the septal swell body in perforation repair utilizing a superior mucosal flap; 3) review our institutional experience with revision surgery for nasal obstruction following successful perforation repair and the contribution of the swell body to this obstruction. Study Design: Retrospective chart review. Methods: A retrospective chart review was conducted for septal perforation repair by the senior author from October 2008 to October 2018. Those cases undergoing secondary surgery were reviewed for surgical indication, procedure(s) performed, and outcomes. Results: Two hundred eighteen perforation repairs were performed during the study period. Secondary surgery was performed on 28 (12.8%) patients, 27 (12.4%) of these for nasal obstruction. Left sided nasal obstruction with mucosal swelling, representative of the inferiorly displaced septal swell body, appeared to contribute to the nasal obstruction in 18 (8.3%) patients following successful perforation closure. There were no instances of right sided mucosal swelling in our patient series. The septal swell body was thinned in all 18 patients, while additional corrective procedures were performed in 17 patients. All patients reported substantial improvement in nasal obstruction and there was no evidence of re-perforation. Conclusions: Attempted repair of a septal perforation using a superior bipedicle flap carries the risk of the septal swell body contributing to post repair nasal obstruction. The swell body can be thinned, without re-perforation, as part of the surgical plan to relieve nasal obstruction.

8:55 **Free Functional Gracilis Flaps for Facial Reanimation in Seniors**

Andrew H. Lee, MD, Baltimore, MD; Lisa E. Ishii, MD, Baltimore, MD; Patrick J. Byrne, MD

FACS MBA, Baltimore, MD; Shaun C. Desai, MD, Baltimore, MD; Masaru Ishii, MD PhD,

Baltimore, MD; Kofi D. Boahene, MD FACS, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the effectiveness and associated morbidity of free functional gracilis flaps for facial reanimation among senior and younger patients.

Objectives: Free functional gracilis flaps (FFGF) are versatile procedures in dynamic facial reanimation, yet its application in senior patients is often limited by perceptions of efficacy and morbidity. The objective of this study was to compare the effectiveness and associated morbidity of FFGF reanimation among senior and younger patients. Study Design: Retrospective chart review. Methods: The charts of 14 consecutive patients aged 60 and above (seniors) who underwent FFGF between 2015 and 2017 were selected for review. 14 patients aged 40 and below (juniors) were selected for comparison. The main outcome measures were postoperative stay, intra and postoperative complications, restoration of facial tone measured by facial asymmetry index (FAI), and visible maxillary dentition. Results: The average age of seniors was 67.2 and juniors was 27.3 years. Mean and median lengths of postoperative stay were 3.64 and 3.0 days amongst seniors and

3.07 and 3.0 amongst juniors. There were no major intraoperative complications in both groups. Postoperatively, 1/14 (7%) seniors developed a donor site seroma, while 2/14 (14%) juniors developed facial hematomas. There was functional muscle recovery in all cases. The width of visible maxillary teeth improved an average of 13.3mm in seniors compared to 4.9mm amongst juniors. The mean smiling FAI decreased from 7.6 to 5.8mm in seniors and 5.3 to 2.0mm in juniors. Conclusions: The FFGF is equally effective for facial reanimation among seniors and juniors and can be safely performed without significant morbidity. Age alone should not preclude the application of the FFGF in seniors with a preference for more dynamic options.

9:00 The Bernoulli Obstruction Theory: A Possible Explanation for Septoplasty Failure Rates

David A. Campbell, MD, Milwaukee, WI; Masoud G.H. Moghaddam, PhD, Milwaukee, WI;
John S. Rhee, MD MPH, Milwaukee, WI; Guilherme J.M. Garcia, PhD, Milwaukee, WI

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand how nasal resistance to airflow depends on the airspace minimal cross-sectional area in patients with nasal airway obstruction. Participants will learn about a potential explanation of why patients with moderate septal deviations may not respond to septoplasty as expected.

Objectives: Inability to predict response to septoplasty in cases of moderately significant septal deviations has been frustrating for clinicians. Acoustic rhinometry (AR) and rhinomanometry, measuring minimal cross-sectional area (mCSA) and resistance (R), have not been as helpful as hoped to predict responders. An inverse relationship between mCSA and R is expected, but strong correlation has not been shown in the literature. A recent study proposes the Bernoulli obstruction theory as an explanation. This predicts a tight coupling between mCSA and R only below a critical mCSA (acrit), when resistance is dominated by a single constriction. The goal of this study was to systematically investigate this relationship. Study Design: Retrospective. Methods: Nasal anatomies of ten healthy subjects were acquired from computed tomography scans. Geometry deforming software was used to create anterior septal deviations with increasing severity. Computational fluid dynamics simulations were performed to quantify resistance and mCSA on the unaltered and four deviated septa for each subject (50 total models). Results: Results were consistent with the theoretical prediction showing a much tighter coupling in the relationship between mCSA and R when $mCSA < acrit$. Acrit is estimated to be 0.21 cm². Conclusions: Tight coupling between mCSA and R is predicted only below an acrit of 0.21 cm², which represents a severe constriction. When preoperative mCSA is above 0.21 cm², septoplasty would produce a smaller and less predictable change in nasal resistance. This may begin to explain why some patients with less than severe deviations do not more predictably respond to septoplasty.

9:05 Body Dysmorphic Disorder in Adult Cleft Patients: An Unseen Psychological Burden of Orofacial Clefts

Eva J. Stein, BS, Chapel Hill, NC; Wesley H. Stepp, PhD, Chapel Hill, NC; Michael Canfarotta, MD, Chapel Hill, NC; Mara Buchbinder, PhD, Chapel Hill, NC; Amelia F. Drake, MD, Chapel Hill, NC;
J. Madison Clark, MD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the psychological strain that orofacial clefts have outside of childhood.

Objectives: There is emerging literature describing body dysmorphia (BDD) of the face, where the individuals are preoccupied with one or more nonexistent or slight defects or flaws in their facial appearance termed facial dysmorphic disorder (FDD). The presence of a cleft lip and/or palate (CL/P) creates the need for multiple surgeries and a variety of clinical care visits that shapes an individual's experience as both a child and an adult. Little literature exists on the lasting psychological impacts that orofacial clefts can exert on patients in adulthood. In this study, we attempted to characterize the severity of FDD symptoms in an adult cleft cohort. Study Design: Prospective, single center, case control study. Methods: Twenty-four (24) adult CL/P patients (case group) and 20 noncosmetic, facial plastics patients without CL/P (control group) were surveyed using a standardized, quantitative symptom assessment tool for body dysmorphic symptoms, the BDD-YBOCS index. Results: Adult CL/P patients were more likely to have clinically significant FDD symptoms (BDD-YBOCS >16) than a non-CL/P patient population being seen for noncosmetic reconstructive surgery (OR 15.2, CI95 1.7-139.3) with FDD symptoms scores 3.5-fold higher than controls ($p < 0.0001$; CI95 5.2-15.6). Obsession and compulsion category subscores were significantly higher in CL/P versus the control population (3.1-fold and 3.9-fold, respectively). Conclusions: These findings suggest that CL/P patients experience significant obsessive and compulsive symptoms with respect to their appearance and emphasizes the importance of recognizing psychological symptoms in the ongoing surgical and medical care of adult cleft patients.

9:10 Q&A

LARYNGOLOGY/BRONCHOSOPHAGOLOGY

**Moderators: Paul C. Bryson, MD FACS, Cleveland, OH
Nausheen Jamal, MD, Edinburg, TX**

**9:15 Assessment of Fiberoptic Endoscopic Evaluation of Swallowing (FEES) Findings in
Individuals with Zenker's Diverticulum and Cricopharyngeal Bar**
David J. Weiland, BS, Orange, CA; Sunil P. Verma, MD, Orange, CA (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the diagnostic utility of FEES findings in patients with Zenker's diverticulum (ZD) and cricopharyngeal bar.

Objectives: To determine the sensitivity and specificity of findings on FEES studies for individuals with cricopharyngeal bar and Zenker's diverticulum. Study Design: Retrospective chart review at a university tertiary referral center. Methods: All individuals diagnosed with cricopharyngeal bar or ZD over an eight year period were identified and those with a FEES study were included. Demographic data, radiographic study findings, and treatment data were recorded. FEES studies were independently reviewed and findings noted. FEES findings were compared across three groups based on presence of either a cricopharyngeal bar, a ZD sized between 1 and 3 centimeters, or a ZD larger than 3 centimeters. Results: Forty-six individuals met inclusion criteria. Thirty-five patients with ZD and eleven patients with cricopharyngeal bar were included. Post-swallow hypopharyngeal reflux (PSHR) of pureed food, present with or without Valsalva maneuver, was noted in 18% of individuals with a cricopharyngeal bar, in 84% of those with ZD less than 3 centimeters, and in 70% of those with ZD greater than 3 centimeters. The sensitivity and specificity of PSHR for those with ZD was 80% and 82%, respectively. PSHR resolved in 79% of the patients who underwent surgery. In the five patients with persistent PSHR, four patients underwent revision surgery with PSHR subsequently resolving. One patient with persistent PSHR was asymptomatic and did not choose to undergo revision surgery. Conclusions: PSHR is a very good tool to identify the presence of a ZD and is much less helpful to identify a cricopharyngeal bar.

**9:20 The Safety and Efficacy of Open Bedside Tracheotomy (OBT): A Retrospective Analysis of
1000 Patients**

David Z. Liao, BE, Bronx, NY; Vikas R. Mehta, MD MPH, Bronx, NY; Corin Kinkhabwala, BS, Bronx, NY; Daniel Li, BS, Bronx, NY; Thomas J. Ow, MD, Bronx, NY; Bradley A. Schiff, MD, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand evidence supporting the use of open bedside tracheotomy (OBT) as well as factors predicting its outcomes.

Objectives: To evaluate the safety/efficacy of performing OBT in ICU patients and identify predictive factors for outcomes. Study Design: Retrospective cohort. Methods: We identified 1000 consecutive patients undergoing OBT starting from 8/1/07. Demographics, time to surgery (TTS) from consult, ICU duration, decannulation rate, complication rates, and mortality rate were analyzed. Multivariate analysis was performed to identify predictors of outcome measures. Results: Mean TTS was 1.6 days. Total complication rate was 12.8% (major complication rate of 0.8%). One major bleeding episode and no stoma infections were reported. Inpatient mortality rate was 27.4%. No deaths were related to tracheotomy. Decannulation rate was significantly increased with obesity (OR 1.990). Complication rate was significantly increased in patients with prior tracheotomy (OR 4.756) and obesity (OR 2.036). Inpatient mortality was significantly increased in patients using vasopressors (OR 2.318) and decreased with obesity (OR 0.614). Thirty day readmission rate was significantly increased with increased age (OR 1.019) and non-white race (OR 2.387). Inpatient mortality was lower in patients who received tracheotomy within 10 days of intubation. Conclusions: This study demonstrates the safety and efficacy of OBT in a highly comorbid population with no strict selection criteria. Compared to published data, OBT allowed for shorter TTS than OR tracheotomy. Safety of OBT was supported by minimal major complication rates, absence of stoma infections, and no tracheotomy related deaths in our cohort. Our complication rate was comparable to/lower than published studies of OBT and percutaneous techniques. Predictive factors for decannulation, complication, mortality, and readmission rates were identified. Early tracheotomy corresponded with reduced inpatient mortality.

**9:25 Early Endoscopic Intervention for the Treatment of Acute Laryngeal Injury and
Laryngotracheal Stenosis**

Anne S. Lowery, BA, Nashville, TN; Alexander H. Gelbard, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participant should be able to discuss if early intervention in postintubation laryngeal injury was associated with improved functional outcomes when compared with intervention in mature posterior glottic stenosis.

Objectives: Patients with laryngeal injury following endotracheal intubation often present long after initial injury with mature fibrosis compromising cricoarytenoid joint mobility and glottic function. The objective of this study was to investigate if early intervention in postintubation laryngeal injury was associated with improved functional outcomes when compared with intervention in mature posterior glottic stenosis. Study Design: Prospective cohort study involving 29 patients with postintubation laryngeal injury treated at a single tertiary care medical center. Methods: Ten patients with fresh injuries (mean 25.9 days to presentation; IQR 1.5-44.8) were compared with 19 patients with mature posterior glottic stenosis

(288.75; 132.73-376.25). Patient specific, injury specific, and intervention specific covariates were compared using unpaired Student t-test or χ^2 . Time to tracheostomy decannulation was assessed using log rank statistics. Results: The patient groups had similar demographics and injury specific covariates. Patients with fresh lesions received the first intervention 29.7 days postintubation, compared to those with mature lesions at 400.3 days ($p < 0.001$). Fresh lesions required fewer endoscopic interventions ($p < 0.001$) and no open reconstruction as compared to mature lesions, in which 89% required open reconstruction ($p = 0.001$). The time to tracheostomy decannulation was shorter in patients with fresh lesions (57 vs. 155 days; $p = 0.03$). 86% of patients with fresh lesions and 65% of patients with mature lesions were decannulated at last followup ($p = 0.08$). Conclusions: Early intervention in laryngeal injury after intubation shows promising results in restoring some degree of laryngeal function, decreasing the number of interventions and eliminating the need for invasive open reconstructions. Furthermore, early intervention decreases the duration of tracheostomy dependence.

9:30 Adult Epiglottitis: Trends and Predictors of Mortality in Over 30,000 Cases from 2007 to 2014

Jonathan M. Hanna, BS, New Haven, CT; Philip R. Brauer, BA, New Haven, CT; Elisa R. Berson, BS, New Haven, CT; Saral Mehra, MD MBA, New Haven, CT

Educational Objective: At the conclusion of this presentation, the participants should know the characteristics of contemporary adult epiglottitis patients, trends in the disease pattern over the last decade, and predictors of mortality in adult epiglottitis. Additionally, participants should be aware of potential concerns regarding the diagnosis and management of adult epiglottitis in the emergency department.

Objectives: To analyze contemporary trends and mortality in adult epiglottitis in the emergency department (ED). Study Design: Retrospective review. Methods: We utilized the Nationwide Emergency Department Sample to study all cases of adult epiglottitis from 2007 to 2014. Weighted cases were analyzed for trends. Predictors of mortality were identified via univariate and multivariate logistic regression. Results: Over the eight year period, 33,549 (weighted) cases of adult epiglottitis presented to the ED. The average age increased over the study period, from 47 to 51 (R-squared > 0.5). Patients were typically middle aged, lower income males living in urbanized settings. Less than 10% received either x-ray or CT, while 68.3% of cases were admitted to the hospital. 11.8% of patients were obstructed, while less than 1% received a laryngoscopic or airway procedure in the ED. During the study period, an average of 42 patients died each year (mortality rate = 1.01%). No interventions were significantly associated with mortality on univariate ($p < 0.05$). Patient age, degree of hospital urbanization, and smoking status were not significantly associated with mortality on multivariate. Conclusions: Adult epiglottitis remains a significant pathology seen in the ED in the United States. Males, obstructed patients, and those in rural settings were 3-5x more likely to die. Although 1% of patients died of this condition, our data demonstrated a negligible rate of laryngoscopic and airway procedures in the ED, which indicates that physicians are not recognizing the need for early intervention in adults with epiglottitis, suggesting that deaths may be preventable through higher utilization of tools for early identification and rapid airway intervention.

9:35 Q&A

9:40 Feasibility of Early Discharge after Open Hypopharyngeal Surgery

Jena C. Patel, BS, Philadelphia, PA; Joseph Spiegel, MD, Philadelphia, PA; Michael C. Topf, MD, Philadelphia, PA; Maurits Boon, MD, Philadelphia, PA; Colin Huntley, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the efficacy of early return to oral diet and early hospital discharge in patients receiving open surgery for hypopharyngeal defects.

Objectives: To determine the rate of postoperative complications, unplanned readmission, and functional status in patients after open hypopharyngeal surgery with early return to oral diet and hospital discharge. Study Design: Retrospective chart review of all patients who underwent open cricopharyngeal myotomy or open treatment of hypopharyngeal diverticula from March 2013 to June 2018. Methods: A clear liquid diet is restarted the day of surgery and is advanced to a soft diet on postoperative day one. Primary outcomes were postoperative complications, unplanned readmission within 30 days of discharge, and functional oral intake status on followup. Multivariable logistic regression was performed to identify risk factors for unplanned readmission. Results: Ninety patients met eligibility criteria. Preoperatively, 53 patients had cricopharyngeal dysfunction, 35 had Zenker's diverticula, and 2 had Killian-Jameson diverticula. Average inpatient length of stay was 2.01 ± 2.05 days. Six patients had postoperative complications (6.7%); the most common complication was esophageal leak ($n = 5$). Two of these patients required further operative intervention. Seven patients (7.8%) had unplanned readmissions within 30 days. Average time to unplanned readmission was 12 days (range 2-19/days). Open diverticulectomy was independently associated with an increased risk of 30 day unplanned readmission as compared to open myotomy on multivariable analysis with an OR = 9.063 (95%, $p = 0.43$, 1.052, 78.055). Average time to oral intake postoperatively was 0.54 ± 1.51 days. At last followup, 80% of patients felt they had improved symptoms or resolution of their dysphagia (0.8 ± 1.07 years). Conclusions: Early oral intake and early discharge after open intervention for hypopharyngeal dysphagia is safe with low unplanned readmission and complication rates.

9:45 Factors Associated with Failure of Electromyography Guided Botox Injection in Adductor Spasmodic Dysphonia

Kevin Y.H. Zhao, MD, Vancouver, BC Canada; Amanda C.M. Hu, MD, Vancouver, BC Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss factors associated with failure of electromyography guided Botox injection in adductor spasmodic dysphonia.

Objectives: Electromyography (EMG) guided botulinum toxin (BT) injection is currently considered first line treatment for adductor spasmodic dysphonia. Failure rate can range between 6-30%. The objective of this study was to determine which factors were associated with failure. Study Design: Single center retrospective chart review. Methods: Adductor spasmodic dysphonia patients presenting for BT injections from August 1, 2017 to July 31, 2018 were eligible. Age, gender, Voice Handicap Index (VHI-10), number of injections, disease duration, unilateral versus bilateral injection, dose quantity, body mass index (BMI), professional voice user, employment status, psychiatric comorbidity, duration of breathiness, duration of dysphagia were investigated. Outcomes included failure as defined by the patient and dosage change. Univariate and multivariate statistical analysis was conducted. Results: Fifty-seven out of 417 injections (13.7%) were categorized as failure by the patients (21% male, mean age 58.35). Failure rate was not associated with age, gender, VHI-10, disease duration, dose quantity or BMI. Failure rate was associated with first injection with a new physician ($p=0.006$), professional voice user ($p=0.0043$), employment status ($p=0.005$) and psychiatric comorbidity ($p=0.047$). Dosage change occurred in 127 (30.5%) of injections and was associated with bilateral versus unilateral injection ($p=0.006$), breathiness ($p=0.0001$) and dysphagia ($p=0.0001$). Conclusions: Our center's failure rate was 13.7%, which is within the range reported in the literature. Failure was associated with patients' first injections with a new physician, professional voice user, employment and psychiatric comorbidities. Dosage change occurred in 30.5% of injections and was associated with injection side effects and bilateral injections.

9:50 Superior Laryngeal Nerve Block for Neurogenic Cough

Vaninder K. Dhillon, MD, Bethesda, MD; Kristine Pietsch, MA, Bethesda, MD; Michelle Wilson, MA, Bethesda, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the option of a superior laryngeal nerve block with lidocaine for patients with neurogenic cough that have completed cough suppression therapy and do not want to consider neuromodulators.

Objectives: To discuss the efficacy of a superior laryngeal nerve (SLN) block with lidocaine as an option for patients who have undergone cough suppression therapy with minimal benefit and do not desire neuromodulators. Study Design: Prospective study. Methods: This is a longitudinal study evaluating the role of a superior laryngeal nerve (SLN) block to one or both SLN in 15 patients who have undergone cough suppression therapy at least once with a speech language pathologist and have not been on neuromodulators. Followup is at least 6 months. The cough severity index is the outcome that is measured longitudinally. Results: We find that at least 2/3 of the patients in this study that underwent at least one superior laryngeal nerve showed significant improvement in cough severity index during their longitudinal followup. Long term followup is ongoing with results pending. Conclusions: There is a role for superior laryngeal nerve block with lidocaine for patients with neurogenic cough that can be considered as an alternative to neuromodulators. Long term followup is ongoing

9:55 Emergent Surgical Airways in Residency: An Assessment of Competence and a Teaching Model

Sarah Khayat, MD, Chicago, IL; Stephanie A. Joe, MD, Chicago, IL; Jessica L. Hootnick, MD, Boston, MA; Sheena Samra, MD, Chicago, IL; Brian M. Sweis, BS, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate that resident competence in performance of a surgical airway is significantly improved by didactic intervention in a simulated clinical scenario and be able to discuss ways in which this intervention may be utilized in training programs to further resident education.

Objectives: This study assesses resident competence in performance of a cricothyroidotomy and the impact of didactic intervention on that performance across medical and surgical specialties and resident education levels. Study Design: This is an analytic cross-sectional study in the form of a combined survey and didactic intervention that seeks to assess the impact of didactic training on resident performance and knowledge of cricothyroidotomies. Methods: Residents of four different specialties (otolaryngology, emergency medicine, general surgery, and anesthesiology) of varying levels of training were recruited. Participants performed a pre-didactic knowledge based survey and procedural assessment on a certified Laerdal Deluxe Difficult Airway Trainer. This was followed by a didactic intervention which included a PowerPoint and NEJM video featuring the background and proper technique of performing a cricothyroidotomy. The participants then repeated the knowledge based survey and procedural assessment. The three outcomes measured included survey score, time to complete the procedural assessment, and procedural assessment score, as judged by two impartial third parties. Results: There was significant improvement on all three outcomes measures in the experimental group that received a didactic intervention (survey score increased: $F=19.45$, $p<0.0001$; procedure time decreased: $F=11.87$, $p<0.01$; procedure skill score increased: $F=7.74$, $p<0.01$). Conclusions: Cricothyroidotomies are rare lifesaving surgical procedures that are performed in specific clinical scenarios in which a practitioner can neither intubate nor ventilate a patient. Currently, there is a dearth of effective surgical airway procedural training among surgery and emergency departments. Simulation of this

procedure in the context of effective didactic intervention can offer residents involved in airway management the tools and confidence required to perform a cricothyrotomy in a real life clinical scenario.

10:00 Q&A

10:05 - 10:35 Break in Exhibit Hall/View Posters

ALLERGY/RHINOLOGY

10:35 - 11:20 ALLERGY/RHINOLOGY PANEL: NEW BIOLOGICS FOR CRS

Moderator: Jean Kim, MD PhD FACS, Baltimore, MD

Panelists: Joseph K. Han, MD, Norfolk, VA
Timothy L. Smith, MD MPH FACS, Portland, OR
Michael G. Stewart, MD MPH FACS, New York, NY
Erica R. Thaler, MD FACS, Philadelphia, PA

**Moderators: Murugappan Ramanathan, MD FACS, Bethesda, MD
Elie E. Rebeiz, MD FACS, Boston, MA**

11:20 Comparison of Eosinophilic/Noneosinophilic Inflammation in Chronic Rhinosinusitis with Nasal Polyps between Patients by Generations

Yasuyuki Noyama, MD PhD, Stanford, CA; Misato Hirai, MD PhD, Okayama, Japan; Kiyoko Nakai, MD PhD, Okayama, Japan; Peter H. Hwang, MD, Stanford, CA; Jayakar V. Nayak, MD PhD, Stanford, CA; Mitsuhiro Okano, MD PhD, Narita, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to know chronic rhinosinusitis with nasal polyps phenotypes changing in Asian population.

Objectives: Increases in tissue eosinophilia in chronic rhinosinusitis with nasal polyps (CRSwNP) have been reported in several Asian countries, an observation that is known as eosinophilic shift. However, there are no long term historical cohort studies in the world. **Study Design:** We examined a retrospective cohort to determine the alteration of eosinophilic/noneosinophilic inflammation in sinonasal tissues in Japanese CRS. **Methods:** We quantified eosinophils and neutrophils from nasal specimens derived from both past (1960s, 1970s, 1980s and 1990s) and recent surgeries (after 2010). Furthermore, we investigated blood eosinophils derived from both past (between 1990-1999) and recent (after 2010) in both Japanese and United States (US) populations. **Results:** The number of tissue eosinophils was significantly larger in both 1990s and after 2010 than others (1960s, 1970s and 1980s). There was no difference between 1990s and after 2010. The number of neutrophils was no difference among each generation. In blood level, eosinophils in after 2010 are significantly higher than before 2000 in Japanese population. However, there was no difference between 1990s and 2010s in US population. **Conclusions:** We hypothesize that eosinophilic shift in Japan occurred between 1990-1999. This shows the reason why eosinophilic CRS (ECRS) has increased is not only genetics but also environmental factors, such as increases in the comorbidity of respiratory diseases including allergic rhinitis and bronchial asthma, a westernization of the Asian lifestyle. However, the answer remains unknown. Assessment of the global representation of eosinophil shifts in east Asia including Japan will contribute to our understanding of the evolution of ECRS and its impact on upper airway health.

11:25 Comparison between Steroid Eluting Implants versus Nonabsorbable Packing as Middle Meatal Spacers Following Endoscopic Sinus Surgery: A Prospective Randomized Trial

Jordan W. Rawl, MD, Galveston, TX; Robert A. McQuitty, MS, Galveston, TX; Mashfee Khan, BA, Galveston, TX; Yong F. Kuo, PhD, Galveston, TX; Mohamad R. Chaaban, MD, Galveston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the efficacies of nonabsorbable packs to steroid eluting absorbable stents as middle meatal spacers after endoscopic sinus surgery in patients with chronic rhinosinusitis (CRS) and to correlate middle meatal spacing efficacy to SNOT-22 clinical outcome measures.

Objectives: To compare the efficacies of nonabsorbable packs to steroid eluting absorbable stents as middle meatal spacers after endoscopic sinus surgery in patients with chronic rhinosinusitis (CRS) and to correlate middle meatal spacing efficacy to SNOT-22 clinical outcome measures. **Study Design:** Prospective, randomized blinded study. **Methods:** CRS patients were randomly assigned to receive either nonabsorbable middle meatal spacers (merocel packs wrapped in non-latex glove) or steroid eluting stents. SNOT-22 scores were collected preoperatively and postoperatively at intervals of 10 days, 2 weeks, 1 month and 3 months. Video recordings of the postoperative nasal endoscopies were also captured at each postoperative visit and used for Lund Kennedy scoring and middle turbinate lateralization (0-10) by a blinded reviewer. **Results:** Forty CRS patients were prospectively enrolled in this study. Patients that had middle meatal spacers with Merocel packing had significantly lower middle turbinate lateralization scores and lower scores of edema early in the postoperative period ($p = 0.0404$). This difference remained at later postoperative visits but was not statistically significant (p

= 0.0816). Quality of life as measured by SNOT-22 was not statistically different between the two packing types ($p = 0.9170$). Conclusions: In this study, nonabsorbable packing materials demonstrated significantly superior middle meatal spacing capacities in the early postoperative period as evidenced by lower Lund Kennedy scores. Packing type did not have effect on quality of life scores. The clinical significance of packing type choice and middle meatal spacing effect warrants further and longer term study to determine effects on quality of life and needs for revision surgery.

11:30 Risk Factors Associated with Increased Opioid Use Following Endoscopic Sinus Surgery

Ido Badash, BA, Los Angeles, CA; Christopher G. Lui, BA, Los Angeles, CA; Kevin Hur, MD, Los Angeles, CA; Joseph R. Acevedo, MD MAS, Los Angeles, CA; Elisabeth H. Ference, MD MPH, Los Angeles, CA; Bozena B. Wrobel, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the patient characteristics and surgical factors that are associated with increased need for opioid analgesia following endoscopic sinus surgery for chronic rhinosinusitis.

Objectives: The opioid crisis is a public health emergency. There is limited evidence regarding which patients will require additional pain medication following endoscopic sinus surgery (ESS). The objective of this study is to determine the risk factors associated with increased need for opioid analgesia in the first 24 hours following ESS. Study Design: Retrospective chart review. Methods: Patients routinely admitted to the hospital following ESS for chronic rhinosinusitis between January 2017 and October 2018 were identified. Opioid consumption was quantified for each patient and converted to a morphine equivalent dose (MED). Sociodemographic characteristics as well as surgical procedures performed were compared. Results: A total of 51 patients (43% female) were included for analysis. The mean MED per patient for the first 24 hours following ESS was 33.6 milligrams, and the mean pain intensity was 2.7/10. Increasing pain scores were strongly associated with increasing MED ($R=0.864$, $p<0.001$). Patients with a preexisting opioid prescription required significantly higher MED in the first 24 hours than those who were opioid naïve (91.7 mg vs 27.3 mg, $p<0.001$). Patients taking antidepressants also required significantly higher MED than other patients (48.6 vs. 24.1, $p=0.029$). The mean MED was significantly higher for smokers than non-smokers (69.1 vs. 30.6, $p=0.03$), and for patients undergoing DRAFIIB/DRAFIID procedures compared with those undergoing simple ESS (54.3 vs 28.6, $p=0.033$). Conclusions: Patients undergoing ESS for chronic rhinosinusitis require different amounts of opioid analgesia for pain control in the immediate postoperative period. A history of current opioid use, antidepressant use, or smoking was associated with increased opioid consumption postoperatively.

11:35 Failure Pressure of Dural Repairs Using a Novel Reconstruction with Titanium Clips in a Porcine ex vivo Model

Kevin T. Chorath, BS, San Antonio, TX; Jacob S. Majors, MD, San Antonio, TX; Philip G. Chen, MD, San Antonio, TX; Mason R. Krynski, MD, San Antonio, TX; Kevin C. McMains, MD, San Antonio, TX; Leonid A. Bunegin, BS, San Antonio, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the failure pressures of commonly used and novel dural repair methods for large skull base defects.

Objectives: The objective of this study was to determine the failure pressure of a novel dural reconstruction using fascia lata held in place with titanium clips against more commonly used methods including DuraGen underlay with Tisseel glue and DuraGen underlay with DuraSeal glue. Study Design: An established ex vivo model was used to test the repair methodologies. Methods: The failure pressure of the three dural repairs was determined in a closed testing apparatus. 24 mm X 19 mm defects in porcine dura were created and 40 mm X 34 mm underlay DuraGen grafts (Integra) were used with either Tisseel (Baxter International Inc.) (TS/DG) or DuraSeal (Integra) (DS/DG). Further, a 24 mm X 19 mm segment of fascia lata was positioned flush to the edges of the dural defect and secured with AnastoClips (LeMaitre Vascular Inc.) (AC/FL). Saline was infused at 30 ml/hour to simulate increasing ICP applied to the undersurface of the grafts until the repairs failed. Five trials per dural repair method were performed for a total of 15 trials. Results: The mean failure pressure of the DS/DG repair was 34.506 ± 14.822 cmH₂O, TS/DG was 12.413 ± 5.114 cmH₂O, and AC/FL was 8.330 ± 3.483 cmH₂O. There was a statistically significant difference in mean failure pressures among the three repair methods. Conclusions: The repairs that utilized DS/DG tolerated the greatest amount of pressure and was the only repair that could have withstood physiologic ICP's. Repair methods utilizing glues tolerated higher pressures compared to clips alone.

11:40 Turbinate Grafts for Reconstruction of Sellar Defects

Tara J. Wu, MD, Los Angeles, CA; Marvin Bergsneider, MD, Los Angeles, CA; Marilene B. Wang, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to: 1) identify the inferior turbinate free mucosal graft (ITFMG) and middle turbinate flap (MTF) as adjunctive techniques for repair of large sellar defects; 2) describe indications for usage during sellar reconstruction, such as to supplement a nasoseptal flap (NSF) or when a NSF is not available; and 3) explain how to perform an ITFMG or MTF intraoperatively after reviewing video demonstrations.

Objectives: At our institution, sellar defects after anterior skull base tumor resection are repaired with the following algorithm: fat graft (FG) + septal free mucosal graft (SFMG) ± rigid fixation for low grade cerebrospinal fluid (CSF) leaks, and FG

+ pedicled nasoseptal flap (NSF) ± rigid fixation for high grade leaks. However, sellar reconstruction in certain cases, particularly revision surgery, remains challenging, due to scar tissue or lack of availability of the NSF. We report a novel technique utilizing inferior turbinate free mucosal graft (ITFMG) or middle turbinate flap (MTF) as an adjunctive technique for repair of large sellar defects. Study Design: Retrospective case series. Methods: Retrospective case series at a single tertiary academic medical center of all patients undergoing anterior endoscopic skull base surgery from 2008 to 2018. Results: Two patients underwent ITFMG reconstruction, and six patients underwent MTF reconstruction, either to provide additional coverage of the sella during primary reconstruction or for secondary reconstruction following a postoperative CSF leak. The surgical steps will be demonstrated with video. The ITFMG was placed around the SFMG or NSF to cover the entire FG. The posteriorly pedicled unilateral or bilateral MTF was rotated to cover the leak site at the lateral edges of the preexisting NSF. There were no postoperative CSF leaks following turbinate reconstruction. Postoperative nasal endoscopy showed 100% flap/graft take. Conclusions: ITFMG and MTF can be added to the armamentarium of primary or secondary reconstruction of CSF leaks from large sellar defects. This technique is particularly useful to supplement a NSF, or when a NSF is not available.

11:45 **Sinonasal Quality of Life Declines in Cystic Fibrosis Patients with Pulmonary Exacerbations**
Chetan Y. Safi, MD, New York, NY; Emily A. Dimango, MD, New York, NY; Claire L. Keating, MD, New York, NY; Zian Zhou, BS, New York, NY; David A. Gudis, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the relationship between chronic rhinosinusitis symptomatology and pulmonary exacerbations in patients with cystic fibrosis.

Objectives: In cystic fibrosis (CF) patients, the relationship between chronic rhinosinusitis (CRS) symptoms and pulmonary disease is not well described. The purpose of this study is to compare sinonasal outcome test (SNOT-22) scores between CF patients with a pulmonary exacerbation and CF patients at their pulmonary baseline, to determine if pulmonary exacerbations are associated with worse CRS symptomatology. Study Design: Cross-sectional study. Methods: Patients over 18 years old seen in a CF Foundation accredited care center were recruited to complete the SNOT-22 survey. Patients started on antibiotics for worsening pulmonary status represented the exacerbation cohort. Clinically stable patients represented the baseline cohort. Average SNOT-22 scores between these two groups were compared using a two sample t-test. Results: 103 patients were enrolled over 3 months with 30 in the exacerbation group and 73 in the baseline group. The average age of patients was 32 years old with 56% females and 44% males. The percent predicted of forced expiratory volume in one second (FEV1) was higher for baseline patients (67.8%) compared to exacerbation patients (53.6%) (p=0.002). The average SNOT-22 score for exacerbation patients (38.4) was significantly higher than for baseline patients (25.4) (p = 0.001) with the rhinologic (p=0.0009), extranasal rhinologic (p=0.0001), sleep dysfunction (p=0.019), and psychological (p=0.002) subdomains also statistically higher for the exacerbation cohort. Conclusions: This study demonstrates that patients treated for a pulmonary CF exacerbation have worse sinus symptoms at the time of exacerbation than patients at their baseline health. This finding indicates that worsening sinus inflammation may be associated with poorer pulmonary health.

11:50 **Workforce Analysis of Practicing Rhinologists in the United States**
Thomas Edward Heineman, MD, Los Angeles, CA; Peter H. Hwang, MD, Palo Alto, CA;
Jivianne T. Lee, MD, Los Angeles, CA; Marilene B. Wang, MD, Los Angeles, CA; Jeffrey D. Suh, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the geographic, demographic makeup, as well as changes in rhinology workforce in the United States.

Objectives: The objective of this study is to analyze the current rhinology workforce in the United States in terms of demographics, fellowship training, and regional distribution. Study Design: A database analysis. Methods: The American Rhinologic Society (ARS) member database for self-reported workplace zip code, age, gender, and fellowship training of practicing rhinologists through 2017 in the United States was reviewed. Each rhinologist was assigned to a specific hospital referral region (HRR) determined by the Dartmouth Healthcare Atlas to assess geographic distribution. Results: There were 297 ARS members who identified themselves as rhinologists, of which 69.2% were fellowship trained (FTR). The median age of FTRs and non-FTRs were 41 and 54 years, respectively (p<0.001). 80.9% of FTRs were male compared to 85.7% non-FTRs. HRRs with the most rhinologists were Los Angeles, Boston, and Manhattan, all with 14. Approximately 100,000,000 people live in HRRs without a practicing rhinologist. The largest HRRs without a rhinologist was Arlington, Virginia with greater than 2,000,000 people. The HRR with the highest rhinologist density was San Mateo County, California (133,047 people per rhinologist). The median density was 747,864 people per rhinologist, which is our assumed optimal density. Given this density, the estimated ideal number of rhinologists in the United States is 401. Conclusions: There is a potential need for rhinologists in select parts of the country. Given the recent growth of rhinology fellowships, the number of FTRs is expanding at approximately 16% per year. While the ARS database is likely an underestimation, with the current training rate we may pass the ideal number of rhinologists within 5 years.

11:55 **Q&A**

12:00 - 1:00 **Lunch Break**

GRAND BALLROOM 6
GENERAL OTOLARYNGOLOGY

1:00 - 1:50 PANEL: OTOLARYNGOLOGY EDUCATION FROM MEDICAL SCHOOL THROUGH MOC

Moderator: Liana Puscas, MD MHS MA FACS, Durham, NC

Panelists: MOC and the ABOHNS

Brian Nussenbaum, MD FACS, Houston, TX

Lifelong Learning Resources

Richard V. Smith, MD FACS, Bronx, NY

Virtual Reality, Augmented Reality and High Fidelity Simulation

Gregory J. Wiet, MD FACS, Columbus, OH

Moderators: Susan R. Cordes, MD FACS, Ukiah, CA

Nausheen Jamal, MD, Edinburg, TX

1:55 The Inclusion of C1 Does not Influence Outcomes in Upper Airway Stimulation for Treatment of Obstructive Sleep Apnea

Ayan T. Kumar, BS, Philadelphia, PA; Adam Vasconcellos, MD, Philadelphia, PA;

Maurits S. Boon, MD, Philadelphia, PA; Colin T. Huntley, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, participants should be able to describe the mechanism of upper airway stimulation for the management of obstructive sleep apnea, report the benefits and efficacy of this treatment modality, and discuss which nerves to include in the stimulation cuff electrode.

Objectives: Upper airway stimulation (UAS) has demonstrated efficacy in the management of OSA. Branches of the hypoglossal nerve that selectively activate tongue protrusion muscles are included within the stimulation cuff electrode. The first cervical nerve (C1) is often also included in order to stimulate additional muscles contributing to tongue protrusion and stabilization. The purpose of this study was to determine whether inclusion of C1 indeed translates into treatment efficacy, decreased voltage requirement, and improved outcomes in patients utilizing UAS. Study Design: Single center, retrospective cohort study. Methods: 114 patients that received a UAS implant at our institution and underwent post-treatment polysomnography (PSG) were evaluated in this study. Stimulation cuff electrodes in 87 patients included C1; those in the remaining 27 patients did not include C1. Demographic data, voltage data, and pre- and post-treatment Apnea-Hypopnea Index (AHI), O2 nadir, and Epworth Sleepiness Scale (ESS) were collected for all patients. Results: There was no significant difference in voltage of the stimulator, or post-treatment AHI, O2 nadir, and ESS between the two cohorts. Treatment success, as measured by post-treatment AHI<20 with a 50% reduction, was similar regardless of C1 inclusion. The same was seen for the percent of patients with AHI<15 and AHI<5 after treatment. The distributions of age and BMI, as well as pre-treatment AHI, O2 nadir, and ESS were also not significantly different between treatment groups. Conclusions: The current study has demonstrated that inclusion of C1 in the stimulation cuff electrode of the upper airway stimulator may not provide any additional benefit in therapy for OSA.

2:00 Impact of PGY1 Boot Camp on Procedural Skill Development

Scott W. Gorthey, MD, Bronx, NY; Anna C. Bitners, BS, Bronx, NY; Esther Rong, BA, Bronx, NY;

Marc J. Gibber, MD, Bronx, NY; Christina J. Yang, MD, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential benefits of PGY1 boot camp in procedural skill acquisition and retention and potential benefits over traditional clinical exposure skill acquisition.

Objectives: To measure the impact of a unique 8 week PGY1 boot camp on resident procedural skill acquisition, retention and improvement over traditional clinical exposure skill acquisition. Study Design: Prospective cohort study. Methods: All PGY-1s (N=4) participated in the boot camp running July-August 2016. Videos of each PGY1 performing suture ligation (SL), rigid bronchoscopy assembly (RB), and flexible laryngoscopy (FL) were recorded pre-boot camp, 1 week post-boot camp and 1 year post-boot camp. In addition, videos were taken during June 2016 of rising PGY2s who did not participate in boot camp for use as a control group. Each video was then rated by two blinded faculty reviewers using a multipoint rating system. Scores in the three skill areas were compared between groups via paired and unpaired t-tests with statistical significance defined as alpha < 0.05. Results: Skill acquisition in RB showed a significant improvement 1 week post-boot camp compared to pre-boot camp (P=0.0176), SL showed a trend towards improvement (P=0.0704), while FL did not show any trend (P=0.9214). There was no significant difference in SL and RB skill proficiencies in comparing 1 week post-boot camp to 1 year post-boot camp (P=0.6925 and P=0.1975 respectively), while FL showed significant improvement (P=0.0478). Proficiency in RB and FL showed a significant difference in PGY1s 1 year post-boot camp compared to PGY2 controls (P=0.0065 and P=0.0324 respectively), while SL showed a trend towards significance (P=0.2787). Conclusions: PGY1 boot camp may improve PGY1 procedural skill acquisition and retention, and may be beneficial in comparison to traditional

clinical exposure acquisition of procedural skills. PGY1 boot camp is a promising arena for multi-institutional curriculum development.

2:05 Factors Correlating to Burnout among Otolaryngology Residents

Leighton F. Reed, BS, Memphis, TN; Rose Mary S. Stocks, MD PharmD FACS, Memphis, TN; Anthony M. Sheyn, MD, Memphis, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to compare factors that affect otolaryngology resident burnout.

Objectives: Physicians have high rates of burnout with an otolaryngology burnout rate of 42%. The most studied burnout correlation is increased work hours. More recently, mindfulness training programs have been shown to decrease burnout and increase self-compassion. Regarding burnout studies specific to otolaryngology residents, there have been few in the past decade. This study explores correlations between burnout and surgical cases completed, nonclinical responsibilities and mindfulness practices along with gathering updated work hours data. Study Design: Cross-sectional survey. Methods: A single survey question was shown to be a reliable substitute for Maslach Burnout Inventory in assessing burnout. A survey was sent to all US otolaryngology residents to investigate the correlation of burnout to postgraduate year, work hours, surgical cases, nonclinical responsibilities, and mindfulness practices. Residents were asked to answer questions regarding their previous year of training. Results: Overall burnout was 51%. PGY-1 was completed with a low burnout rate compared to other years. PGY-3 and PGY-4 have increased levels of moderate to severe burnout. Increased work hours were confirmed to increase burnout. No other factors correlated with increased or decreased burnout. However, only 15% who practiced mindfulness training had this training offered by their department or university. Conclusions: A 51% burnout rate is a concerning rate. Increased work hours and PGY-2 through PGY-5 correlated with increased burnout. Accessibility to mindfulness training was shockingly low. As mindfulness training has been one of the few proven activities to decrease burnout, more departments could benefit from providing these experiences to their residents.

2:10 Evaluation of Drug Induced Sleep Endoscopy (DISE) Performed in an Outpatient Endoscopy Suite

Shabnam Ghazizadeh, MD, Los Angeles, CA; Kyasha Moore, MPH MS, Los Angeles, CA; Kianusch Kiai, MD MS, Los Angeles, CA; Abie H. Mendelsohn, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the safety and efficacy of DISE performed in an outpatient endoscopy unit as compared to an operating room.

Objectives: Review patient demographics and compare total hospital time, anesthesia time, and procedure time for DISE performed in a main operating room versus an outpatient endoscopy suite, as well as review rates of anesthesia related complications in both settings. Study Design: A retrospective chart review of sleep endoscopy procedures performed at a tertiary medical center. Methods: Using appropriate billing codes, a retrospective chart review was done of DISE procedures performed by a single attending surgeon during the years of 2016 to 2018 (n=109). Demographic information, operative procedures, findings, total time in the hospital, total anesthesia time and total procedure time were reviewed and compared using a t-test for significance. Results: A total of 109 procedures for sleep endoscopy were identified. Twenty-two patients had additional procedures at the time of the sleep endoscopy and were therefore excluded. Eighty-seven sleep endoscopies were included, 65 done in an outpatient medical procedure unit (MPU), and 22 done in the main operating room (MOR). Population groups were similar in average age, BMI, and AHI (p>0.05). The total hospital time (minutes) was significantly less for endoscopy done in the MPU at 150.1 (range 84-226) as compared to MOR at 312 (range 176-466) (p<0.01). The average documented anesthesia time was significantly lower in the MPU: 28.8 (range 9-127) as compared to 42.6 (range 33-42) for MOR (p<0.01). The total procedure time was similar between MPU and MOR groups, at 8.5 and 10.4 minutes respectively (p=0.11). There were no documented complications for sleep endoscopy done in either setting. Conclusions: Drug induced sleep endoscopy is a critical step in the surgical evaluation for obstructive sleep apnea, the performance of which can require extensive resources and anesthesia care. This early study suggests that performing sleep endoscopy in a medical procedure unit is safe and significantly decreases total hospital time and anesthesia care time.

2:15 The Efficacy of Surgical Management for Upper Airway Resistance Syndrome: A Systematic Review and Case Series

Lucas D. Harless, MD, San Rafael, CA; Megan L. Durr, MD, Oakland, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the evidence supporting surgical management of upper airway resistance syndrome (UARS) and describe which procedures may yield more benefit to the UARS patient.

Objectives: To present new evidence evaluating surgical management of UARS patients and evaluate the literature to determine the efficacy of surgery in these patients. Study Design: Systematic review and case series. Methods: We performed a literature search of PubMed and Ovid from 1985 to 2016. Inclusion criteria included English language articles containing original data with ≥ 5 subjects, measurable outcomes, and readily available treatments. Data was collected regarding study design, subject demographic information, clinical outcomes, and level of evidence. Two investigators reviewed all articles independently. A retrospective case series at our institution from 2015 to 2017 investigated the efficacy of surgical management of UARS with ESS score as the primary outcome measure. Results: Of 108 abstracts identified,

3 articles were included, yielding 49 patients. All of the studies were of level 3 and 4 evidence. The most common procedures performed included laser assisted uvulopalatoplasty (LAUP), radio frequency turbinate reduction (RFTR), and a combination of nasal and palate surgery. Outcome measures were determined by ESS. Significant improvement in ESS was noted in 2 studies; one investigating LAUP, another investigating a variety of surgical procedures excluding RFTR (level 4). No significant change in ESS was noted in a study evaluating RFTR (level 3). Data from our institution's retrospective case series shows a modest improvement in ESS with various surgical procedures ($p=0.04$) without a significant change in apnea hypopnea index (AHI) or respiratory disturbance index (RDI). Conclusions: There is a lack of high quality data supporting surgical management for UARS, but available data suggests surgery may be effective in improving ESS scores. RFTR does not appear to improve ESS scores.

2:20 Does Insurance Status Impact Delivery of Care with Upper Airway Stimulation for Obstructive Sleep Apnea?

Jena C. Patel, BS, Philadelphia, PA; Michael C. Topf, MD, Philadelphia, PA; Maurits Boon, MD, Philadelphia, PA; Colin Huntley, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the difference in treatment waiting times for Medicare and private insurance patients receiving upper airway stimulation.

Objectives: To understand differences in patient demographics, insurance related treatment delays, and average waiting times for Medicare and private insurance patients undergoing upper airway stimulation (UAS) for treatment of obstructive sleep apnea (OSA). Study Design: A retrospective analysis of all Medicare and private insurance patients who underwent a drug induced sleep endoscopy (DISE) followed by recommendation to undergo UAS from November 2016 to July 2018. Methods: Data regarding demographics, time to UAS surgery, baseline sleep data, and insurance related cancellations were collected. The primary outcome was time from DISE to UAS surgery in Medicare versus private insurance patients. Results: Forty-four patients with Medicare and 31 patients with private insurance underwent DISE followed by UAS procedure. Patients with Medicare undergoing UAS were older (67.36 ± 11.04 years) than patients with private insurance (54.90 ± 8.13 years, $p < 0.001$). More women ($n=18$) with Medicare received UAS than private insurance ($n=6$, $p=0.041$). There was no significant difference in BMI, preoperative apnea hypopnea index (AHI), O₂ nadir, or Epworth Sleepiness Score between the two cohorts. Medicare patients waited an average of 138.43 ± 94.26 days from the time of their DISE to UAS surgery when compared to patients with private insurance (210.97 ± 103.21 days, $p < 0.001$). Conclusions: In our region, UAS is an approved procedure by Medicare while many private insurance companies still consider it investigational. Medicare patients undergoing UAS have shorter waiting periods, and fewer insurance related treatment delays when compared to patients with private insurance. The characterization of UAS as investigational by private insurance companies may delay care for patients with OSA.

2:25 Resident Physician Burnout and Well Being: One Intervention and Its Impact

Kristin L. Stevens, MD, Minneapolis, MN; Amy Anne D. Lassig, MD, Minneapolis, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to quantify the high rates of burnout amongst resident physicians, describe what factors lead to high burnout, understand the negative impact of burnout on residents and patient care, and explain the impact of the tested intervention on burnout and well being in otolaryngology residents at a single institution.

Objectives: While there are many studies quantifying high rates of resident burnout, there is a severe lack of research focusing on interventions at the organizational level to decrease burnout and improve well being amongst residents. We examined the impact of two hours of weekly protected nonclinical time on burnout and well being in otolaryngology residents at a single institution. Study Design: Prospective, cross-over study. Methods: 19 otolaryngology residents (PGY1-PGY5) at a single institution participated in this study. Burnout was measured primarily by the Maslach Burnout Inventory (MBI) and secondarily by the Mini-Z Questionnaire. Well being was measured primarily by the Resident and Fellow Well-Being Index (WBI) and secondarily by a quality of life single item linear analogue self-assessment. Participants completed these 4 surveys at approximately 6 week intervals from October 2017 to July 2018. Every participant acted as their own control and was on the intervention phase of the study for the first or last 6 weeks of a quarterly rotation. While on the intervention phases of the study, participants were assigned two hours of weekly nonclinical time. They then completed a weekly survey detailing how they spent their two hours. Results: There was a mean decrease of 0.35 points in MBI emotional exhaustion (EE) score ($p = 0.021$) while on intervention from week 19 to week 26, indicating decreased burnout. Overall intervention effect is seen when comparing baseline scores to week 32, which showed a mean decrease of 0.63 points in MBI EE score ($p = 0.005$). There was a mean decrease of 0.68 points in WBI score ($p = 0.008$) while on intervention from week 19 to week 26, indicating increased well being. This effect was even stronger after 12 straight weeks of intervention with a mean decrease of 0.79 points in WBI score ($p = 0.028$) from week 19 to week 32. Overall intervention effect showed a mean decrease of 1.26 points in WBI score ($p = 0.010$). Conclusions: Two hours of weekly nonclinical time led to statistically significant decreased burnout and increased well being in otolaryngology residents. While a pilot study in nature, the statistical significance achieved with such small numbers is encouraging and warrants further investigation of this intervention on a larger scale.

2:30 Q&A

2:35 - 3:05 Break with Exhibitors

3:05 - 3:55

PANEL: STATE OF THE ART DIAGNOSIS AND MANAGEMENT OF CONGENITAL HEARING LOSS

Moderator: John P. Bent III, MD, Bronx, NY

Panelists: Matthew L. Bush, MD PhD FACS, Lexington, KY
John H. Greinwald Jr., MD, Cincinnati, OH
Judith E.C. Lieu, MD MSPH, St. Louis, MO
Blake C. Papsin, MD FACS, Toronto, ON Canada

CLINICAL FUNDAMENTALS AND GENERAL OTOLARYNGOLOGY

**Moderators: Stacey T. Gray, MD FACS, Boston, MA
Todd T. Kingdom, MD FACS, Aurora, CO**

3:55 Designing a Resident Led Otolaryngology Clinic Curriculum at a Community Health Center for Underserved Patients: An Initial Experience

Christopher D. Vuong, MD, Loma Linda, CA; Nathan H. Lee, BS, Loma Linda, CA;
Shannon O. Fujimoto, BS, Loma Linda, CA; Khanh K. Nguyen, MD, Loma Linda, CA;
Priya D. Krishna, MD, Loma Linda, CA; Daniel I. Kwon, MD, Loma Linda, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize a mutually beneficial partnership between a federally qualified health center system (FQHC) and an otolaryngology residency program to provide a unique training experience and effective healthcare for underserved patients.

Objectives: To report a resident led otolaryngology clinic experience at an independent federally qualified health center (FQHC) with an affiliated academic center. We examined the access of subspecialty care for underserved patients and the added value to resident education. **Study Design:** Retrospective cohort study. **Methods:** A retrospective chart review was conducted of all patients seen at a FQHC otolaryngology clinic from September 1, 2017 to August 31, 2018. Access to care for surgical patients was measured by time from referral to evaluation, surgical intervention, and followup. Matched controls were patients who underwent similar procedures at the affiliated academic practice. Types of procedures, frequency and continuity of resident involvement in all phases of care were reviewed. The overall experience value was determined by survey results of residents who completed the rotation. **Results:** Residents reported overall positive growth in areas of patient management, understanding of system based practice, and surgical skills. An average of 65 new patients was seen per month with approximately 25% ultimately undergoing surgery. All otolaryngology subspecialties were represented including otology, facial plastics, and head and neck oncology. There was a relatively high correlation of continuity among resident providers in all phases of care. Data analysis is ongoing to compare care delivery between the otolaryngology FQHC and university based clinic. **Conclusions:** We demonstrate a mutually beneficial partnership between a full resourced FQHC system and an otolaryngology residency program to provide a unique training experience and effective healthcare delivery.

4:00 Evaluating Gender Parity in Operative Experience for Otolaryngology Residencies in the United States

Richard K. Gurgel, MD, Salt Lake City, UT; Brandon R. Cardon, MD, Salt Lake City, UT;
Chelsea M. Allen, PhD, Salt Lake City, UT; Angela P. Presson, PhD, Salt Lake City, UT;
Sukgi S. Choi, MD, Boston, MA; Robert H. Miller, MD MBA, Houston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss gender disparities that exist in operative case volume among graduating otolaryngology residents in the United States.

Objectives: Gender disparity exists in medicine, such as differences in pay and promotion opportunities. We hypothesize that there is also a gender difference in graduate medical education as manifested by operative case volume. This study compares surgical case volume by gender for graduating US otolaryngology residents. **Study Design:** Cohort study. **Methods:** With data use approval from the ACGME, we evaluated the key indicator case log summaries of graduating otolaryngology residents from 2009-2017. Mean and SD were used for all cases, and t-tests were used to compare cases by resident gender. The Bonferroni method was used to adjust for multiple comparisons across years and within major categories. **Results:** Data from 1,740 male and 804 female residents were evaluated. Across all years, the average number of key indicator cases reported was 778.8 and 813.6 by female and male residents, respectively, with an average difference of 34.8 cases per year (95% confidence interval [CI] 19.4, 50.2) (p-value<0.001). When a resident self-reported the role of resident surgeon/supervisor, the average number of key indicator cases reported was 602.6 and 643.9 by female and male residents, respectively, with an average difference of 41.3 cases per year (95% CI 28.0, 54.6) (p-value<0.001). Specific key indicator cases with statistically significant (p<0.05) male predominance included neck dissections, laryngectomies, and flaps. **Conclusions:** Gender based discrepancies in surgical case volume exist among graduating otolaryngology residents. This disparity is partially attributed to self-reported role in the surgery. This study has identified those discrepancies so that training programs can implement strategies to ensure improved gender parity.

4:05

Hypertension Associated with Epistaxis in U.S. Hospital Population

James H. Wilson, MChem, Charlottesville, VA; Jose L. Mattos, MD MPH, Charlottesville, VA; Cyrelle-Elize R. Fermin, BS, Charlottesville, VA; Ian T. Churnin, MD, Charlottesville, VA; Jamiluddin Qazi, BS, Charlottesville, VA; Spencer C. Payne, MD, Charlottesville, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential risk of epistaxis with hypertension.

Objectives: Many clinicians have theorized that hypertension may increase the risk of epistaxis. However, there is insufficient clinical evidence to support this claim. Our objective was to investigate the association between hypertension and epistaxis in a nationally representative sample of the United States. Study Design: Multivariate logistic regression of survey data. Methods: The 2014-2015 National Hospital Ambulatory Medical Care Survey (NHAMCS) was queried. Hypertension was defined as blood pressure (BP) meeting the Joint National Committee (JNC) requirements for prehypertension and grade 1 or 2 hypertension. Epistaxis was indicated if this was the main reason for the visit. Relevant demographic, socioeconomic, and comorbid factors were included in a multivariate logistic regression model which accounted for the complex, stratified, multistage survey design of NHAMCS. Results: 278,363,641 weighted visit records were analyzed. Epistaxis accounted for 0.174% reasons for visit with normal BP but was found in 0.470% of visits with at least prehypertension, 0.661% of visits with at least grade 1 hypertension, and 1.05% of visits with at least grade 2 hypertension. Visits for epistaxis were associated with an increased BP in both a univariate analysis {OR = 2.69, p<0.05 (prehypertension), OR = 2.90, p<0.05 (grade 1), OR = 3.76, p<0.05 (grade 2)} and the multivariate logistic regression {OR = 1.91, p<0.05 (prehypertension), OR = 2.14, p<0.05 (grade 1), OR = 2.78, p<0.05 (grade 2)}. Conclusions: Hypertension is associated with increased risk for epistaxis based on a nationally representative sample of hospital visits in the United States. This study supports the concept that hypertension may be a risk factor in epistaxis, and further research is warranted.

4:10 Factors Influencing Medical Student Choice of Otolaryngology: What Impacts Their Decision

Leila J. Mady, MD PhD MPH, Pittsburgh, PA; Amber D. Shaffer, PhD, Pittsburgh, PA; Noel Jabbour, MD, Pittsburgh, PA; Barry M. Schaitkin, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the influences driving the national trend in declining medical student applications to otolaryngology.

Objectives: Unprecedented decline in medical student (MS) otolaryngology applications is an issue which requires critical investigation. We sought to understand the factors/perceptions impacting applicants' decisions. Study Design: Cross-sectional survey. Methods: The survey was circulated to all otolaryngology program directors (PD) for distribution to current PGY1/PGY2 residents. Results: 118 of 610 (19.3%) residents participated. The program specific paragraph (PSP) and the otolaryngology resident talent assessment (ORTA) phone interview were regarded as negative influences in 49% and 54%, respectively. Of MS who considered otolaryngology but applied to a different specialty, these factors were estimated as negative influences in 35% and 38%, respectively. 44% of residents viewed the specialty reputation (difficult to match into) as a negative influence. Reputation was estimated as a negative influence in 69% of MS who applied to a different specialty. 5% of residents viewed PD advice as a negative influence, whereas this was estimated as a negative influence in 23% who applied to a different specialty. 69% of residents reported that the number of classmates applying from one institution did not influence their decision. Conclusions: The PSP and ORTA represent self-imposed barriers that we have created to applying to our specialty. These factors, augmented by the perception that otolaryngology is too competitive, are key drivers in deterring MS applications. Measures to increase applications should focus on addressing these negative influences. Through early exposure and mentorship in otolaryngology, we may address perceptions regarding barriers to entry and focus on cultivating a pipeline of applicants well suited for a career in otolaryngology.

4:15 Gender Trends in Authorship of Original Otolaryngology Publications: A Fifteen Year Perspective

Devki C. Shukla, BS, New York, NY; Annie E. Arrighi-Allisan, BA, New York, NY (Presenter); Annika M. Meyer, MD, New York, NY; Sarah M. Kidwai, MD, New York, NY; Sharon H. Barazani, BS, New York, NY; Maura K. Cosetti, MD, New York, NY; Marita S. Teng, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the trends in female authorship within otolaryngology literature.

Objectives: To examine trends in female author representation within original otolaryngology research. Study Design: Retrospective study. Methods: Original research articles published in 11 otolaryngology journals were analyzed for 2000, 2003, 2006, 2009, 2012, and 2015. The gender of first and last author for each article was recorded. Overall female authorship was calculated by summing the numbers of first and last female authored articles. Student's t-test and Cochran-Armitage trend test were utilized to determine significance between years and groups. Results: Of the 9,623 research articles published in these journals during these five representative years, 223 were excluded due to one or more gender indeterminate authors. Female first authorship exhibited a significant upward trend from 2000 to 2015 (P value <0.0001); overall female authorship demonstrated similar trends (P value <0.0001). Female senior authorship did not change significantly during this time period (9.86% in 2000 to 11.06% in 2015; P value = 0.4352). The proportion of articles with a female author

in first, last, or both positions increased from 28% to 39% from 2000 to 2015 (P value <0.0001). Conclusions: Increasing female representation in otolaryngology literature may reflect the rising proportion of women within otolaryngology, as well as greater mentorship availability. Despite these auspicious strides, female authored papers nonetheless represent a smaller proportion of the literature, and female senior authors remain a stark minority. Future studies should identify the barriers to female access and advancement within the field.

4:20 Q&A

4:25 Improving Inpatient Resident Hand-Offs and Transitions of Care with an Automated Tool for Computer Generated Patient Lists

Austin N. DeHart, MD, Richmond, VA; Kelley M. Dodson, MD, Richmond, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to report the advantages of a computer generated patient list and explain how this can help improve resident hand-offs and transitions of care.

Objectives: 1) Explain the concept of a computer generated patient list; 2) analyze the differences in time, accuracy, and completeness between a handwritten and a computer generated patient list; and 3) compare handwritten versus computer generated lists for effective hand-offs and transitions of care with emphasis on time management, educational benefit, and patient care. Study Design: Quality and process improvement. Methods: Retrospective analysis of patient lists at one academic tertiary care institution with single blinded prospective crossover trial and blinded opinion survey. Results: Handwritten lists were prone to errors of omission and only 10.7% included all expected lab values, JP drain outputs, and critical medications. On average, a computer generated list was faster to generate (8.8 seconds vs. 6.3 minutes per patient, $p < 0.000000005$) required significantly less user input in number of clicks (8.2 vs. 90.9, $p < 0.000000001$) and distance of mouse travel (3.6 vs. 35.3 meters, $p < 0.000005$), while providing more thorough information with no omissions. The majority of residents surveyed preferred the computer generated lists and felt this improved patient care on rounds and during handoffs without this tool negatively impacting their education. Conclusions: Handwritten patient lists are subject to human error, illegibility, and omission. The utilization of an automated tool to create computer generated patient lists is faster, more accurate, and more complete, while improving patient care for hand-offs and transition of care without negatively affecting resident education.

4:30 Otolaryngology Departmental Education and Standardized Guidelines Decrease Number and Amount of Opioid Prescriptions

Katherine A. Lees, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the impact of department wide education and standardized guidelines on decreasing the number and amount of opioids prescribed.

Objectives: To determine if standardized guidelines and educational curriculum on opioid prescribing practices decreases the number and amount of prescriptions in the postoperative period. Study Design: Quality improvement pretest-posttest design. Methods: The number of prescriptions as well as the amount of opioids was collected for various otolaryngologic procedures over a one year period. A department wide grand rounds presentation on safe opioid prescribing practices with introduction of recommended guidelines for opioid prescriptions for these procedures was implemented. The opioid data was then collected and statistical analysis was performed to compare the pre- and post-implementation practices. Results: Overall, there was a decrease in the median oral morphine equivalents (OME) prescribed from 150 mg to 75 mg ($p < 0.0001$) as well as the number of prescriptions for >200 OME ($p < 0.0001$). Specific procedures with statistically significant reduction in opioid prescriptions included endoscopic laryngeal surgery, parotidectomy, rhinoplasty, septoplasty, endoscopic sinus surgery, thyroidectomy, and tympanoplasty. There was no change in the number of opioid refills ($p = 0.82$). Conclusions: Implementation of departmental education and standardized opioid prescribing guidelines for the postoperative period decreases the number and amount of opioid prescriptions without a change in the prescription refill rates.

4:35 Retrospective Severity Analysis of Facial Fractures at an Urban Level I Trauma Center from 2008-2017

Bianca Georgakopoulos, BS, Washington, DC; Armon Panahi, BS, Washington, DC;
Andrew D. Sparks, MS, Washington, DC; Lois Collins, MSN RN, Washington, DC;
Philip E. Zapanta, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the impact that an official title verification has on an urban hospital in regards to severity scoring, days in hospital and in ICU, and operative time for facial fracture cases.

Objectives: To identify severity differences in facial fractures during an official verification to a level I trauma center. Study Design: Retrospective chart review. Methods: A retrospective chart analysis of 1,291 patients was performed with facial fracture patients at an urban hospital. Zip codes, facial AIS (abbreviated injury score), ISS (injury severity score), days until operation from injury, days in ICU, in hospital, and on ventilator were recorded. Analysis was of before and after the official trauma I title. Results: When comparing both cohorts, the post-verification cohort had more patients with a lower facial AIS (2.1 vs. 1.8), a lower ISS (12.4 vs. 9.5), more days until surgery if operative (2.0 vs. 2.3), fewer days in ICU (8.1

vs. 5.2) and hospital (4.9 vs. 3.8) ($p < 0.05$). Fewer patients had urban zip codes post-level I verification (93.2% vs. 55.6%, $p < 0.05$). Conclusions: After transition to a level I trauma center, neighboring hospitals with limited trauma coverage tended to send patients regardless of AIS and ISS scores. Most cases were not severe, leading to a statistically significant longer wait until surgery. However, this may not be clinically significant. More severe cases in the post-verification cohort are associated with less ICU time and less overall inpatient days demonstrating the improvement of the trauma services after verification to a level I trauma center. The level I trauma title has led to a relative rise in less severe facial fractures, which seems to correspond to outside hospitals without true facial trauma coverage sending mild to moderate trauma cases to the tertiary trauma center.

4:40 Building an Otoscopic Screening Tool Using Deep Learning Image Recognition

Devon M. Livingstone, MD, Calgary, AB Canada; Aron S. Talai, MSc, Calgary, AB Canada;
Justin K. Chau, MD, Calgary, AB Canada; Nils D. Forkert, PhD, Calgary, AB Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss image recognition machine learning and its relevance to automated otoscopic diagnosis. They will have a better appreciation for how artificial intelligence will augment how we practice otolaryngology. They will also understand the potential benefits to our speciality.

Objectives: Otolologic disease is difficult for primary care providers to accurately diagnose. Neural networks and deep learning algorithms have been applied with great success in many areas of medicine, often performing more accurately than well trained human comparators. Artificial neural networks are artificial intelligence computing systems inspired by the synaptic networks that constitute biological brains. Neural networks can learn to identify abnormalities after being trained using normal and abnormal example images. We aimed to build an artificial neural network deep learning algorithm capable of screening for otologic abnormalities. Study Design: Prospective image database collection. Methods: A large database of otoscopic images was generated. 80% of the images were used for training a convolutional neural network in the Keras deep learning platform, and 20% of the preaugmentation images were used for algorithm validation. Image augmentation was employed on the training dataset to increase the number of training images. The general network architecture consisted of three convolutional layers plus batch normalization and dropout layers to avoid over fitting. Results: 734 unique otoscopic images of various ear pathologies were obtained, including 63 cerumen impactions, 120 tympanostomy tubes, and 346 normal tympanic membranes. Our algorithm is capable of accurately identifying and differentiating between normal tympanic membranes, tympanostomy tubes, and cerumen impactions. Diagnostic performance on other otologic pathologies will improve as more images are obtained and incorporated into the algorithm training database. Conclusions: We built the foundation for a screening tool for otologic disease powered by deep learning artificial intelligence. Our study shows that image recognition machine learning holds immense potential as a diagnostic adjunct for otologic disease management.

4:45 ENT Mentorship Program for Preclinical Medical Students

Rishabh Sethia, MD, Columbus, OH; Cameron C. Sheehan, MD, Columbus, OH; Douglas Danforth, PhD, Columbus, OH; Garth Essig Jr., MD, Columbus, OH; Theodoros N. Teknos, MD, Cleveland, OH; Charles A. Elmaraghy, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the structure and outcomes of a novel medical school mentorship program for the field of otolaryngology.

Objectives: To provide preclinical medical students early access to otolaryngologists to learn about the speciality, facilitate acquisition of clinical skills, and provide one on one mentorship. Study Design: Prospective analysis. Methods: Students are matched with a single otolaryngology faculty mentor and are required to attend eight hours per month in the clinic or operating room, monthly lectures, rounds, and give a final presentation. Mentors complete performance evaluations, and surveys are administered to follow students longitudinally until match day. Results: Thirty-five students and 17 faculty members have participated in the program since 2015. All mentors and students found the program to be a valuable experience. When compared to nonparticipating students, participants had significantly higher confidence scores for clinical performance, knowledge of anatomy, and familiarity with the department of interest. A majority of students felt the program prepared them well for third and fourth year, and all eight of the initial program participants successfully matched into residency with four entering otolaryngology. Conclusions: Medical students face a competitive residency application process in otolaryngology with limited exposure which creates an opportunity for guidance in the pursuit of matching into this competitive field. This novel preclinical mentorship program prepares students for their clinical years and residency by facilitating acquisition of various competencies. Students gain hands on clinical exposure in a field of interest and support for navigating the application process. The structure of this program can be applied to other medical schools or specialties if the individual departments contain adequate resources of teaching faculty willing to participate.

4:50 Q&A

**4:55 Introduction of President-Elect, C. Gaelyn Garrett, MD, Nashville, TN
By Sigsbee W. Duck, MD**

5:00 Adjourn

POSTER PROGRAM

ALLERGY/RHINOLOGY

E1. Predictive Factors for Sinonasal Outcome Test 22 Improvement in Chronic Sinusitis Patients with and without Osteoneogenesis

Seth A. Ahlquist, BS, Los Angeles, CA; Ashley E. Kita, MD, Los Angeles, CA (Presenter); Albert Y. Han, MD PhD, Los Angeles, CA; Jeffrey D. Suh, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the differences in clinical characteristics between chronic sinusitis patients with and without osteoneogenesis, indicate the most significant prognosticators of clinical outcome scores in this population, and understand how that informs preoperative discussions and selecting surgical candidates.

Objectives: To compare the characteristics of chronic rhinosinusitis (CRS) patients with and without osteoneogenesis and demonstrate how these factors may predict clinical outcomes. Study Design: Retrospective cohort study. Methods: All CRS patients from 2013-2017 at a single institution with ≥ 1 CT scan were separated into cohorts based on radiologist documented osteoneogenesis (n =285). Demographics, clinical history, and Sinonasal Outcome Test-22 (SNOT-22) scores were obtained. Chi-square and t-test were utilized to analyze differences in cohorts. Linear regression established predictive factors of clinical outcomes. Results: 118 patients with osteoneogenesis and 163 without osteoneogenesis were identified (42.6% male, 65.1% underwent surgery). Those with osteoneogenesis had significantly increased age, CT scans, rates of CF, prior/multiple prior and future sinus surgeries, and significantly decreased rates of rheumatologic, allergic, and neuropsychiatric comorbidities. There was no significant difference in initial/final SNOT-22, BMI, rates of DM, asthma, OSA, GERD, vasculitides, tobacco/alcohol use, or a minimal clinically important difference (MCID) of 9. Initial SNOT-22 was the only significant predictor of final SNOT-22 once included in the model ($R^2 = .51$ and $.37$ for the osteoneogenesis and non-osteoneogenesis cohorts, respectively). 68 patients who underwent surgery had clinical outcome data available. Initial SNOT-22 scores 0-20, 20-40, 60-80, and 80-100 had rates of 29%, 69%, 57%, 75%, and 100% MCID, respectively. All $p < .05$. Conclusions: The predominant predictor of clinical outcomes in CRS patients was initial SNOT-22, but more so in the osteoneogenesis cohort. The majority of individuals with an initial SNOT-22 >20 who undergo surgery will experience a MCID.

E2. Understanding the Molecular Pathogenesis of Chronic Rhinosinusitis and Potential Therapeutic Agents: A Meta-Analysis

David Z. Allen, BA, Columbus, OH; Ross A. Wanner, BA, Columbus, OH; Sean McDermott, BA, Columbus, OH; Jihad Aljabban, BA, Columbus, OH; Omar Latif, BA, Columbus, OH; Charles Elmaraghy, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the value of meta-analysis of public data and its utility in understanding chronic rhinosinusitis pathogenesis.

Objectives: Chronic rhinosinusitis (CRS) is a debilitating allergic disease with significant healthcare costs. Elucidation of CRS pathogenesis will improve treatment and reduce its economic burden. Study Design: We tagged 67 CRS nasal epithelial samples and 39 healthy nasal epithelium controls. Gene signatures were analyzed in Ingenuity Pathway Analysis, using statistical significance $p < 0.05$ and absolute log ratio > 0.15 between disease and controls. Methods: Search Tag Analyze Resource was employed to conduct meta-analysis using the National Center for Biotechnology's gene expression omnibus to define CRC pathogenesis. Results: Analysis revealed CD28 signaling and leukocyte extravasation signaling as top canonical pathways. IFN^{γ} , lipopolysaccharide, IL4, and L-dopa were the top upstream regulators. The predicted activity associated with L-dopa was inhibited. While classically known as a neurotransmitter, L-dopa holds an unexplored role in modulating T cell immunity. Additionally, the gene SLC26A4 was starkly upregulated. This molecule produces the protein called pendrin, which is responsible for molecular transport in the inner ear. Upregulation of SLC26A4 suggests pendrin is a driver of CRS pathogenesis. PSPHP1, phosphoserine phosphatase pseudogene 1, was the most downregulated gene. Just recently described, PSPHP1 is involved in CD8 T cell mediated immunity suggesting an impaired adaptive response in CRS. Additionally, analysis demonstrated upregulation of adenosine deaminase (ADA), an immunomodulator that drives inflammation in several inflammatory disorders that has not been well investigated in the context of CRS. Lastly, the immunobiologic abatacept, known to treat diseases such as rheumatoid arthritis, targeted the disease signature. Conclusions: While CRS is presumed to be driven by a maladaptive immune response, its exact mechanism remains unclear. Here we suggest potential novel markers, targets for therapy, and new indications for an existing drug.

E3. Relationship between Cancer and Olfactory Dysfunction: A Cross-Sectional Analysis of NHANES 2013-2014

Cyrelle-Elize R. Fermin, BS, Charlottesville, VA; Jose L. Mattos, MD MPH, Charlottesville, VA (Presenter); Spencer C. Payne, MD, Charlottesville, VA; Jamil J. Qazi, BS, Charlottesville, VA; James H. Wilson, BS, Charlottesville, VA; Ian T. Churnin, MD, Charlottesville, VA

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

standing of the statistically significant relationship between cancer subtype, particularly breast cancer, and olfactory dysfunction.

Objectives: Demographic adjusted analyses of the United States National Health and Nutrition Examination Survey (NHANES) have shown a significant association between a history of cancer and objective olfactory dysfunction (OD) among adults 40 years and older. **Study Design:** This study investigated 1) if different subtypes of cancer were associated with objective or subjective OD; and 2) if a given subtype of cancer was associated with increased risk of subjective or objective OD. **Methods:** The 2013-2014 NHANES database was queried, using survey weights so that analyses were representative of the US population. Subjective OD was determined by questionnaire response. Objective OD was determined using the 8 item scratch and sniff Odor Identification test and defined as a smell score less than or equal to five correctly identified odors. Baseline demographics, olfactory function confounders, medical history, and social history were accounted for using multivariate logistic regression modeling. **Results:** A history of cervical cancer was associated with subjective OD ($p < 0.05$). A history of cancer, breast cancer, prostate cancer, and non-melanoma skin cancer was associated with objective OD ($p < 0.05$). In bundled multivariate modeling, a history of breast cancer was associated with increased odds of objective OD [OR 2.35, 95% CI (1.06, 5.22), $p < 0.05$]. **Conclusions:** Breast cancer was associated with increased odds of objective OD, after adjustment for demographics, olfactory confounders, comorbid conditions, and social history in the US population. This adds to growing body of literature regarding the impact of quality of life and clinical outcomes in cancer patients with OD.

E4. WITHDRAWN -- Evaluation of Olfactory Training for Post-Viral Olfactory Dysfunction

Pawina Jiramongkolchai, MD, St. Louis, MO; Dorina Kallogjeri, MD MPH, St. Louis, MO; Daniel P. Lander, BS, St. Louis, MO; Michael Jones, PhD, St. Louis, MO; Jonathan E. Peelle, PhD, St. Louis, MO; Jay F. Piccirillo, MD, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to describe olfactory training for patients with post-viral olfactory dysfunction and explain the different objective and subjective measures of smell.

Objectives: Post-viral olfactory dysfunction (PVOD) is a major cause of impaired olfaction. Olfactory training (OT) is a promising intervention for PVOD. This study evaluated the efficacy of OT with four essential oils, as measured by objective and patient reported outcome measures. **Study Design:** Prospective, single institution cohort study. **Methods:** Eligible PVOD participants completed 3 months of OT. Olfaction was measured with the University of Pennsylvania Smell Identification Test (UPSIT) and Sniffin' Sticks, which measures smell threshold, identification, and discrimination (TDI). Patients' self-reported ratings were measured using the visual analogue scale (VAS) and scores on the Questionnaire for Olfactory Dysfunction (QOD). Mixed model analysis was used to analyze outcome measures. **Results:** 28 participants (n=19 females, n=14 anosmics, mean (\pm SD) age 58 (9.4) years) were enrolled. The median duration of smell loss was 17.5 months (range 3-240). At baseline, participants' mean (\pm SD) UPSIT and TDI scores were 18.6 ± 8.5 and 16 ± 6.8 , respectively. To date, 15 participants completed the study and there was no significant change in UPSIT or TDI scores post-OT. However, patients self-reported a significant improvement in smell with a 11.6% increase in VAS scores post-OT (95%CI: 1.2% to 22%), and QOD scores also improved by 2.4 points (95%CI: 1.1 to 3.6). **Conclusions:** PVOD OT is not associated with improvement in objective measures, but is associated with significant improvement in patient reported measures of olfaction. Reasons for this difference are not clear but are similar to other rhinologic conditions where subjective and objective measures are discordant. Future research should explore reasons for this discrepancy between subjective and objective measures of smell, and include a non-essential oil OT control group.

E5. Aspirin Desensitization Therapy in Aspirin Exacerbated Respiratory Disease: A Systematic Review

Natasha L. Larivée, BSc MSc, St. John, NB Canada; Christopher J. Chin, MD FRCSC, St. John, NB Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the evidence and support for aspirin desensitization therapy in aspirin exacerbated respiratory disease (AERD, Samters' triad).

Objectives: Aspirin exacerbated respiratory disease (AERD) represents an aggressive form of chronic rhinosinusitis with nasal polyposis that is notoriously challenging to treat. There is evidence to suggest desensitization to aspirin may improve symptomatology and disease control in these patients. The goal of our study was to critically appraise the literature on this topic and assess the effect of desensitization on sinonasal symptomatology. **Study Design:** Systematic review. **Methods:** PRISMA guidelines were followed. We searched EMBASE, CINAHL, Medline, and the Cochrane Library for relevant literature. Studies were included if they were observational studies or randomized controlled trials, had $n > 1$ and were published in English. Systematic reviews were reviewed for relevant studies, but excluded from data extraction. The references of included studies were reviewed to ensure all relevant studies were included. We assessed study for quality and presence of common sources of bias. **Results:** Twenty-four studies met inclusion criteria. In general, polyp size, polyp recurrence, nasal symptom scores, and systemic steroid use improved when patients were desensitized. The vast majority of studies recommend desensitization. **Conclusions:** There is mounting evidence that aspirin desensitization is a valuable adjunct to treat sinonasal symptoms in the treatment of patients who have AERD. Future studies should focus on route of desensitization and maintenance dose of aspirin.

E6. The Transverse Turbinate Line: A Reliable Landmark for Identification of the Maxillary Sinus Natural Ostium

Brian C. Lobo, MD, Gainesville, FL; Julia C. Comer, MD, Gainesville, FL; Carolyn A. Chabuz, BS, Gainesville, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to reliably identify the maxillary sinus natural ostium using the transverse turbinate line, a previously undescribed endoscopic landmark.

Objectives: Present the transverse turbinate line (TTL), a reliable landmark for identification of maxillary sinus natural ostium (MSNO). Study Design: Cadaveric series. Methods: After IRB approval, cadavers were evaluated regarding the MSNO, and its relationship to the middle turbinate (MT). This included the TTL, defined as the inferior most vertical point of the MT before transitioning to the horizontal segment. In addition, visualization of MSNO with angled scopes was quantified, as was whether a standard maxillary sinus seeker would reach the medial aspect of the maxillary fontanelle. Results: 24 specimens without evidence of previous sinonasal surgery or facial dysmorphism were identified, with 40 sinuses appropriate for dissection. 13 specimens had been bisected, leaving 27 amenable for endoscopic exam. The MSNO was on average 4.04 +/- 0.65 mm in diameter. When comparing the MSNO position to the TTL, it was reliably found less than 1mm (-0.48 +/- 0.82 mm) from the inferior aspect of the ostium. When compared to the normalized distance of the TTL from the superior aspect of the ostium, significance was not noted (p=.11). The inferior MT border was 8.75 +/-1.88 mm from the inferior portion of the MSNO. Conclusions: The TTL represents a consistent endoscopic landmark for identification of the inferior aspect of the MSNO. The superior aspect was found to be similarly conserved, but not perfectly due to variability in both the size, and angular deviation from the sagittal plane. The variance in height of the MT does not make it an appropriate landmark. Radiologic analysis would provide additional data points for confirmation.

E7. Four Handed Endoscopic and Orbital Approach for Frontal Sinus and Medial Orbital Tumors: Surgical Management of Two Cases

Chadi A. Makary, MD, Martinsburg, WV; Christopher A. Maroun, MD, Baltimore, MD (Presenter); John Nguyen, MD, Morgantown, WV; Hassan H. Ramadan, MD, Morgantown, WV

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential benefits and indications of utilizing a combined endoscopic and transorbital approach for frontal sinus and medial orbit tumors.

Objectives: To describe the utility of using a combined endoscopic endonasal and transorbital approach to successfully resect frontal sinus and medial orbital tumors. Study Design: Retrospective review of the surgical management of two cases. Methods: The following were reviewed: Case 1: 26 year old male presented with a large left frontal sinus osteoma and a subperiosteal abscess. Case 2: 57 year old woman with a left medial extraconal orbital mass presented with a progressive increase in the size. Results: The endoscopic approach is employed first, including middle meatal antrostomy and total ethmoidectomy. The orbital approach follows with careful dissection to the medial orbital wall. (1) Left Draf IIA frontal sinusotomy was performed, followed by endoscopic and transorbital dissection of the osteoma. Resection and abscess drainage were performed using the Sonopet ultrasonic bone curette. The medial orbital wall was reconstructed with a Medpor sheet. (2) The mass, which was fixed to the medial rectus muscle, was initially dissected endoscopically. Visualization was limited due to significant fat herniation. Two conjunctival incisions were made. The muscle was isolated and retracted laterally with the globe. Orbital contents were then separated from the lesion. Further dissection was completed endoscopically and total resection of the mass was performed. Conclusions: The combined endoscopic and transorbital approach shows an effective means of resection for tumors of the frontal sinus and medial orbit. Selecting a purely endoscopic versus combined approach depends on the pathology, location, and surgeon experience.

E8. Cranial Base Manifestations of IgG4 Related Disease: A Multi-Institutional Study

John P. Marinelli, BS, Rochester, MN; Eric M. Dowling, MD, Rochester, MN (Presenter); Chiara A. Marvisi, MD, Parma, Italy; Augusto A. Vaglio, MD PhD, Parma, Italy; Alessandro A. Palumbo, MD, Parma, Italy; Patrick T. Kiessling, BS, Rochester, MN; Matthew L. Carlson, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to describe key aspects of IgG4 related disease that are pertinent to the otolaryngologist, describe typical clinical and radiologic features characteristic of patient presentation when lesions involve the skull base, and differentiate these lesions from more common pathology such as meningioma, nasopharyngeal carcinoma, or pituitary macroadenoma.

Objectives: IgG4 related disease (IgG4-RD) represents a newly recognized autoimmune disease characterized by fibro-inflammatory infiltrates rich in IgG4+ plasma cells. Rarely, the skull base can harbor initial disease manifestations, presenting considerable diagnostic challenges due to IgG4-RD's tendency to mimic more common pathology of the cranial base. Unfortunately, disease rarity combined with the recency of its initial description has limited prior research in the otolaryngology. The current study was envisioned to describe cranial base manifestations of IgG4-RD with a specific emphasis on aspects most pertinent to the skull base surgeon who may be referred such patients for primary evaluation. Study Design: Retrospective review. Methods: Review of all cases at two large tertiary referral centers since disease description in 2003. Results: Ten patients were identified (60% female; median age, 56 years; range, 23-66). Presenting symptoms commonly included headache (90%), diplopia (60%), hearing loss (30%), trigeminal hypesthesia (20%), and facial paresis (10%). Nine of 10 cases presented in the setting of isolated skull base disease. Frequent preliminary clinical diagnoses included nasopharyngeal carcinoma (20%), pituitary macroadenoma (20%), meningioma (20%), and granulomatosis with polyangiitis

(20%). The cavernous sinus (60%), sphenoid midline (40%), petrous apex (30%), and internal auditory canals (20%) were the most commonly subsites. Strategies for successful diagnostic workup and management will be presented. Conclusions: Presenting with nonspecific symptomatology and imaging findings, IgG4-RD represents a rare cause of the skull base mass. Multiple biopsies are often required, and obtaining adequate tissue specimen is complicated by densely fibrotic cranial base lesions that are frequently in close proximity to critical neurovascular structures.

E9. Association between Smell and Taste Dysfunction and Obesity and Metabolic Syndrome in Older Adults

Jamiluddin J. Qazi, BS, Charlottesville, VA; James H. Wilson, BS, Charlottesville, VA; Cyrelle-Elize R. Fermin, BS, Charlottesville, VA; Ian T. Churnin, MD, Charlottesville, VA; Spencer C. Payne, MD, Charlottesville, VA; Jose L. Mattos, MD MPH, Charlottesville, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the relationship between smell and taste dysfunction and obesity or metabolic syndrome.

Objectives: To characterize the associations between objective olfactory and gustatory dysfunction and obesity and metabolic syndrome in older adults. Study Design: The 2013-2014 National Health and Nutrition Examination Survey (NHANES) data was used to investigate the relationships between objective smell and taste dysfunction and obesity and metabolic syndrome. Methods: Adults age 60 or older were categorized based on smell status into hyposmia, anosmia, and dysosmia (hyposmia and anosmia) using the Pocket Sniff Test. Taste status was evaluated using whole mouth quinine, 1M NaCl, 0.32M NaCl, and tongue tip quinine and NaCl solutions. Obesity was defined as a BMI > 29. Metabolic syndrome was present if 3 of the 5 following criteria were met: waist circumference > 101cm (male) or 87cm (female), triglyceride level > 149mg/dL, HDL cholesterol < 40mg/dL (male) or 50mg/dL (female), fasting blood glucose > 99mg/dL. Comorbidity, demographic, and socioeconomic variables were included in multivariate logistic regression models to account for the NHANES's sampling design. Results: 1,382 subjects age 60 or older were included in the weighted analysis dataset. In univariate obesity analysis, dysosmia (OR = 0.641, P = 0.025) and 0.32M NaCl taste dysfunction (OR = 0.640, P = 0.032) were protective. 0.32M NaCl taste dysfunction remained significant in multivariate analysis. Metabolic syndrome was significantly associated with tongue tip quinine dysfunction in univariate (P = 0.011, OR = 1.451) and multivariate (P = 0.010, OR = 1.468) analyses. Conclusions: In a representative sample of older adults in the United States, smell and taste dysfunction can be protective against obesity while taste dysfunction can predict metabolic syndrome.

E10. No poster

E11. WHIM Syndrome with a Chemokine Receptor Defect and Its Impact on Paranasal Sinus Development

Caroline C. Rieger, MD, Washington, DC; Victoria Idowu, BS, Bethesda, MD; Carmen Brewer, PhD, Bethesda, MD; Chris Zalewski, PhD, Bethesda, MD; Kelly King, PhD, Bethesda, MD; Hung J. Kim, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the presentation of WHIM syndrome and demonstrate how the CXCR4 chemokine receptor, the mutation responsible for the condition, plays a key role in paranasal sinus development.

Objectives: 1) Recognize WHIM syndrome as a genetic disorder caused by CXCR4 mutations characterized by warts, hypogammaglobulinemia, recurrent infections and myelokathexis; 2) recognize the otorhinolaryngologic phenotypic characteristics of WHIM syndrome; and 3) understand the impact of CXCR4 mutations in paranasal sinus development. Study Design: Retrospective chart review. Methods: This is a retrospective chart review of a WHIM syndrome cohort at a medical research institute including otorhinolaryngologic history, audiometric data and paranasal sinus CT scans. Results: 33 patients (20 females, 13 males) ages 2-64 were identified who had confirmed CXCR4 mutations. Thirty patients had a history of chronic sinusitis. Sixteen of twenty patients who completed an UPSIT score presented with anosmia. When the cohort was stratified into individuals <18 years old (n=14) and >18 years old (n=17), marked maxillary sinus hypoplasia was observed in both groups compared to age matched counterparts (<18 group: mean=3.84 cm³ +/- SD 2.04 vs 8.11 cm³ +/- SD 5.02, p= 0.0017; >18 group: 5.29 cm³ [right] and 4.95 cm³ [left] vs 13.54 cm³ [right] and 12.74 cm³ [left], respectively, p=<0.0001). Fourteen patients had a history of otitis media, and on formal audiologic evaluation, thirteen patients had hearing loss, bilateral in nine patients and unilateral in four. Conclusions: Patients with WHIM syndrome present with recurrent infections including chronic sinusitis and otitis media and have hypoplastic maxillary sinuses. This finding in patients with a defective chemokine receptor, CXCR4, suggests that paranasal sinus malformation may be due to either recurrent infections in early childhood or from dysfunction of CXCR4 mediated signaling pathways important in normal sinus development.

E12. Surgical Outcomes and Imaging Findings of Respiratory Epithelial Adenomatoid Hamartoma: A Systematic Review

Chetan Y. Safi, MD, New York, NY; Carol Li, MD, New York, NY; Charles A. Riley, MD, New York, NY; Rohan Ramakrishna, MD, New York, NY; Abtin Tabaei, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the characteristic imaging findings of respiratory epithelial adenomatoid hamartoma (REAH) as well as explain the postoperative recurrence rates and olfaction outcomes after surgical excision of REAH.

Objectives: Respiratory epithelial adenomatoid hamartoma (REAH) is a recently classified pathologic diagnosis that is

often identified incidentally following endoscopic sinus surgery (ESS) for presumed chronic rhinosinusitis (CRS). Limited data exist defining preoperative imaging features and surgical outcomes. The purpose of this systematic review is to examine the characteristic imaging findings of REAH and postoperative olfactory and recurrence outcomes. Study Design: Systematic review. Methods: A systematic review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines on articles published from 1995 to present. PubMed, EMBASE, and Ovid Medline databases were queried for studies pertinent to imaging findings of REAH and surgical outcomes. Results: A total of 294 articles were identified, with 15 articles meeting inclusion criteria. Seven articles assessed both imaging findings and surgical outcomes. Three articles focused exclusively on imaging, while five examined surgical outcomes. Olfactory cleft (OC) widening greater than 10 mm on computed tomography (CT) was characteristic of REAH. 441 total patients with REAH were included, 221 of which (50.1%) had concurrent nasal polyposis, while 154 patients (34.9%) had isolated REAH. Surgical intervention ranged from simple excision to complete ESS. 65% of patients reported improved olfaction. Recurrence was noted in 4.1% of patients with followup ranging from four months to five years. Conclusions: A widened OC may suggest the presence of REAH. This disease process has been identified in patients with nasal polyposis or encountered as an isolated lesion. Targeted surgery may result in improved olfaction and a low likelihood of recurrence, though long term prospective studies are necessary.

E13. Antibodies Directed against Integration Host Factor Inhibited Biofilm Formation on Multiple Sinus Implant Materials

Rishabh Sethia, MD, Columbus, OH; Lauren G. Martyn, BS, Columbus, OH; Laura A. Novotny, MS, Columbus, OH; Steven D. Goodman, PhD, Columbus, OH; Lauren O. Bakaletz, PhD, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to compare biofilm formation on different sinus implant materials treated with antibiotics and antibodies directed against integration host factor.

Objectives: Intranasal implant materials are commonly used during sinus surgery to achieve postoperative hemostasis and prevent edema and adhesion formation. Previous studies have demonstrated that packing material supports bacterial growth and biofilm formation, and that use of antibodies directed against integration host factor (anti-IHF) caused a reduction in biomass within the packing material. We tested the hypothesis that use of anti-IHF antibodies prior to bacterial inoculation would prevent biofilm formation on several different sinus implant materials. Study Design: N/A. Methods: Non-typeable haemophilus influenzae (NTHI) biofilms were grown on three different sinus implant materials. The materials were composed of synthetic polyurethane foam, chitosan lactate foam, or polyvinyl alcohol sponge. The materials were pre-equilibrated with either: sterile medium, naive rabbit serum, or rabbit anti-IHF serum. Inoculated implant materials were incubated for an additional 16 hours and then evaluated by confocal microscopy. COMSTAT2 analysis was performed on images of biofilms to evaluate relative biomass. Results: NTHI formed biofilms on the synthetic polyurethane foam, chitosan lactate foam, and polyvinyl alcohol sponge. Biofilm development was inhibited when the packing material was pre-equilibrated with anti-IHF prior to seeding with bacteria compared to naive serum. Conclusions: Biofilm formation was well supported by different sinus implant materials. Pre-treatment with anti-IHF inhibited biofilm formation. These data support the potential benefit of developing materials pre-equilibrated with anti-IHF to prevent biofilm formation on sinus implants.

E14. Atypical Esthesioneuroblastoma Originating in the Maxillary Sinus Extending into the Nasopharynx

Eshita Singh, BS, Cincinnati, OH; James C. Wang, MD PhD, Cincinnati, OH; Hayley Born, MD, Cincinnati, OH; Allen M. Seiden, MD, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the typical versus possible atypical presentations of esthesioneuroblastoma presenting in the nasal cavity.

Objectives: To describe esthesioneuroblastoma originating outside of the superior nasal cavity where the olfactory tissue is normally located. Study Design: Case report. Methods: Esthesioneuroblastoma (ENB) is a rare malignancy of the head and neck, representing only 3% to 6% of all intranasal tumors. ENB typically arises from the neuroepithelium of the olfactory cleft in the superior nasal cavity at the anterior skull base. We present a 39 year old male with intermittent right sided epistaxis, throbbing headache, and maxillary sinus pressure. He reported discomfort that radiated to his right neck with paresthesia of his right upper gingiva. Results: Head and neck CT revealed a partially calcified mass originating in the upper aspect of the right maxillary sinus with extension into the right nasal cavity and nasopharynx measuring 2.8x2.5x2.7cm, with no clear involvement of the olfactory cleft. Patient underwent partial resection with biopsy, which revealed the mass to be attached at the lacrimal bone and infundibulum without visible connection to the olfactory cleft. Pathology was consistent with low grade esthesioneuroblastoma. PET scan showed no evidence of distant metastasis. Conclusions: This is a unique case of esthesioneuroblastoma originating in the maxillary sinus extending into the nasopharynx and nasal cavity without involvement of the olfactory region. Patient reported improvement of headache with no new episodes of epistaxis after resection.

E15. Clinical Experience with the Contralateral Transmaxillary Approach to the Petrous Apex

Carl H. Snyderman, MD MBA, Pittsburgh, PA; Eric W. Wang, MD, Pittsburgh, PA; Juan C. Fernandez-Miranda, MD, Stanford, CA; Paul A. Gardner, MD, Pittsburgh, PA

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

access of endonasal and contralateral transmaxillary approaches to the petrous apex.

Objectives: Evaluate clinical experience (indications, technique, complications, degree of resection) of a new endoscopic endonasal surgical approach to the petrous apex. **Study Design:** Retrospective chart review. **Methods:** We identified 16 patients who underwent a contralateral transmaxillary (CTM) approach for a petrous apex lesion from 2015-2018. Degree of resection was based on postoperative imaging. **Results:** Male:female ratio was 7:9 with an average age of 55 years (range 19-78). The majority of petrous apex lesions were chondromatous neoplasms: 7 chondrosarcomas; 6 chordomas; 1 meningioma; 1 metastasis; 1 petrous apicitis. Fifty percent of patients had prior treatment (surgery, radiation therapy). Surgery included a transclival approach and ipsilateral transpterygoid approach in all patients. Reconstruction of surgical defects included a vascularized flap in all patients: 14 nasoseptal flaps; 2 lateral nasal wall flaps. The reconstructive flap was on the same side as the CTM approach in 12 of 14 (86%) patients. A postoperative cerebrospinal fluid leak occurred in 1 of 11 (9%) patients with an intraoperative leak. There were no internal carotid artery (ICA) injuries. A sensorineural hearing loss occurred in one patient. The extent of tumor resection was improved in all patients with the CTM. **Conclusions:** The CTM approach improves the degree of resection of skull base tumors involving the petrous apex using an endoscopic endonasal approach and may minimize risk to the ICA.

E16. A Rare Presentation of Adenoid Cystic Carcinoma of the Inferior Turbinate

Briana Vamosi, BS, Cincinnati, OH; James C. Wang, MD PhD, Cincinnati, OH; Raquel Zemtsov, MD, Cincinnati, OH; Allen M. Seiden, MD, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the differential diagnosis of malignant masses of the nasal cavity.

Objectives: Adenoid cystic carcinomas are malignant tumors of secretory glands, most commonly from major and minor salivary glands with a guarded long term prognosis. Nasal cavity involvement has been reported, but is not well understood. The aim of this study was to illustrate a unique case of adenoid cystic carcinoma, solid type arising from the inferior turbinate. **Study Design:** Case report. **Methods:** Patient's chart was reviewed for presentation, workup, diagnosis, and treatment. A 67 year old male presented with complaints of chronic left nasal congestion for 10 months, refractory to 4 months of nasal saline and fluticasone sprays, progressing to complete nasal obstruction. Rigid nasal endoscopy suggested a large left choanal polyp filling the nasopharynx. **Results:** CT scan demonstrated soft tissue density filling the left nasal cavity and ostiomeatal complex. In the operating room, the mass appeared to arise from the posterior inferior turbinate, with an appearance suggestive of inverted papilloma. The mass was resected along with the inferior turbinate. Pathology was consistent with adenoid cystic carcinoma, solid type with perineural invasion with clear margins after excision. Patient was then referred for radiation therapy. **Conclusions:** Adenoid cystic carcinomas are malignant tumors that rarely affect the nasal cavity. This patient presented with common sinus symptoms, but a prolonged course led to referral and further workup. While rare, this patient illustrates the possibility of malignancy in the setting of chronic congestion.

E17. Using Ophthalmologic Examination to Predict Long Term Prognosis of Abducens Nerve Palsy in Endoscopic Skull Base Surgery

Rachel L. Whelan, MD, Pittsburgh, PA; Michael M. McDowell, MD, Pittsburgh, PA; Courtney C. Chou, MD, Pittsburgh, PA; Carl H. Snyderman, MD, Pittsburgh, PA; Susan T. Stefko, MD, Pittsburgh, PA; Eric W. Wang, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the frequency of postoperative abducens nerve palsy in the setting of endoscopic skull base surgery and the value of dedicated postoperative ophthalmologic assessment in order to predict recovery.

Objectives: While abducens nerve palsy is a known risk in the setting of endoscopic endonasal skull base (ESBS), the frequency and prognosis of postoperative palsy remain unknown. Our goals were to determine frequency, prognosis, and whether ophthalmologic assessment can predict recovery of abducens nerve palsy after ESBS. **Study Design:** Retrospective review of all patients with pathology at highest risk for abducens nerve injury (pituitary adenoma, chordoma, meningioma, chondrosarcoma, cholesterol granuloma) generated a list of patients with abducens nerve palsy before and after ESBS performed from 2011-2016. **Methods:** Patients with dedicated ophthalmologic assessment postoperatively were included in analysis. Validated ophthalmologic clinical grading scale measuring lateral rectus duction from 0 to -4 (full motion to midline drift only) were compared between time points to assess recovery of abducens nerve palsy. **Results:** Of 732 patients who underwent high risk ESBS, 116 abducens nerve palsies were identified; 77 pre and 39 postoperatively, yielding overall frequency of 15.8%, 10.5% pre and 5.3% postoperatively. Meningioma and chordoma were associated with higher rates of postoperative CN VI palsy. Of 20 patients with postoperative palsy and dedicated ophthalmologic examination, 11 (55%) resolved without intervention and had a lower initial mean palsy score than patients with partial or no recovery (-2.8 versus -4, respectively). All 4 patients with delayed postoperative palsy resolved. **Conclusions:** Frequency of postoperative abducens nerve palsy following ESBS in high risk tumors was 5.3%. While severe abducens nerve palsy may or may not recover, patients with a partial or delayed palsy postoperatively are likely to recover function without intervention.

FACIAL PLASTIC & RECONSTRUCTIVE

E18. Prevalence of Patterns of Facial Trauma among Young Athletes

Jason R. Audlin, MD, Syracuse, NY; Kiranya E. Tipirneni, MBBS, Syracuse, NY; Jesse T. Ryan, MD, Syracuse, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the prevalence patterns and associations between facial fractures and athletics among young athletes.

Objectives: Participation in athletics is common among high school and college students and presents an increased risk of injury within this age group. Previous studies reporting sports associated maxillofacial injuries have been limited to NCAA athletes, but their incidence among high school athletes remains unknown. We report the trends of maxillofacial injuries among high school and college athletes. Study Design: Retrospective review of lacrosse, basketball, and baseball athletes between ages 13-23 were between October 2015 to October 2017 based on facial fractures CPT codes in our electronic medical records. Methods: Incidence of maxillofacial injuries by sport, anatomic location, and need for operative intervention were measured and compared to data from district and university websites. Results: There were 31 reported maxillofacial fractures among 9,574 athletes in our state. Prevalence was highest among baseball players (0.0066). Nasal bone and zygomaticomaxillary complex fractures were most common at 35.5% and 25.8%, respectively. Prevalence and need for operative intervention were significantly different when analyzed by sport, both of which were highest among baseball players ($p=0.005$ and $p=0.012$, respectively). No significant difference in type of facial fracture. The average number of days to return to play following maxillofacial injury was similar by sport ($p=0.77$). Conclusions: Maxillofacial fractures are uncommon among young athletes but have the potential to cause significant morbidity. Interestingly, baseball players demonstrated the highest prevalence of injuries, most of which required operative repair, despite being a noncontact sport. Improved awareness and use of facial protection by athletes will be essential in reducing the incidence of maxillofacial injuries.

E19. Facial Plastic Surgery in Otolaryngology: A Struggle for Recognition on Two Fronts

Marlon M. Maducdoc, MD MBA, Irvine, CA; Jack L. Birkenbeuel, BS, Irvine, CA; Dillon C. Cheung, BS, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA; Harrison W. Lin, MD PhD, Irvine, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the recent recognition of facial plastic surgery as a new subspecialty of otolaryngology recognized by the American Board of Medical Specialties by understanding the path it took to achieve this significant milestone.

Objectives: To provide a brief summary of the surroundings, developments, struggles and advancements that followed otolaryngologists on their journey to become recognized by the American Board of Medical Specialties (ABMS) as facial plastic surgeons. Study Design: Historical recount. Methods: An extensive literature review was performed on the history and development of facial plastic surgery from beginning to present time. Results: As modern facial plastic surgery emerged in the mid-nineteenth century, otolaryngology had an early stake in its development. Through the unrelenting work of individuals across many specialties, facial plastic surgery began to flourish into the specialty it is today. While many otolaryngologists are certified as facial plastic and reconstructive surgeons, this was not always the case. Held back by conflict between general surgeons, plastic surgeons, and even other otolaryngologists, early otolaryngologist facial plastic surgeons had to create a path for themselves. This recount provides an overview of the surroundings that followed otolaryngologist facial plastic surgeons on their journey to expand the specialty of otolaryngology and be recognized as board certified facial plastic surgeons by ABMS. The recent addition of facial plastic surgery within the head and neck by ABMS, as well as their approval of the name change from the American Board of Otolaryngology to the American Board of Otolaryngology-Head and Neck Surgery is in large part due to the effort of early facial plastic surgeons within otolaryngology. Conclusions: The path was arduous; thus, it is important for all training and practicing otolaryngologists to understand the backstory of this significant achievement.

E20. Narrow Field Fibula Flap

Christopher J. Britt, MD, Maywood, IL; Ryan M. Smith, MD, Chicago, IL; Kofi D. Boahene, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to describe a narrow field fibula and understand its applications.

Objectives: To describe the narrow field harvest of a distal fibula flap and its applications. Study Design: Retrospective case review. Methods: 5 patients were identified who underwent narrow field fibula resection and were described. Results: Narrow field fibula flap was performed by harvesting bone from 6 cm proximal to the inferior border of the lateral malleolus and leaving at least 12 cm of usable fibula proximally. Each patient had reconstruction of a parasymphiseal and/or body defect. Each patient had anastomoses to the facial artery and vein with at least a 3.0 venous coupler. There were no major complications or flap loss and no ambulatory complications. Postoperative lower extremity computed tomographic angiography was performed in one patient and showed patent proximal peroneal vessels demonstrating subsequent flap viability. Conclusions: Narrow field fibula flap harvest is safe and effective. The peroneal vessels remain patent after distal ligation, and a subsequent fibula flap could be harvested ipsilaterally. Operative times and complications related to proximal fibula dissection would be minimized with this flap.

E21. Vasoactive Medications in Pedicled Flaps: A Systematic Review

Sabrina A. Brody-Camp, MD MPH, New Orleans, LA; Ryan D. Winters, MD, New Orleans, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role of vasoactive medication in pedicled flaps, and which medications have proven harmful as well as those that improve flap outcomes compared to controls.

Objectives: Vasoactive medications are frequently used perioperatively in patients undergoing pedicled flaps. However, there are limited conclusions about the effects such medications may have on flap outcomes. This review sought to determine which vasoactive medications improve or harm flap survival. **Study Design:** Systematic review of the literature. **Methods:** PubMed, EMBASE, and Cochrane Review were searched. Studies were included that examined the use of vasoactive medications on rotational or pedicled flaps, including random pattern skin flaps. Only systemic medications were included. The primary outcome was flap survival, with secondary outcomes including flap flow, vessel density, and histological analysis. **Results:** 56 studies met criteria, with the vast majority (55) done on animal models. 38 different vasoactive medications were used in these studies, with 31 of them demonstrating a significant difference in flap outcome compared to controls. Five studies examined the effect of sildenafil, demonstrating significant improvement in flap survival, vessel density and angiogenic growth factors, with a decrease in necrosis. Another five studies investigated the role of nitric oxide, which was found to have a protective effect on flap survival, while use of its inhibitors resulted in decreased perfusion and worse flap outcomes. **Conclusions:** A wide array of studies have examined the effects of vasoactive medications on flap outcomes. The heterogeneity of data and use of animal models prevents conclusive recommendation for human patients. Nevertheless, several promising themes emerged from the review, including the beneficial use of nitric oxide and sildenafil, and thus warrant further study.

E22. Objective Results in an Emerging Facial Nerve Center

Jimmy Chen, BA, Portland, OR; Natalie A. Krane, MD, Portland, OR; Wenelia Baghoomian, BA, Portland, OR; Mark K. Wax, MD, Portland, OR; Myriam Loy, MD, Portland, OR

Educational Objective: At the conclusion of this presentation, the participants should be able to understand how objective outcomes can be measured for assessment of quantifiable improvement in patient outcomes following facial paralysis surgeries.

Objectives: To report objective outcomes for a cohort of patients undergoing nerve transfer and free gracilis muscle transfer procedures at the newly emerging facial nerve center at our institution. **Study Design:** Retrospective review of patients undergoing nerve transfer and free gracilis muscle transfer procedures at our institution from 2014 to 2018. **Methods:** The primary objective outcomes were smile excursion, excursion angle, and facial asymmetry index (FAI) in repose and smile, measured by FACE-gram and Emotrics software. Demographic data, pre and postoperative photographs, and videos were collected. Minimal followup of 6 months was required for inclusion. **Results:** In the last 4 years, 16 patients underwent nerve transfer procedures at our institution and 5 free gracilis muscle transfers were performed. Smile excursion, excursion angle, symmetry of the oral commissure at repose and smile were all improved following nerve transfer and free gracilis muscle transfer ($P < .05$). Measurements for smile excursion improved from -1.4 (SD 1.1) mm to 3.3 (SD 1.4) mm on the affected side in facial nerve transfer patients and -2.7 (SD 1.8) mm to 3 (SD 3.3) mm for free gracilis muscle transfer patients. The FAI with smile improved from 8.5 (SD 3.0) to 4.7 (SD 2.4) in nerve transfer patients and 15.7 (SD 7.8) to 5.2 (SD 2.9) for patients who underwent a free gracilis muscle transfer. **Conclusions:** Facial paralysis surgeries at our institution resulted in significant improvements in objective outcomes such as smile excursion, angle, and facial symmetry.

E23. Risk Factors for Auricular Hematoma and Recurrence after Drainage

Prarthana J. Dalal, BS, Chicago, IL; Matthew R. Purkey, MD, Chicago, IL (Presenter); Caroline P. Price, BS, Chicago, IL; Douglas M. Sidle, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to identify factors associated with primary and recurrent auricular hematoma, as well as treatment measures associated with reduced recurrence.

Objectives: To review an institutional experience with auricular hematoma across all clinical settings including the emergency department (ED) and outpatient clinics at an urban tertiary care academic hospital, characterize practice patterns across setting and specialty, and assess for factors predictive of treatment success. **Study Design:** Retrospective cohort study. **Methods:** Patients presenting to the ED, admitted to an inpatient ward, or seen in the outpatient setting between 2000 and 2017 with a diagnosis of auricular hematoma were reviewed. A number of relevant patient features including demographic factors, medications, and social risk factors were analyzed, as were several factors related to the presentation and management of the hematoma to identify variables of clinical significance. **Results:** A total of 87 individual cases were identified. Auricular hematomas most commonly occurred in males after sports related trauma (e.g., martial arts, wrestling, boxing). Factors associated with lower rates of recurrence included initial treatment by or in consultation with an otolaryngologist and application of a bolster dressing. **Conclusions:** In our cohort, initial management of auricular hematoma by an otolaryngologist or with an otolaryngology consultation and placement of a bolster dressing was associated with lower rates of hematoma recurrence.

E24. IL-4 Mediated Regeneration of Facial Nerve Gap Defect in the Rat Model

John E. Hanks, MD, Ann Arbor, MI; S. Ahmed Ali, MD, Ann Arbor, MI; Aaron W. Stebbins, BS, Ann Arbor, MI; Eva L. Feldman, MD, Ann Arbor, MI; Michael J. Brenner, MD, Ann Arbor, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role of IL-4 promotion in the improved regenerative outcomes following experimentally induced facial nerve gap injury in the murine model.

Objectives: Studies in the literature have demonstrated the importance of mediating the pro-inflammatory response following nerve injury. Promotion of the IL-4/ STAT-6 pathway has resulted in improved survival of motor neurons in the murine facial nerve crush injury model. We aim to test our hypothesis that promotion of an anti-inflammatory environment in a gap injury in the adult rat will improve regenerative outcomes. Study Design: In vivo murine surgical model employing adult Sprague-Dawley rats. Methods: Twelve adult Sprague-Dawley rats were split into three groups. All rats underwent creation of a gap defect to their left facial nerve. Group I had the defect repaired with a conduit with IL-4, group II had an empty conduit, and group III had no reconstruction performed. Results: All rats survived to the experimental endpoint. Electrophysiological data was obtained biweekly in the form of compound muscle action potential (CMAP) measurements. Group I demonstrated evidence of nerve regeneration at week 4, whereas groups II and III did not demonstrate evidence of regeneration until week 10. At the final time point of week 10, group I had a mean amplitude (millivolts) of 1.432, group II 1.133, and group III 0.171. Conclusions: Modulation of the post-injury anti-inflammatory environment is a promising field of study for nerve regeneration. Via a rat model with a gap defect in the facial nerve, we were able to demonstrate earlier return of function as well as improved CMAP measurement in the group treated with an IL-4 embedded conduit. This holds great potential as a potentially translatable model for managing facial nerve injuries in human patients.

E25. The Effect of Platelet Rich Fibrin Matrix on Skin Rejuvenation: A Split Face Comparison

Shirley Hu, MD, New York, NY; Michael Tehrani-Bassiri, MD, New York, NY; Manoj T. Abraham, MD, Poughkeepsie, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the effects of platelet rich fibrin matrix (PRFM) on facial rejuvenation and the role of the VISIA complexion analysis system in providing objective data on skin characteristics.

Objectives: To determine the effect of PRFM on skin rejuvenation using objective data derived from the VISIA Complexion Analysis system. Study Design: Double blind, randomized, placebo controlled trial conducted at a single study center in the United States comparing two groups. Methods: Twenty patients received a single PRFM treatment in the midcheek region and nasolabial fold on one side of the face and saline in the corresponding area on the contralateral side. Subjects had each hemiface evaluated at week 6 with computer measurements performed by the Canfield VISIA Complexion Analysis and self-assessment using the Skin Rejuvenation Outcome Evaluation (SROE). Independent t-test was used for statistical analysis (pd0.05). Results: Preliminary data for ten patients show an average improvement of 216.5 ± 49.7 in VISIA measurements across all skin parameters for the PRFM group compared to 104 ± 32.8 for the saline group ($p=0.08$). There was a mean decrease in the feature count for both surface and subsurface parameters of 196.9 ± 46.4 and 18.4 ± 23.1 , respectively, in the PRFM group, compared to 94.71 ± 27.5 and 16.5 ± 11 in the control arm. SROE scores improved by 2.6 points in the treatment group and 1.4 points in the saline group. All subjects were able to correctly identify the side injected with PRFM and expressed increased satisfaction with the appearance of skin texture and nasolabial fold prominence. Conclusions: PRFM can objectively improve global skin quality compared to placebo, and this trends toward statistical significance.

E26. Improving Graft Survival and Clinical Results in Irradiated Scalps

William H. Lindsey, MD, McLean, VA; William W. Lindsey, BS, Richmond, VA (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to identify potential candidates for hair restoration after scalp radiotherapy and understand what needs to be done differently in those patients' hair cases.

Objectives: Radiation therapy induced hair loss can be a devastating cosmetic issue for adults and children recovering from cancer therapy. Hair pieces are uncomfortable, hot, and when displaced by routine activities, cause significant embarrassment. Study Design: Case series. Methods: Seven strip and hair transplantation cases were performed on patients 3 or more years out from radiation therapy to the scalp. Strip cases ranged from 1100 to 2100 grafts depending on the available non or minimally irradiated donor hair available. Results: All cases demonstrated postoperative growth not significantly different from standard hair restoration cases in the healthy population. Postoperative examination and photography illustrates this but also shows that these patients tend to have finer hair caliber than before treatment for cancer. Strip excision with trichophytic closure, keeping the grafts slightly larger with extra adipose around the bulb, and making recipient slits correspondingly larger were techniques useful in optimizing results. There were no cases of wound dehiscence, bleeding, or infection. In the latest three cases, platelet rich fibrin matrix was injected into the recipient field before graft placement. Conclusions: Careful surgical technique, specifically leaving extra tissue at the follicular base, and gentle placement in slightly larger recipient slits, allows for excellent coverage of radiation alopecia in patients with sufficient donor hair. Patient selection to determine the amount of hair available and the amount of scalp to cover however is key.

E27. Machine Learning for Objective Assessment of Intraoperative Technical Skill in Septoplasty: A Multisite External Validation Study

Molly L. O'Brien, BS, Baltimore, MD; Sonya Malekzadeh, MD FACS, Washington, DC (Presenter); Narges Ahmadi, PhD, Munich, Germany; Anand Malpani, PhD, Baltimore, MD; S. Swaroop Vedula, MBBS PhD, Baltimore, MD; Greg D. Hager, PhD, Baltimore, MD; Masaru Ishii, MD PhD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the validity of two machine learning approaches for objective assessment of intraoperative technical skill in septoplasty.

Objectives: External validation of existing machine learning (ML) for objective assessment of technical skill in septoplasty. Study Design: Prospective cohort study. Methods: We evaluated two published techniques for technical skill assessment of septal flap elevation using two datasets of Cottle motion: DS-1 (3 sites, 91 procedures, 5 faculties/10 trainees) and DS-2 (4 sites, 48 procedures, 6 faculties/21 trainees). The first technique analyzes features of stroking motions of the Cottle elevator. The second technique, descriptive curve coding (DCC), encodes changes in direction of trajectories. We used a support vector machine to classify an instance as expert (faculty) or novice (trainee) with comparable 5-fold cross-validation in both datasets. We computed accuracy, area under the receiver operating characteristic curve (AUC), and 95% confidence intervals. Results: Accuracy of DCC in DS-1 (0.733; 0.731 to 0.736) was higher than that in DS-2 (0.606; 0.602 to 0.609). On the other hand, accuracy of stroke analysis in DS-1 (0.543; 0.539 to 0.546) was lower than that in DS-2 (0.657; 0.653 to 0.66). AUC was higher for both stroke analysis and DCC in DS-2 (0.661; 0.527 to 0.661 and 0.548; 0.545 to 0.548, respectively) than in DS-1 (0.598; 0.475 to 0.598 and 0.53; 0.527 to 0.53, respectively). Conclusions: ML techniques for intraoperative technical skill assessment in septoplasty are valid across datasets, but there is room for improvement in their performance.

E28. Effect of Perioperative Factors on Ear Keloid Recurrence

Amelia K. Ramsey, BS, Shreveport, LA; Kevin A. Moore, MD, Shreveport, LA; Kaveh K. Karimnejad, MD, Shreveport, LA; Paul M. Weinberger, MD, Shreveport, LA; Paige E. Bundrick, MD, Shreveport, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss how perioperative factors can play a role in the recurrence of keloids.

Objectives: To assess the effect of various perioperative factors on ear keloid recurrence and time to recurrence. Study Design: IRB approved retrospective chart review. Methods: We examined suture type (nonabsorbable vs. absorbable), method of excision (scalpel vs. CO2 laser), and postoperative steroid use for patients surgically treated for ear keloids. In order to determine a correlation between primary variables and the time to keloid recurrence, we used Kaplan-Meier survival curves with log rank statistic for determining significance. In addition, a contingency table analysis with Fisher's exact was used to examine the correlation between the type of suture, method of excision, and steroid use. Results: No statistically significant correlation between our examined factors (nonabsorbable vs. absorbable suture, scalpel vs CO2 laser, or postoperative steroid use) and outcomes of keloid recurrence or time to keloid recurrence was found. There was a possible trend for earlier recurrence of ear keloids with the CO2 laser with a median recurrence of 38 +/- 246 days compared to the scalpel excision with a median recurrence of 272 +/- 228 days, however, these results were not statistically significant. Conclusions: Based on our results, we cannot reject our null hypothesis as there was no statistically significant correlation between our examined factors (nonabsorbable vs. absorbable sutures, scalpel vs. CO2 laser, or postoperative steroid use) and outcomes of keloid recurrence or time to keloid recurrence, though we did see a possible trend for earlier recurrence when the CO2 laser was used. Various therapies developed over the years to impede keloid formation have not shown standardized clinical improvements, necessitating a better understanding of physiologic mechanisms of wound healing and how surgical techniques and postoperative therapy contribute to recurrence of keloids. A larger, prospective study with standardized initiation of postoperative steroids and standardized followup visits could show a correlation between perioperative factors and ear keloid recurrence. To our knowledge this is the only study directly comparing nonabsorbable vs. absorbable sutures as well as scalpel and CO2 laser use.

E29. An Overview on Perioperative Pain Management Using Nonopioid Medications in Patients Undergoing Septoplasty or Septorhinoplasty

Cong N. Ran, MD PhD, Chicago, IL; Alexander Louis Schneider, MD, Chicago, IL; Q. Eileen Wafford, M LIS, Chicago, IL; Douglas M. Sidle, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to assess the effectiveness of nonopioid pain management strategies in patients undergoing septoplasty or septorhinoplasty using current literature.

Objectives: To identify nonopioid pain management strategies in patients undergoing septoplasty or septorhinoplasty and to assess the effectiveness of these strategies. Study Design: Comprehensive review of all available publications until October 2018, regarding perioperative pain management of patients undergoing septoplasty or septorhinoplasty. Methods: Systematic searches in MEDLINE, CENTRAL, EMBASE, and Google Scholar by querying "septoplasty" "septorhinoplasty" "rhinoplasty" "nose surgery" "nasal surgery" "perioperative" "pain" "analgesia" "anesthesia" "nerve block" were completed. The queried results were reviewed and selected using standard PRISMA guideline. Our review included all randomized, placebo controlled trials investigating the role of perioperative nonnarcotic pain medication in septoplasty and

septorhinoplasty patients. The studies were assessed for risk of bias and reviewed by the authors. Primary outcome that we examined was visual analog scale of pain (VAS) at various time points. Additional outcomes that we examined were analgesic consumption and adverse effects. We used GRADE guidelines to assess the quality of the evidence for each outcome. Results: A total of 23 randomized controlled trials were included with a total of 1824 patients examined. From these studies, preoperative gamma aminobutyric acid analogues, such as pregabalin and gabapentin and postoperative anti-inflammatory medications, such as dexketoprofen, orlornoxicom, significantly reduced VAS and analgesic consumption. The adverse effects of all medications examined were minimal. Additional pain management strategies that were found effective included various postoperative regional blocks. All studies followed patients up to 6-24 hours after surgery. Conclusions: Overall, there are reasonable alternatives and adjuncts to narcotics that an otolaryngologist should consider in managing pain during the perioperative period of septoplasty and septorhinoplasty patients.

E30. Analysis of the Aging Face for the Resident

Sunthosh K. Sivam, MD, Kansas City, KS; Clinton D. Humphrey, MD, Kansas City, KS; J. David Kriet, MD, Kansas City, KS

Educational Objective: At the conclusion of this presentation, the participants should be able to perform analysis of the aging face using an easily adopted systematic approach.

Objectives: To develop a short and focused online curriculum that provides learners with a systematic approach to analysis of the aging face and to prove its efficacy compared to currently available resources. Study Design: Randomized control trial. Methods: Two residents from each residency class will be randomized into group A and group B, respectively. Those in group A and B will take a baseline skills assessment where they will be asked to analyze a set of patient photos. Group A will then be given access to the novel online learning module while group B will be referred to existing resources (textbooks). Both groups will perform their second analysis of a set of patient photos then a third set 10 weeks after the second assessment. Each resident's assessment will be graded based on a binary grading rubric. Group A performance will be compared to group B to test whether or not the learning module significantly impacts a resident's ability to analyze the aging face and if this is a lasting impact. Results: TBD. Conclusions: TBD.

GENERAL

E31. Otolaryngology Resident Knowledge in Medical Coding, Billing and Documentation

Jay J. Agarwal, MD, New York, NY; Enrique G. Gorbea Dolagaray, MD, New York, NY; Arvind K. Badhey, MD, New York, NY; Kirkland Lozada, MD, New York, NY; Patrick Colley, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the baseline knowledge of otolaryngology residents in the topic of medical coding, billing and documentation. They should also be able to understand the effect of an educational intervention on the baseline knowledge.

Objectives: 1) To determine the baseline knowledge of otolaryngology residents in the topics of medical coding, billing and documentation (MCBD); 2) to determine if an educational intervention could increase resident knowledge in MCB. Study Design: Prospective study. Methods: A written assessment was used to assess residents' knowledge of MCB at two otolaryngology residency programs during their weekly academic session followed by a 20 minute lecture given by an otolaryngology faculty member who was blinded to the content of the assessment. Finally, the same test was administered in a post-test fashion. Results: Twenty-five residents participated in our study and all otolaryngology PGY levels were represented. When analyzing pre- and post-intervention testing scores for all residents as a group, the average pre-intervention score was 70.5% (95% CI: 67.16-73.84) and the post-intervention average increased to 77.64% (95% CI: 74.11-81.17), a statistically significant improvement ($p=0.006$). Pre- and post-intervention testing scores also increased for each PGY level individually, however, this was only statistically significant for the PGY1 level ($p=0.04$). Our results also show that pre- and post-intervention scores did not correlate to PGY level. Conclusions: Our study is the first to show that otolaryngology residents have a low knowledge base when it comes to the area of MCB and educational interventions can lead to significant increases in their knowledge base at every PGY level. We also show that PGY year does not correlate to MCB knowledge which implies that residents of all levels are not well trained in this area.

E32. Evaluating Opioid Prescription Practices in Head and Neck Surgery: A Single Center Analysis

Arvind K. Badhey, MD, New York, NY; Anni Wong, MD, New York, NY; Jaclyn Klimczak, MD, New York, NY; Patrick Colley, MD, New York, NY; Marita Teng, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss opioid prescribing practices within an academic otolaryngology program. Discuss the influences on number of opioids prescribed. Evaluate which aspects of patient demographics and prescribers that effect total morphine milligram equivalents (MME) prescribed.

Objectives: Surgeons prescribe nearly 10% of all opioids in the United States. While there are general guidelines for postoperative pain management, there are no procedure specific guidelines. We aim to 1) evaluate opioid prescribing practices for common otolaryngology surgeries in a single health system; and 2) apply results towards quality initiatives in postoperative pain management. Study Design: Retrospective review. Methods: All adult patients undergoing ambulatory otolaryngologic surgery, from April 2017 to June 2017, at four hospitals within an integrated healthcare system were included. Patient demographics, medication type and quantity, prescriber training level, operating surgeon, and hospital site

were analyzed. Results: 737 patients were reviewed, of which 678 (92%) received an opioid prescription upon discharge. The most common prescribers were PGY-5 residents (26%). The median morphine milligram equivalent (MME) prescribed was 150; equivalent to twenty, 5 mg oral oxycodone pills. Of the most common procedures performed (thyroidectomy, endoscopic sinus surgery, microlaryngoscopy, and direct laryngoscopy), none had significant influence on the number of opioids prescribed. Attending surgeon, care center, or PGY year of the prescriber also had no influence. Conclusions: In analyzing a single otolaryngology service and evaluating common surgical procedures, a wide variability in opioid prescribing was observed. While one would expect prescribing patterns to be consistent and linked to attending or senior preference, our data suggests this may be more a perception than a reality. This demonstrates a need for quality initiatives to optimize and perhaps, standardize opioid prescribing after head and neck surgery, in turn, limiting potential opioid abuse and opioid diversion.

E33. Impact of a Prolonged Surgical Mission Expedition on the Breadth of Otolaryngology-Head and Neck Surgery Practice in a Developing Nation

Dessalegn Berihu, MD, Mekelle, Ethiopia; Yilkal Zemene, MD, Mekelle, Ethiopia; Joshua P. Wiedermann, MD, Mekelle, Ethiopia

Educational Objective: At the conclusion of this presentation, the participants should be able to understand how practice trends can change during a prolonged mission trip to a developing nation.

Objectives: To assess the impact of prolonged onsite training and teaching on the breadth and comfort of practice among the otolaryngology-head and neck surgeons in a developing nation. Through identification of knowledge and skill gaps, we aim to expand the practice of local attendings to allow for a more comprehensive range of medical and surgical care. Study Design: Cohort/survey study. Methods: Otolaryngology-head and neck surgery residents and attendings of our tertiary referral hospital were surveyed to assess the breadth and exposure of their current practice. This will be compared to their practice following exposure to a year long surgical mission expedition with a United States trained otolaryngology-head and neck surgeon. Results: Although data is currently being collected, in just three months of the mission the breadth of cases successfully performed by the otolaryngology-head and neck surgery team has quadrupled in variety. We have also added office based procedures including ultrasound diagnosis and fine needle aspiration techniques. Final data and analysis will be collected in the early spring, 2019. Conclusions: Preliminary data and anecdotal experience have shown tremendous growth of comfort and breadth of surgical care in an underserved, developing area with the utilization of a prolonged surgical mission.

E34. Industry Payments for Otolaryngology Research: A Four Year Analysis of the Open Payments Database

Philip R. Brauer, BA, New Haven, CT; Elliot C. Morse, BS, New Haven, CT; Saral Mehra, MD MBA, New Haven, CT

Educational Objective: At the conclusion of this presentation, the participants should be able to characterize industry sponsorship of otolaryngology research and be able to compare otolaryngology to other surgical specialties. In addition, participants should understand the distribution of research funding by company and the concentration of funding on the most highly compensated principal investigators.

Objectives: To investigate research payments to otolaryngologists from industry. Study Design: Cross-sectional retrospective analysis. Methods: Using the Open Payments database, we characterized research payments made to otolaryngologists in 2014 - 2017. We analyzed trends in payment values over time as compared to other surgical specialties. Trends in the geographical and temporal distribution of payments to individual principal investigators, along with the ties to specific companies, were investigated. Results: Compared to other surgical specialties, otolaryngology was the second or third lowest in terms of research funding from industry sponsors depending on the year. The median payment (mean) was \$819 (\$5,514), \$548 (\$3,083), \$771 (\$3,484), and \$1,000 (\$5,768) in 2014, 2015, 2016, and 2017, respectively. Although significant differences in the mean and median payment between each region varied by year, the Northeast was typically the highest. Examining the forty most highly funded recipients, we found that these principal investigators had total compensation that was on average spread over 3.35 years of the database, 2.975 different companies, and 7.35 distinct scientific studies, which were all significantly higher compared to less funded otolaryngologists. Conclusions: Research payments to otolaryngologists are concentrated to a small number of physicians; however, many of the most highly funded principal investigators worked on numerous studies with a variety of different companies over many years. In this way, potential bias is limited because fewer individuals have a vested interest in a particular study or industry relationship. Therefore, research in otolaryngology supported by industry may have fewer potential conflicts of interest than previously suspected.

E35. The Development of an Ultrasound Community of Practice within Otolaryngology

Kevin A. Calamari, BA, Columbus, OH; Sean M. McDermott, BS, Columbus, OH; Christine C. Barron, BA, Columbus, OH; Garth F. Essig, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate knowledge of the otolaryngology ultrasound community of practice being developed at our institution, our future goals for the community, and how this concept could potentially be applied at other institutions moving forward.

Objectives: An ultrasound community of practice (COP) is a concept developed at our institution involving a group of medical students and physicians collaborating to promote sonography within a medical specialty through research, edu-

cation, and clinical skills. Recently, an ENT ultrasound COP was created that is now at an inflection point in determining how best to engage members moving forward. Study Design: We theorize that this COP will serve as a central hub for students and physicians interested in ENT ultrasound and sought input regarding student's goals from participation. Methods: An electronic survey was administered to all medical students who expressed interest in the ENT ultrasound COP after an initial introductory and planning meeting. Results: Of 111 students who demonstrated interest in joining a COP, 15 (13.5%) specifically highlighted otolaryngology. After an initial meeting and discussion of annual goals, including literature reviews, research projects, and didactic scanning sessions, 80% expressed interest in clinical patient care and research. 40% wanted to participate in educational development. In regards to perceived benefits, exposure to ENT physicians and research experience were indicated as being the greatest benefits, with increased ultrasound familiarity also indicated as beneficial. Conclusions: This initial survey of interested students demonstrates a strong student interest in furthering the ENT COP objectives. Next steps will involve cataloging recent ENT ultrasound research, developing didactics, and designing research projects. Nearly two-thirds indicated they have ultrasound experience, allowing the COP to function as a platform to bring together ultrasound novices and experienced scanners to further the otolaryngology ultrasound advancement within the COP.

E36. Are Opioids over Prescribed in Otolaryngology Surgery?

Geoffrey C. Casazza, MD, Salt Lake City, UT; Hilary C. McCrary, MD, Salt Lake City, UT; Ryan Cardon, PharmD BCPS, Salt Lake City, UT; Richard K. Gurgel, MD, Salt Lake City, UT; Jeremy D. Meier, MD, Salt Lake City, UT

Educational Objective: At the conclusion of this presentation, the participants should be aware of the over prescribing of opioids in otolaryngology surgery.

Objectives: Understand patient opioid use following otolaryngology surgery. Study Design: Prospective patient survey. Methods: All patients undergoing otolaryngology surgery within a multihospital network were surveyed regarding postoperative opioid use. Electronic surveys were distributed approximately 3 weeks postoperatively. Participating patients were surveyed regarding the amount of opioid prescribed, the amount of opioid taken, the adequacy of their pain control, and their disposal of excess medication. Prescription records were reviewed to identify the actual amount of opioid each patient was prescribed. Opioid amounts were converted to oral morphine equivalents (OME) for comparison. Results: 908 patients responded to the survey. 464 patients (51.1%) underwent nasal surgery, including endoscopic sinus surgery, 168 (18.5%) underwent neck surgery, 226 (24.9%) underwent oral cavity/oropharyngeal surgery (OC/OP), and 50 (5.5%) underwent otologic surgery. Mean opioid prescribed (in OME) from the medical record was 216.3 ±151.4 for nasal surgery, 149.6 ±96 for neck surgery, 409.6 ±175.4 for OC/OP surgery, and 171.5 ±82.8 for otologic surgery. Mean opioid used, per patient report, was 93.8 ±116.2 for nasal surgery, 65.4 ±96.8 for neck surgery, 276.4 ±222.6 for OC/OP surgery, and 57.6 ±61.9 for otologic surgery. At least 683 patients (75.2%) reported having excess opioids. 492 patients (72%) kept excess and only 126 (18.4%) properly disposed of excess in a medication disposal box. 35 patients (5.1%) flushed excess and 28 (4.1%) threw away excess in the trash. Conclusions: Most patients undergoing otolaryngology surgery will have excess opioids and most will keep them. Decreasing postoperative opioid prescriptions may decrease surplus available for potential abuse.

E37. Development and Prospective Evaluation of a Novel High Fidelity Retrobulbar Hematoma Simulator

Christopher J. Chin, MD FRCSC, St. John, NB Canada; Alexander E. Clark, BA, St. John, NB Canada (Presenter); Kathryn Roth, MD FRCSC, London, ON Canada; Kevin Fung, MD FRCSC, London, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the benefits of using the high fidelity retrobulbar hematoma simulator to teach emergency, vision saving surgical skills.

Objectives: Retrobulbar hematoma is a rare but devastating complication of sinus surgery. It is treated initially with a lateral canthotomy and cantholysis at the bedside. Due to the acuity of this complication, teaching this in the clinical setting is difficult. The objective of this study was to develop a high fidelity cadaveric model for addressing this problem. Study Design: Prospective cohort survey. Methods: A fresh frozen human cadaveric model of a retrobulbar hematoma was created using a Foley catheter to simulate elevated intraocular pressure. Residents participating in an emergencies in otolaryngology boot camp participated. A survey measuring confidence levels in performing lateral canthotomy and cantholysis was administered. After completing the skill station, a post-intervention survey was administered to assess confidence of the learner as well as fidelity and usefulness of the task trainer. Results: Thirty-three residents participated in the boot camp. Residents rated their confidence pre-intervention at 1.3/5 which suggests the majority were unable to perform the procedure. After using the model, residents rated their confidence at 3.5/5, which falls between basic knowledge and reasonably confident; this improvement achieved statistical significance ($P < 0.0001$). Fidelity of the model was rated 3.9/5; a score of 4 is defined as realistic. Lastly, the residents rated the usefulness of the model as 4.7; a score of 5 is defined as very useful. Conclusions: A high fidelity cadaveric model of a retrobulbar hematoma was successfully developed. This novel simulator was perceived to be useful, realistic, and effective by junior residents.

E38. Parathyroid CT Angiography in Primary Hyperparathyroidism with Nonlocalizing Sestamibi: A Case Series

Michael J. Coulter, MD, San Diego, CA; Isaac E. Schwartz, MD, Naples, Campania Italy; Gilbert E. Boswell, MD, San Diego, CA

Educational Objective: Participants should be able to discuss the parathyroid CT angiography technique and its role in primary hyperparathyroidism.

Objectives: Preoperative localization of hyperactive parathyroid glands in primary hyperparathyroidism has improved in recent years. We have developed a two phase technique using CT angiography that accurately localizes hyperactive parathyroid glands while minimizing radiation dosage in patients in whom standard imaging has failed to localize an abnormal parathyroid gland. **Study Design:** Case series. **Methods:** Parathyroid CT angiography uses a novel patient positioning, individualized timing of IV contrast, and radiation sparing techniques borrowed from cardiac imaging. It is utilized in patients for whom sestamibi and ultrasound imaging are nonlocalizing. Several illustrative cases were selected to demonstrate the diverse clinical scenarios in which this technique has been successfully utilized in patient care. **Results:** Case 1 is a 61 year old woman with symptomatic hyperparathyroidism whose sestamibi scan was equivocal. PCTA clearly localized an adenoma which was successfully removed. Case 2 is a 45 year old woman with asymptomatic hyperparathyroidism whose sestamibi was similarly equivocal and ultrasound was nonlocalizing. PCTA identified a large, atypically high superior left ectopic adenoma which led to an altered surgical plan for successful resection. Case 3 is a 22 year old man with asymptomatic primary hyperparathyroidism who had a nonlocalizing sestamibi. PCTA identified a middle mediastinal ectopic adenoma that was resected via thoracotomy. **Conclusions:** PCTA is a new technique in anatomic imaging for hyperparathyroidism. It has been successfully utilized for localization of parathyroid adenomas that are otherwise difficult to image.

E39. Case Report: Facial Nerve Weakness after Sodium Hypochlorite Dental Irrigation

Wesley L. Davison, MD, New York, NY; Ana H. Kim, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the risks of using sodium hypochlorite during endodontic root canal therapy including possible neurologic deficits. They should also be able to explain the proper treatment for such injuries.

Objectives: Demonstrate a rare cause of facial nerve palsy. **Study Design:** Case report. **Methods:** Dental practitioners routinely use dilute sodium hypochlorite (1-5.25%) irrigant during endodontic root canal procedures in order to cleanse the root canal system due to its ability to dissolve organic soft tissue and for its antimicrobial properties. Adverse sequelae of sodium hypochlorite irrigation are most likely to occur in the posterior maxillary teeth of older women. **Results:** A 47 year old woman presented one month after having endodontic root canal therapy with sodium hypochlorite irrigant on tooth #11. During the procedure she developed facial swelling, erythema, V2 numbness and paralysis of her left upper lip. Despite IV antibiotics and steroids the facial numbness and weakness did not improve. CT and MRI showed superficial inflammation, partially opacified left maxillary and ethmoid sinuses, and a thrombosed facial vein. Two months post-procedure, the patient still reported persistent facial weakness with smiling, and complained that water sometimes entered her eye while showering. **Conclusions:** Irrigation with sodium hypochlorite during root canal therapy can rarely cause inflammation, edema, neurologic deficits, permanent tissue necrosis and even airway emergencies. Using alternative irrigants, personal protective equipment for the patient, a well sealed rubber dam and high volume suction reduce the risk of injury. For severe injuries, patients may require admission for IV steroids and antibiotics. Tissue necrosis may require debridement. This case demonstrates a unique cause of facial nerve palsy that is a documented, rare occurrence in the dental literature but should not be overlooked by other practitioners, particularly otolaryngologists who are likely to treat these patients.

E40. Opioid Stewardship in Otolaryngology/Head and Neck Surgery

Kelly M. Dean, MD, Chapel Hill, NC; Asim A. Lal, BS, Chapel Hill, NC; Trevor G. Hackman, MD, Chapel Hill, NC; Peggy P. McNaull, MD, Chapel Hill, NC; Brooke A. Chidgey, MD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand current prescribing patterns of opioid pain medications for patients undergoing ambulatory head and neck surgeries, to discuss patient knowledge about the proper use, storage and disposal of opioid pain medications, and to utilize evidence based recommendations regarding the quantity of opioids necessary to adequately treat postoperative pain for a variety of outpatient surgeries in otolaryngology.

Objectives: The aim is to analyze current opioid prescribing habits and to obtain information from patients regarding opioid usage. Ultimately the goal is to provide evidence based recommendations for the quantity of opioids necessary to adequately control postoperative pain in a variety of outpatient surgical procedures in otolaryngology. **Study Design:** Cross-sectional survey. **Methods:** A telephone survey was administered to patients undergoing select surgical procedures including endoscopic sinus surgery, septoplasty, tympanomastoidectomy, and cochlear device implantation. Patient surveys quantified postoperative pain, determined number of opioid doses used, and gathered information regarding patient opioid knowledge. Responses were collected using REDCap databases. All responses were anonymous except to those investigators completing the survey. **Results:** A total of 59 surveys were completed from May-August 2018. Nasal/sinus surgery patients were prescribed an average of 18.2 doses of opioids but took an average of 9.2 doses in the first two weeks after surgery, leaving an average of 10.1 doses unused. Patients who underwent otologic surgery were prescribed an average of 19.8 opioid doses. This group took an average of 8.3 opioid doses after surgery, leaving an average of 11.5 doses unused. **Conclusions:** Surgeons overestimated the postoperative narcotic pain medication requirement and therefore overprescribed opioid medications (197% in sinus surgery and 238% in otologic surgery) for these common outpatient surgeries. Our results reveal that typical outpatient sinus and otologic surgical pain is adequately covered with 10 doses of opioids within the first two weeks after surgery. Future directions include continuing and expanding data collection to include all outpatient surgeries across all divisions within the department.

E41. Gender Gap in Residency and Fellowship Directorships in Otolaryngology Training

Madison V. Epperson, BA, Cincinnati, OH; Christopher J. Gouveia, MD, Santa Clara, CA; Meredith E. Tabangin, MPH, Cincinnati, OH; Stacey L. Ishman, MD MPH, Cincinnati, OH; Mekibib Altaye, PhD, Cincinnati, OH; Alice C. Tang, MD, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, participants should be able to describe the proportion of residency and fellowship directorships held by women and to explain trends in academic rank and years of practice of those occupying these positions.

Objectives: To determine the representation of women in otolaryngology holding residency and fellowship directorships and to further elucidate their academic rank and years in practice in comparison to male colleagues. Study Design: Descriptive review. Methods: A comprehensive list of otolaryngology residency and fellowship directors in the United States and Canada in 2017-2018 was utilized for this study. Academic rank and years in practice were determined from biographical information from departmental websites, with Doximity and internet search used as secondary resources. Descriptive statistics were tabulated and distribution of rank were compared using t-test with $p < 0.05$ considered significant. Results: Among the 287 residency and fellowship directorships, women held 19.9% (57/287) of overall directorships, 27.6% (21/102) of residency directorships, and 15.9% (30/204) of fellowship directorships. Overall, full professors comprised 49% (140/287) of directorships. However, 43.9% (25/57) of women holding directorships were associate professors, with 29.8% (17/57) as assistant professors and 26.3% (15/57) as full professors. In comparison, the majority of men holding directorships had the rank of full professor at 54.3% (125/230), whereas 31.7% (73/230) were associate professors and 13.5% (31/230) were assistant professors ($P=0.0003$). Those occupying directorships have practiced on average 19 ± 9.2 years; women have practiced 13.9 ± 6.8 years, and men 20.2 ± 9.4 years. Conclusions: This study establishes that more men than women hold residency and fellowship directorships, consistent with the gender gap previously demonstrated within otolaryngology. However, it demonstrates that women are holding directorships at lower academic ranks and with fewer years of practice than men.

E42. Does Placement of a Drain Decrease the Rate of Post-Parotidectomy Seroma Formation?

Soroush Farnoosh, MD, Syracuse, NY; Mark F. Marzouk, MD, Syracuse, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the differences in rates of seroma formation after parotidectomy in patients with drain versus in patients without a drain, as well as patients with an active negative pressure suction drain and patients with a passive drain. We also discuss how the type of drain can increase the length of hospital stay without significantly changing the complication rate.

Objectives: To compare the rates of postoperative complications related to drain placement versus no drain placement in patients who undergo parotidectomy and determine if the type of drain (active vs. passive) would affect the length of hospital stay after surgery. Study Design: Retrospective analysis. Methods: Clinical charts of patients who underwent total or superficial parotidectomy were retrospectively reviewed. Patients who underwent concurrent neck dissection or wide local excision of skin were excluded. Age, gender, type of drain, closure, complications, length of hospital stay, size of the specimen, and pathology were recorded. ANOVA, T-test, and chi-squared test were used to analyze the data. Results: 157 patients met our inclusion criteria. Fifteen (9.5%) patients developed seroma postoperatively. The rate of seroma formation was not significantly different between active, passive, or no drain groups. The benign or malignant pathology also did not significantly affect seroma formation. Patients with a seroma had a slightly larger defect, but this was not statistically significant. Length of hospitalization was significantly shorter for patients with no drain or a passive drain compared to patients with an active drain ($p < 0.05$). Conclusions: Type of drain, pathology, size of defect, and type of closure did not significantly affect the rate of postoperative seroma formation after. The type of drain however significantly affected the length of stay. Types of drain may increase the length of stay, while they may not significantly decrease the rate of complications.

E43. Trends in National Institutes of Health Funding among Otolaryngology Principal Investigators

Zainab Farzal, MD, Chapel Hill, NC; Erin M. Mamuyac, MD, Chapel Hill, NC; Elizabeth D. Stephenson, BA, Chapel Hill, NC; Julia S. Kimbell, PhD, Chapel Hill, NC; Adam M. Zanation, MD, Chapel Hill, NC; Adam J. Kimple, MD PhD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the recent trends in NIH funding for otolaryngology principal investigators.

Objectives: To analyze trends in NIH funding for otolaryngology-head and neck surgery (Oto-HNS) principal investigators (PIs). Study Design: Retrospective database review. Methods: We exported NIH Reports Expenditure and Results Tool (RePORTER) data from 2008-2017. All research grants listed under otolaryngology for research organization department were reviewed, and additional data were collected including PI sex and subspecialty within Oto-HNS. Results: Number of Oto-HNS grants funded per year ranged from 258-347 with no discernible trend over time. Percentage of female PIs increased minimally from 24.8% in 2008 to 29.8% in 2017. Most NIH funded grants were within otology/neuroscience (range: 65.7%-74.2%), followed by head and neck/cancer research (range: 12.8%-17.3%). Pediatric otolaryngology (excluding otology), rhinology, laryngology, and facial plastics each consistently averaged less than 10% of grants funded every year. 71.8%-80.4% of grants were secured from the National Institute on Deafness and Other Communication Disorders (NIDCD), followed by National Cancer Institute (NCI, 6.9-9.5%) and the National Institute of Dental & Craniofacial Research (NIDCR, 4.8%-7.4%). R grants comprised the majority of total funding (66.4-75.0%) with a steady increase in

fellowship F (2.7% in 2008 to 8.7% in 2017) and training T (5.7% in 2008 to 10.8% in 2017) grant funding. Conclusions: Female PIs remain a minority and most Oto-HNS funding is within otology/neuroscience. NIH funding in pediatrics, rhinology, laryngology, and facial plastics is uncommon, but may represent areas for expansion for our field.

E44. Design and Implementation of an Academic Otolaryngology-Head and Neck Surgery Residency Program in a Developing Nation

Filmawit Gebremeskel, MD, Mekelle, Ethiopia; Yilkal Zemene, MD, Mekelle, Ethiopia; Joshua P. Wiedermann, MD, Mekelle, Ethiopia

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the impact of developing an academic residency program in a developing nation.

Objectives: To assess the knowledge and skill gaps within a new residency program in a developing nation. Once identified, we aim to develop a strong academic residency program by designing a new curriculum and implementing routine academic multidisciplinary conferences. Study Design: Idea/editorial/opinion. Methods: A United States trained otolaryngology-head and neck surgeon will spend a year in a developing nation with the primary goal of designing and implementing an academic residency program. The thoughts, experiences perspectives from the residents will be collected throughout the year to help portray the impact of this prolonged mentoring experience. Results: The program is currently in its third month and we have experienced tremendous growth including the implementation of a comprehensive curriculum, formal rounds, multidisciplinary conferences, and temporal bone labs. We will continue to obtain information from the residents as the year progresses and collection will be complete in early spring. Conclusions: We hope to show the impact a prolonged mission trip has on the thoughts and expectations of the native residents in a developing nation.

E45. Etiology Analysis of Mandibular Fractures at an Urban Trauma Center from 2008-2017

Bianca Georgakopoulos, BS, Washington, DC; Armon Panahi, BS, Washington, DC; Andrew D. Sparks, MS, Washington, DC; Philip E. Zapanta, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to identify which populations are at certain risks for particular etiologies leading to mandibular trauma.

Objectives: To analyze which patient populations are more likely to have mandible fractures over a ten year period in an urban area. Study Design: Retrospective chart review. Methods: A retrospective chart analysis of 576 patients was completed on patients with fractured mandibles at an urban teaching hospital. Age groups were compared to race, gender, season, alcohol consumption, and mechanism of injury in two and three way variable calculations. Results: Younger patients' mandibular fractures were most likely due to assault or sports injuries, while older patients were more likely due to falling. Mandible fractures caused by falls were more likely to occur in the winter and less likely in the summer. In general, males were more likely injured from assault, and female injuries were attributed to falling. For all age groups, fractures in Caucasian and Asian populations are associated with falling ($p < 0.05$), while the African American population is correlated with physical assaults leading to injury ($p < 0.05$). Conclusions: Different injuries have various associated patient stereotypes. With mandibular fractures in an urban location, there is now more evidence behind mandibular fractures due to younger patients being assaulted or in sports accidents, elderly people falling, more falls in the winter months, a higher proportion of females falling and men being assaulted, and racial discrepancies regardless of age. Urban hospitals often treat a wide variety of age groups and these age groups have mandible fracture associations based on multiple factors including etiology, season, gender, race, and age.

E46. Retrospective Analysis of Mandibular Fractures at a Level I Trauma Center from 2008-2017

Bianca Georgakopoulos, BS, Washington, DC; Armon Panahi, BS, Washington, DC; Andrew D. Sparks, MS, Washington, DC; Sean B. Kane, MD, Washington, DC; Philip E. Zapanta, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to compare current mandibular data (from 2008-2017) to 1990-1999 data from a 2003 study conducted in the same city, as well as explain the effects of an official trauma level I status on mandibular cases.

Objectives: To identify trends in mandible fracture patients during an official title verification to a level I trauma center, and to compare specific variables to a 2003 study analyzing a similar urban level I trauma center. Study Design: Retrospective chart review. Methods: A retrospective chart analysis of 577 patients with mandible fractures was performed at an urban teaching hospital. The date of fracture, date of surgery, demographics, fracture site(s), etiology, alcohol consumption, surgery, and insurance type were recorded. Results: Significant differences were noted for both cohorts of pre- versus post-verification level I ($p < 0.05$). When comparing the 2008-2013 to the 2013-2017 cohort, the latter cohort had more patients between 26-35 years old (24.2% vs. 32.4%), African American patients (52.0% vs. 68.8%), assaults (53.7% vs. 63.3%), public insurance (24.7% vs. 54.1%), and operative interventions (58.0% vs. 71.7%). The data from the post-verification cohort was more similar to the 2003 study of an urban trauma center. Conclusions: With the change to true level I trauma center status, there was a significant shift in patient demographics in mandibular trauma. There were more operative interventions, patients were more likely to be assaulted, patients were predominantly African American, and the patient population was more likely to have public insurance. For an otolaryngologist covering the trauma call at a level I trauma center, these factors may be clinically significant. The comparison to the 2003 study demonstrates how official level I trauma status possibly influences the types of cases and patient populations admitted due to a greater influx of patients.

E47. Retrospective Comparison of Facial AIS to other Patient Variables at an Urban Trauma Center from 2008 to 2017

Bianca Georgakopoulos, BS, Washington, DC; Armon Panahi, BS, Washington, DC; Andrew D. Sparks, MS, Washington, DC; Lois Collins, MSN RN, Washington, DC; Philip E. Zapanta, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to determine how specific hospital, patient, and injury associated variables influence the Abbreviated Injury Scale (AIS) score for facial fracture cases.

Objectives: To analyze how facial the Abbreviated Injury Scale (AIS) may be influenced by other patient variables at a hospital from 2008-2017. Study Design: Retrospective chart analysis. Methods: A retrospective chart analysis of 1,291 patients seen at an urban trauma center was performed with data from 2008 to 2017 looking specifically at the facial AIS score due to facial fractures (facial and mandibular). The AIS was compared to demographics, season, days in hospital, days until operation, days on ventilator, days in ICU, and alcohol levels. Results: Most of the facial fracture cases had a facial AIS of 1 or 2 instead of a score of 3 or 4, which is considered more severe (90.2% vs. 8.8%). A higher facial AIS was associated with older patients, Caucasian patients, a longer time in the ICU, shorter time in the emergency department, and more time on a ventilator ($p < 0.05$). A lower AIS was associated with African American patients and also alcohol consumption ($p < 0.05$). Conclusions: These findings demonstrate that more severe facial fracture cases are processed faster through the trauma bay, but will have longer ICU stays and ventilator dependency. This higher acuity was maintained by the efficiency of the trauma teams and responding otolaryngologists and plastic surgeons. In an urban setting, most facial fractures will likely have a lower AIS and lower acuity, but the trauma teams and specialty services help minimize hospital holding times when there are more severe facial trauma cases.

E48. WITHDRAWN -- Feasibility of Intensive Ecological Sampling of Tinnitus in Intervention Research

Katherine M. Gerull, BA, St. Louis, MO; Dorina Kallogjeri, MD MPH, St. Louis, MO; Marilyn L. Piccirillo, MA, St. Louis, MO; Thomas L. Rodebaugh, PhD, St. Louis, MO; Eric J. Lenze, MD, St. Louis, MO; Jay F. Piccirillo, MD, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to explain how EMA can be used as a research tool in tinnitus research.

Objectives: Ecological momentary assessment (EMA) provides an alternative to retrospective patient reported outcome measures, which fail to capture the individual and dynamic nature of tinnitus. Our objective was to study the impact of repetitive EMA sampling in patients undergoing a therapeutic tinnitus intervention. Study Design: Longitudinal cohort study. Methods: This was a 12 week study of 30 adults with self-reported bothersome nonpulsatile tinnitus of >6 months duration. Participants completed 2 weeks of EMA text surveys 7 times per day (pre-intervention), followed by 8 weeks of EMA questions 4 times per day (during intervention), concluding with 2 weeks of EMA questions 7 times per day (post-intervention), for a total of 420 surveys over 12 weeks. During the 8 week intervention period, participants completed a commercially available auditory intensive online cognitive brain training program. The primary outcome measures were compliance with EMA surveys, as measured by survey response rates and participant reported effects of EMA on their tinnitus bother. Results: Of the 30 participants in this study (20 women and 10 men; median [range] age 54 [47-64] years), 25 participants completed the study protocol (83%). Participants completed a median of 87% of EMA surveys (range: 67-99%). Qualitative analysis of participants' free text responses found that participants did not report negative side effects of the EMA. Conclusions: Excellent participant compliance can be achieved with multi-week temporally rigorous EMA sampling. We observed no meaningful impact of EMA on the rate of completion and satisfaction with the brain training program. EMA is a promising sampling methodology in tinnitus research.

E49. Current Status of Medical Coding Education in US Otolaryngology Residency Programs

Enrique G. Gorbea, MD, New York, NY; Kirkland Lozada, MD, New York, NY; Patrick Colley, MD, New York, NY

Educational Objective: We wish to inform the otolaryngology community about the various practices being implemented across the country to educate residents on medical coding in preparation for postgraduate life. We find that there is much variability in regards to when and how this topic is being taught, which may require standardization of medical coding and documentation research in the future.

Objectives: To assess the current state of otolaryngology residency education on medical coding and documentation. Study Design: 11 question online blind survey to all otolaryngology residency program directors in the US. Methods: Emails were collected for all otolaryngology residency program directors from ACGME website and the survey was submitted. Results were blind and collected over a 3 month period. Results: 22.6% of US otolaryngology residency PD's responded to the survey. 75% of respondents said their programs have a dedicated medical coding and documentation curriculum. Most interventions occurred on a yearly basis (57.1%). 95.2% of respondents state their residents receive coding and documentation education every year of their residency. 91.7% of PD's believe learning proper coding and documentation before finishing residency is beneficial. 87% of responding PD's believe their residents are currently knowledgeable about medical coding by graduation. Opinions on ideal medical coding teaching strategies varied, but most (65.2%) believe it should be taught continuously throughout all years of residency. Conclusions: Most US otolaryngology programs have a medical coding education curriculum for residents. Additionally, PD's believe their residents are knowledgeable on medical coding by graduation. However the manner and timing of these educational interventions varies widely. These results

highlight the need for a standardized curriculum on medical coding from the ACGME to improve training of otolaryngology residents across the country.

E50. Status of Medical Coding, Billing and Documentation Knowledge among Otolaryngology Attendings

Enrique Gorbea, MD, New York, NY; Jay Agarwal, MD, New York, NY; Arvind Badhey, MD, New York, NY; Kirkland N. Lozada, MD, New York, NY; Roheen Rhaitata, MD, New York, NY; Patrick Colley, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to see how there is a large discrepancy between the proportion of otolaryngology attendings who were trained on medical coding, billing and documentation during residency and the proportion who believe it should be taught during residency. They will also learn practice setting and experience level are not predictive of medical coding, billing and documentation knowledge level.

Objectives: 1) To determine the knowledge base and self perception of otolaryngology attendings on medical coding, billing and documentation (MCBD); 2) to identify whether practice setting or experience are predictive of MCBD knowledge; and 3) to assess whether otolaryngologists believe MCBD should be taught in residency. **Study Design:** Online survey and assessment. **Methods:** An anonymous online survey was submitted to both academic (AP) and private practicing (PP) otolaryngology attendings, which included a 7 question survey and a 24 question assessment designed to measure MCBD knowledge level. Results were collected and analyzed using descriptive and appropriate comparative statistics. **Results:** The survey was sent to a total of 213 otolaryngology attendings and 79 responded to our survey. 57 of these were PP and 20 AP. 44 were general otolaryngologists whereas 35 were subspecialty otolaryngologists. Only 12.7% of all respondents were trained in MCBD during residency yet 92% expressed MCBD should be taught during residency. Self perception of MCBD knowledge was higher for PP, general otolaryngologists, and otolaryngologists with ≥ 15 years experience, but this did not correlate with statistically higher scores on our assessment. Experience of 5-14 years was shown to have higher MCBD assessment scores ($p=0.02$). **Conclusions:** Only a small fraction of practicing otolaryngologists in our sample received MCBD education in residency, but almost all agree it should be part of residency education. Surprisingly, practice setting and experience level did not predict MCBD knowledge level.

E51. Role of Preoperative Radiography for Management of Recurrent Secondary Hyperparathyroidism in Chronic Renal Failure

Frances Mei L. Hardin, MD, Columbia, MO; Joseph P. Cousins, MD PhD, Columbia, MO; Robert P. Zitsch, MD, Columbia, MO

Educational Objective: At the conclusion of the presentation, the participants should be able to discuss radiographic findings that correlate to parathyroid implant anatomy in the forearm, as well as the landmarks that may be used to guide a surgeon's preoperative planning for explantation.

Objectives: Recurrent secondary hyperparathyroidism (SHPT) in chronic renal failure (CRF) patients can be a complicated disease to manage. We report the case of preoperative radiographic imaging prior to explantation of parathyroid tissue from the forearm of a patient with SHPT and CRF. Emphasis is placed on appropriate imaging modality in CRF patients who cannot safely receive contrast. **Study Design:** Case report and literature review. **Methods:** Radiographic (MRI/MRA) depiction of parathyroid implant within the forearm, in a case of CRF patient with SHPT, and its role in guiding surgical approach. **Results:** A 33 year old male with endstage renal disease on dialysis presented with recurrent SHPT after multiple parathyroidectomy procedures. He underwent a 3 1/2 gland parathyroidectomy in 2007 with implantation of a half gland into the left forearm. Subsequently the patient had persistently elevated parathyroid hormone (PTH) and calcium levels with excision of some, but not all, parathyroid tissue from the left forearm in 2012. He presented in 2018 with a PTH level of 955. MRI and MRA of the forearm with arterial spin labeling acquisition were obtained to delineate the location of the implant in relation to anatomical landmarks. The patient underwent surgical explantation of parathyroid tissue and postoperative PTH fell to 22. **Conclusions:** Recurrent SHPT in CRF patients poses a unique challenge to image and treat. Given that the CRF patient may not safely receive gadolinium contrast, radiographic study options are limited. However, imaging can be invaluable for preoperative planning.

E52. Evaluating Differences in Subjective Scoring for Commitment to Academic Medicine Using the Standard Letters of Recommendation in Otolaryngology Residency

Javier J.M. Howard, MPH, Cincinnati, OH; James Wang, MD PhD, Cincinnati, OH; Meredith E. Tabangin, MPH, Cincinnati, OH; Sarah Rohde, MD, Nashville, TN; Vinita Takiar, MD PhD, Cincinnati, OH; Alice L. Tang, MD, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) demonstrate an understanding that women and racial/ethnic minorities continue to be under-represented in academic medicine; 2) discuss factors that may contribute to this under-representation, including implicit bias.

Objectives: To examine whether there are differences in evaluator subjective grading with regards to commitment to academics based on 1) the gender or race of the student; or 2) by the academic rank of the evaluator. **Study Design:** Retrospective cohort study. **Methods:** Applications to a large academic medical center based otolaryngology residency program in 2017 were reviewed; only applications with standardized letters were included. The commitment to academics scale was measured and scored (lower values indicates higher commitment, range 0-0.77). To determine if there were differences

in the subjective grading of commitment to academics, distributions of scores were compared using a t-test with $p < 0.05$ considered significant. Results: A total of 474 standardized forms were submitted from 217 applicants (35% women, 59% Caucasian). Subjective scores for commitment to academics did not differ between females (mean \pm SD, 0.17 \pm 0.17) and males (0.17 \pm 0.16), $p=0.83$ or between non-Caucasians (0.16 \pm 0.16) and Caucasians (0.18 \pm 0.16), $p=0.29$. Full professors (median 0.10; IQR 0.04, 0.23) gave more committed scores to applicants than assistant professors (median 0.17; IQR 0.08, 0.29), $p=0.02$. Conclusions: Subjective grading of commitment to academics did not vary based on applicant gender or race, however differences were observed based on the academic rank of the evaluator. Further research efforts to remove bias in the evaluation process should be considered.

E53. Retropharyngeal Fluid Collection: A Rare Case of Superior Vena Cava Syndrome

Jessica B. Howell, MD, Richmond, VA; Tyler K. Deblieux, MD, Richmond, VA; Ryan S. Nord, MD, Richmond, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to diagnose and treat SVC syndrome presenting as a retropharyngeal fluid collection.

Objectives: 1) Discuss the pathophysiology, workup, differential diagnosis, and treatment for SVC syndrome involving the retropharyngeal space; 2) demonstrate the multidisciplinary approach to successful intervention. Study Design: Case report and literature review. Methods: Case report and literature review. Results: A 28 year old woman with history of sickle cell disease requiring chronic exchange infusion via central venous access presented with upper extremity and facial edema, dyspnea, and dysphagia. Bedside fiberoptic laryngoscopy demonstrated fullness of the posterior pharyngeal wall. Imaging confirmed a significant retropharyngeal space fluid collection as well as catheter related thrombosis of the left brachiocephalic vein and SVC. The patient underwent elective intubation and thrombolysis of the SVC in conjunction with interventional radiology services. Repeat imaging revealed resolving retropharyngeal edema, allowing for extubation without further complications. Conclusions: Symptomatic retropharyngeal fluid collection is a rare presentation of SVC syndrome. Diagnosis requires a high index of suspicion and must be on the differential for the astute clinician, as successful treatment requires urgent intervention.

E54. Impact of Otolaryngology PGY-1 Curriculum Changes on Resident Operative Experience

Benjamin N. Hunter, MD, Springfield, IL; Marc E. Error, MD, Salt Lake City, UT; Dana L. Crosby, MD, Springfield, IL; Arun Sharma, MD MS, Springfield, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the impact that the ACGME changes to the PGY-1 curriculum for otolaryngology residency programs has had on operative experience of residents over the first two years of residency.

Objectives: In 2016, the Accreditation Council for Graduate Medical Education (ACGME) instituted changes to the post-graduate year (PGY)-1 curriculum for otolaryngology residency programs, requiring 6 months of dedicated otolaryngology education activities (an increase from the previous requirement of 3 months). The goal of the current study was to assess the impact on resident operative experience. Study Design: This was a multi-institutional study. Methods: This study examines the surgical experience of residents over the first two years of residency. Data was compared between two groups: the inaugural class for whom ACGME changes took effect (group A), and a group comprised of the two classes immediately prior to the change (group B). Results: Results from five centers included 15 residents in group A and 29 residents in group B. Residents in group A logged similar numbers of codes (914 vs 851, $p=0.676$) and cases (529 vs 562, $p=0.454$) compared to residents in group B. When comparing key indicator cases, residents in group A logged more cases in the facial plastics (FP) category under role of assistant surgeon (30 vs 16, $p=0.038$) than those in group B. Irrespective of resident role, residents in Group A performed more head and neck key indicator cases (67 vs 40, $p=0.194$) and FP key indicator cases (45 vs 33, $p=0.095$) than residents in group B, although these differences were not statistically significant. Conclusions: Otolaryngology residents who had six months of otolaryngology training during their first year had similar overall operative experience by volume as their predecessors, but greater surgical experience in certain areas, especially head and neck and facial plastics.

E55. ABC Camerawork Guide for Dr. Photographer: An Exploratory Qualitative Study

Farid F. Ibrahim, MD, Montreal, QC Canada; Sam J. Daniel, MD, Montreal, QC Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to use a camera correctly in their clinics and operating rooms.

Objectives: Photographs are commonly taken in medical contexts. Although automated camera systems are very user friendly, it is still technically challenging to reach a standardized photograph. Moreover, appropriate utilization of digital images within the medical practice has not always been uniformly agreed upon. Therefore, the aim of this exploratory qualitative study was to investigate experts' recommendations for health professionals utilizing digital photography. Study Design: Exploratory qualitative study. Methods: Qualitative description methodology was used in this study. This methodology is a comprehensive summarization, in every term of a specific topic - medical photography, experienced by individuals - medical photographer. It was used to gain an understanding of underlying opinions and to provide insights into the aforementioned topic that were applied to develop a guideline. Results: Photographs are a valued resource in the medical practice but a doctor photographer needs to be mindful of how they are crafted and utilized in a proper and meaningful way. Selecting the appropriate equipment and handling it in a professional manner is necessary when taking photographs. Addi-

tionally, obtaining an informed consent and concealing the patient's identity should be considered in medical photography sessions. Our interviews result in techniques to capture an image in a professional way without breaching patient's privacy. Conclusions: This study initiated the inception of a best practice guide that handles important technical and ethical parameters of medical photography using digital cameras. Further research is recommended to test and validate this guide.

E56. Impact of a Resident Educational Program to Improve Inpatient Documentation

Keven S.Y. Ji, BA, Durham, NC; Melissa A. Pressley, BS, Durham, NC; Russel R. Kahmke, MD, Durham, NC; Charles R. Woodard, MD, Durham, NC; Howard W. Francis, MD, Durham, NC; David W. Jang, MD, Durham, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that a one time resident educational program at a tertiary care institution was able to significantly improve documentation of inpatient comorbidities in otolaryngology-head and neck surgery patients.

Objectives: Accurate documentation of patient comorbidities is critical in value based healthcare. In academic institutions, documentation of patient complexity often depends on the house staff's knowledge and attention to this issue. We aimed to assess the impact of an educational intervention for residents to improve inpatient documentation. Study Design: Otolaryngology residents at a tertiary care institution underwent a one time training program on accurate and thorough documentation of comorbidities for adult inpatients. Methods: Severity of illness (SOI) scores as calculated by Vizient (Irving, TX) were compared for inpatients in the two year periods before and after the intervention. Results: 881 patients were included: 418 pre-intervention and 463 post-intervention. The mean [SD] age at admission was 59.7 [16.5] years for pre-intervention vs. 59.6 [15.7] years for post-intervention patients. 52.6% of pre-intervention patients vs. 49.5% of post-intervention patients had a primary diagnosis of squamous cell or basal cell carcinoma of the head and neck. A greater proportion of post-intervention patients (30.5%) had a SOI score of 3 or 4 compared to pre-intervention patients (25.1%), although this did not reach statistical significance ($p=0.058$). Mean pre-intervention SOI was significantly lower than mean post-intervention SOI (1.97 vs. 2.11, $p=0.01$). Conclusions: A one time resident educational program was able to significantly improve documentation of inpatient comorbidities. Such a program may help to produce more accurate outcomes in an era of value based healthcare. Further study involving a larger patient cohort consisting of multiple specialties may help to validate the impact of this intervention.

E57. Pattern of Urgent Airway Management for Otolaryngology Service: A 3 Year County Hospital Experience

Jee-Hong Kim, MD, Los Angeles, CA; David Lam, BS, Los Angeles, CA; Kyohei Itamura, BS, Los Angeles, CA; Kevin Hur, MD, Los Angeles, CA; Tamara N. Chambers, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate clinical patterns of advanced airway cases encountered by otolaryngology residents in a major tertiary trauma hospital.

Objectives: Describe clinical patterns of advanced airway cases encountered by otolaryngology residents in a major tertiary trauma hospital. Study Design: Retrospective cohort study. Methods: We analyzed patients for which the otolaryngology service was consulted for urgent or emergent airway management from May 2015 to May 2018 at a major tertiary trauma center. Management modalities included both surgical (tracheostomy) and nonsurgical (nasotracheal intubation, airway foreign body, laryngeal surgeries using a telescope or microscope). Simple oral intubation was excluded. Results: A total of 126 patients (81 male, 45 female, median age 53) met inclusion criteria. Sixty of 126 (48%) required tracheostomy placement, of which 42 (33%) were awake tracheostomy. Thirty-two of 126 (25%) patients initially required nasotracheal intubation, 15 of which were converted to tracheostomy, 16/126 (13%) patients required airway foreign body removal, 33/126 (26%) patients required laryngeal surgery using either a telescope or microscope. Among the patients requiring awake tracheostomy, malignancy was the most common reason (46/60, 76%). There were 4 short term complications, including 2 nasotracheal intubation attempts converted to slash tracheostomy, 1 trach bleed take back and 1 innominate vessel injury during tracheostomy. Conclusions: Otolaryngology consults for urgent airway cases resulted in a similar frequency of surgical and nonsurgical management. Understanding patterns of presentation, management and complications during acute airway cases are important for patient safety and resident education.

E58. Optimizing the Management of Patients with Cerebrospinal Fluid Leaks Requiring Operative Intervention

Ashley Kita, MD, Los Angeles, CA; Montana Upton, BS, Los Angeles, CA; Nikhil Bellamkonda, BS, 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 create a simple algorithm to identify and expedite the care of patients that may have a CSF leak requiring operative intervention.

Objectives: Cerebrospinal fluid (CSF) leak is a feared complication in head and neck surgery. Diagnosis and timing of operative management are important considerations. As these may be variable, this review aims to analyze factors leading up to operative intervention to guide future management strategies. Study Design: Retrospective review of CSF leaks managed operatively at our institution between March 2017 and September 2018. Methods: With IRB permission, CSF leaks managed operatively were identified by searching operative procedure codes in our department. Results: 12 patients were identified. 58% underwent operative repair the day of admission. These same patients were previously evaluated and felt to be stable enough for expedited outpatient operative intervention. 8 patients had a history of recent surgery at the site of leak, 3 presented with skull base lesions, and 1 presented spontaneously. 83% were leaking at presentation. Of those with a history of recent surgery, the average time between prior surgery and repair was 12 days. Preoperative imaging

suggested the site of leak in 7 patients. A third of cases used intraoperative intrathecal fluorescein. Patients were admitted for an average of 12.7 days and underwent operative intervention an average of 2.25 days after admission. Conclusions: The diagnosis of CSF leak was made outpatient in most cases. Persistent otorrhea or rhinorrhea and a history of recent surgery were more predictive of a need for operative intervention than imaging or serologic testing. This suggests that patient history and presentation may be sufficient to direct a physician toward operative intervention with additional workup reserved for more ambiguous cases.

E59. Laser Tongue Treatment for Halitosis

Victor Z. Kizhner, MD, New York, NY; Yosef P. Krespi, MD, New York, NY (Presenter); Karen A. Wilson, DPM, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to get exposure of new halitosis treatment modality. Exposed to various parameters collected specific to the halitosis exam.

Objectives: Malodor is a multifactorial condition with oral pathology representing the main culprit and the tongue being the first to second contributor to the malodor. Bacterial load can represent a quantifiable measure regardless of the original pathology. We hypothesize that reduction in malodor can be represented by tongue changes both in appearance, bacterial and biofilm load reduction (measured by CFU and volatile gases measurement), organoleptic measurement and subjective improvement. **Study Design:** Randomized controlled. **Methods:** A two arm study consisting of 25 adults with oral malodor are treated with laser tongue debridement (LTD) and one control arm. The Er,Cr:YSGG solid state laser has been shown to be effective in biofilm reduction. Coupled to water irrigation, the water molecules act as a sensitizer and a medium to flush the biofilm. **Results:** Parameters collected are demographics, organoleptic testing, CFU counts, tongue color analysis, Halometer scores, HALT questionnaire prior to the treatment and 20 minutes after. Sustainability is tested with a repeat collection a week following the treatment. Adverse effects are recorded. **Conclusions:** The tongue is proven to be a major contributor to oral malodor and must be addressed in treatment protocol. LTD significantly reduces malodor by subjective and objective criteria. While impossible to determine whether the tongue serves as a bacterial reservoir or is the origin for oral bacteria it is clear that LTD improves oral hygiene and reduces malodor. LTD is safe and easy to perform. We encourage LTD to be a crucial part of any oral malodor treatment protocol.

E60. Pain Management and Prescribing Practices in Otolaryngology Training Programs

Jaclyn A. Klimczak, MD, New York, NY; Arvind K. Badhey, MD, New York, NY; Anni Wong, MD, New York, NY; Patrick M. Colley, MD, New York, NY; Marita S. Teng, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the inconsistencies in residency opioid prescribing for common otolaryngology procedures, and the need for formal opioid prescribing education to provide safe and effective pain management therapies for our patients in the postoperative setting.

Objectives: To understand the knowledge, competency and influencing factors regarding postoperative opioid prescribing practices among otolaryngology residents. To gain insight on the opioid prescribing education (OPE) and resources provided by otolaryngology residency programs. **Study Design:** Electronic cross-sectional survey. **Methods:** An anonymous electronic survey was distributed to otolaryngology residents in the greater New York City area that addressed their preferred pain management regimen for eight common otolaryngology surgeries in addition to opioid and non-opioid prescribing influences, use/knowledge of pain management resources, and prior OPE. A survey distributed to US otolaryngology program director (PDs) inquired on resident prescribing influences and OPE in residency training programs. **Results:** Thirty-five residents and fifteen PDs participated. Resident opioid prescribing varied between the eight standard otolaryngology surgeries, with average narcotic pills dispensed ranging from 3.8 to 21.1. Attending/senior preference was consistently reported as the greatest influencer on resident prescribing among both residents and PDs. Only 20% of programs had formal OPE initiatives, consistent with the 65.71% of residents who reported no prior OPE. **Conclusions:** Residents are often at the forefront of managing postoperative pain in academic medical centers. Yet large inconsistencies exist among otolaryngology procedures. The lack of formal OPE in US otolaryngology residency programs may lead to factors unrelated to surgery influencing these prescribing practices. This sheds light on the need for otolaryngology resident OPE to assist in standardizing prescribing practices, provide meaningful patient education on opioid use and disposal and educate residents on the risk assessment tools offered to provide the most appropriate and safe analgesic therapy to patients.

E61. Getting to Know You Better: A Survey of Otolaryngology Residency Applicants' Interview Preferences

Alvin B. Ko, MD, Detroit, MI; Amy M. Williams, PhD, Detroit, MI; Kathleen L. Yaremchuk, MD, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to better describe what otolaryngology residency applicants prefer in their interview format.

Objectives: The 2016-17 and 2017-18 interview seasons saw a potentially worrisome drop in otolaryngology residency applications. There have been no published surveys of applicant preferences for interview format and content in our field. We offer the results of an anonymous survey administered during the 2017-18 interview season. **Study Design:** Cross-sectional anonymous survey. **Methods:** All applicants invited to interviews at 3 residency programs were sent a link to an anonymous online survey. **Results:** Ninety-two applicants completed the survey. When asked who they would prefer to meet, applicants reported it was very important to meet with the department chair (73.9%), program director (94.6%), and all faculty involved in training (59.8%). It was fairly to very valuable to have an onsite interview (85.9%); 94.6% preferred onsite

compared to 4.3% preferring video interviews. 53.3% reported having travel expenses covered was fairly to very important. Time alone with current residents (94.6%) and optional social events (78.2%) also seemed fairly to very valuable. 44.6% felt an activity like a dexterity test or ethical case was not important versus 13% who felt it was fairly to very important. 89.1% preferred shorter interview days (< 6 hrs) and 60.9% preferred speed interviews (meeting more faculty with less time per interview). Conclusions: Otolaryngology residency applicants prefer onsite interviews, meeting all core faculty, and time alone with residents. Social events are valuable; testing activities may be less well received.

E62. Should Otolaryngologists Care about Their Online Ratings?

Justin A. Koceja, BS, San Antonio, TX; Eric R. Smith, BS, San Antonio, TX; Dylan Z. Erwin, BBA BA, San Antonio, TX; Marisa A. Earley, MD, San Antonio, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize variables that impact physician rating and overall number of reviews.

Objectives: To investigate how otolaryngologists are reviewed online by their patients and to identify and compare variables that impacted the overall rating and number of reviews. Study Design: A secondary analysis of data extracted on 14,379 otolaryngology physicians listed on Healthgrades.com. Methods: Data was extracted on 14,379 otolaryngology physicians listed on Healthgrades.com, the largest online database of physician reviews. The variables analyzed included the average rating (out of five stars), number of reviews, gender, age, insurances accepted, number of procedures performed, inclusion of a biography, inclusion of awards or research, malpractice claims, board certifications, languages spoken, and if the doctor had same day availability. Data was analyzed using Microsoft Excel and SPSS to determine the relationships between each variable and the number of reviews and average rating, with the null hypothesis being no difference. The level of significance was less than 0.05. Variables were examined in secondary analysis using a regression model. Results: Physician ratings increased by approximately 0.5 stars for every 15 minute decrease in wait time and increased by 0.35 stars when a physician biography, research or awards, or same day availability were posted. Malpractice claims correlated with a lower rating when compared to physicians without claims. Older age of physician correlated with fewer number of reviews. There was no impactful difference between ratings comparing physician gender, languages spoken, or number of board certifications. Conclusions: The data indicate that overall rating correlates with several factors that otolaryngology physicians can control, such as updating biography, decreasing wait time, and listing awards, research and same day availability.

E63. Doctor, Will It Hurt? Assessment of Patient Pain during Routine Otolaryngology In-Office Procedures with a Validated Pain Questionnaire

Brittany A. Leader, MD, Cincinnati, OH; Javier J.M. Howard, MPH, Cincinnati, OH; John Paul Giliberto, MD, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss patient discomfort with routine in-office otolaryngology procedures using a validated pain assessment tool, and secondly have additional information to better educate their patients on anticipated pain prior to procedures.

Objectives: Otolaryngologists routinely perform a variety of in-office procedures (IOP). Patients are often apprehensive, frequently asking if it will hurt. There are no studies in the literature assessing pain experienced during IOP using a validated assessment tool. Therefore, the validated Short Form McGill Pain Questionnaire (SF-MPQ) was used to assess pain with IOP. Study Design: Prospective study at a tertiary academic medical center, where consecutive adult patients were evaluated by a single provider from July 1, 2017 to March 30, 2018. Methods: Patients completed the SF-MPQ immediately after their procedure. Patients without English literacy were excluded. For analysis, procedures performed less than five times during the study period were excluded. The SF-MPQ was analyzed in its two parts: total score and visual analog scale (VAS). Results: The most common procedures were flexible laryngoscopy (N=84), rigid stroboscopy (N=6), injection laryngoplasty (N=18), cerumen debridement (N=6), nasal endoscopy (N=7), and fine needle aspiration (N=10). There were statistically significant differences between procedures. In general, procedures where a needle pierces the skin resulted in significantly more pain when comparing least square means for both total score and VAS. Mean total scores for procedures without needles were 1.59 vs 6.61, with a mean difference of 1.93 (CI 1.03-3.23), and for VAS 0.49 cm vs 1.97 cm, with a mean difference of 0.98 cm (CI 0.56-1.52). Conclusions: Pain with IOP varied significantly by instrumentation. Procedures which required a needle breaching the skin resulted in greater pain on both the total and VAS scores from the SF-MPQ.

E64. Development of a Low Cost, Renewable Endoscopic Sinus Surgery Skills Trainer (ESSST)

Ryan P. Leary, MD, Bronx, NY; Jeremy M. Feintuch, BA, New York, NY; Joshua D. Feintuch, BA, New York, NY; Waleed M. Abuzeid, MD, Bronx, NY; I. Martin Levy, MD, Bronx, NY; Marc J. Gibber, MD, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss how a low cost, renewable skills trainer can be designed to teach an endoscopic skill to fluency.

Objectives: To determine if the ESSST is construct valid. Study Design: Participants were divided into 3 groups based on their skill level: 1) medical students with no prior endoscopic experience; 2) ORL trainees who performed less than 30 endoscopic sinus surgeries; 3) experienced surgeons who performed more than 30 endoscopic sinus surgeries. Methods: The study participants, classified by skill level, were asked to perform 3 tasks on the ESSST and their performance

was videotaped. An experienced rhinologist evaluated the videos of each task and scored performance and economy of motion using a standard scoring sheet. A one way ANOVA and Post Hoc Tukey Tests were used to determine if there was a significant difference in performance of the 3 groups. Results: Performance scores for medical students, trainees, and experts were 0.55, 0.81, and 0.90, respectively (ANOVA $p = 0.0008$). Economy of Motion scores were 0.38, 0.63, and 0.70, respectively (ANOVA $p = 0.001$). Post Hoc Tukey Test was significant when comparing medical students with residents and attendings suggesting construct validity. Conclusions: Medical students had more errors and have less economy of motion than trainees and experts. Experts have higher mean scores for performance and economy of motion than trainees suggesting construct validity. The study suggests that ESSST is low cost and renewable and is a useful adjunct to higher fidelity simulators.

E65. Association of Interview Positions Compared to Residency Program Attributes

Andrew H. Lee, MD, Baltimore, MD; Ji Soo J. Kim, BS, Baltimore, MD; Ross S. Liao, BS, Baltimore, MD; Patrick J. Young, BS, Los Angeles, CA; Alexander T. Hillel, MD, Baltimore, MD; David W. Eisele, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to consider otolaryngology residency interviewing date practices with respect to the number of positions offered and to determine correlations with program geography, number of residency positions, and ranking.

Objectives: While information surrounding the timing of interviews is well disseminated among applicants, the number of interviews per date is often a nebulous topic. Our objective was to assess the number of interview slots offered to better understand residency interviewing patterns and identify influential factors. Study Design: Survey of OHNS program coordinators. Methods: OHNS program coordinators were surveyed during the 2017-2018 application cycle about the number of applicants interviewed. Program attributes were collected including Doximity residency ranking, geographic location (Northeast, South, Midwest, and West), and number of residency positions per year. Negative binomial regression was applied and exponentiated coefficients were calculated to gauge the importance of each program attribute in predicting the number of interviews per day ($P < 0.05$ significant level). Results: 90 programs (91%) disclosed the number of interviewees per date. Programs interviewed a mean of 16.8 students per interview day (range: 5-41), 14.1 (range: 6-30) students per open residency position, and 41.0 students total (range: 16-82). When controlling for other variables, there was an estimated increase of 21% students interviewed per each additional open residency position ($p < 0.00001$), 20% fewer students interviewed for programs located in the West ($p = 0.013$), and 23% fewer interviewed per day for programs in the top 10 ($p = 0.017$). Conclusions: Programs that were located in the West, those with fewer residency positions, and those ranked in the top 10 were independently associated with interviewing fewer applicants per day. This information may help to shed light on potential interview slots and set expectations for students and their mentors.

E66. Analysis of Peritonsillar Abscess Patients Using the NSQIP Surgical Registry

Felicity Lenes-Voit, MD, Dallas, TX; Charles Saadeh, MD, Dallas, TX; Ron B. Mitchell, MD, Dallas, TX; Gopi B. Shah, MD MPH, Dallas, TX; Romaine F. Johnson, MD MPH, Dallas, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the perioperative outcomes of peritonsillar abscess drainage among adult patients.

Objectives: To study a cohort of adults, ages 18 to 90, who underwent peritonsillar abscess drainage using the NSQIP Surgical Registry. Study Design: A retrospective case control study. Methods: We performed an analysis of the 2014 to 2016 ACS NSQIP Surgical Registry of adults, ages 18 to 90, who underwent intraoperative PTA drainage (CPT code 42700). We examined the demographics, perioperative complications, reoperations, readmissions, and compared them to a 2:1 random sample of other surgical patients. Results: The analysis included 600 PTA patients (1200 controls). The median age was 30 years (IQR = 22 to 41). There were 325 (54%) male, 61% (366/600) white, 10% (59/600) Hispanic, and 30% (183/600) smokers. The median LOS was one day (IQR = 0 to 2 days). 87 (15%) also underwent a simultaneous tonsillectomy. The reoperation rate was 6% (35/600). The most frequent reoperation was control of tonsil bleed (16/600, 2.7%). Only 3/600 (0.5%) were required reoperation for salvage drainage. The readmission rate was 5.0% (30/600). The most frequent surgeries among control patients were laparoscopic appendectomy (55/1200, 4.6%), cholecystectomy (65/1200, 5.4%), and knee arthroplasty (60/1200, 5.0%). When compared to the control patients, the PTA patients were significantly younger (33 vs. 56 years, $p < .001$), more likely to smoke (OR 1.7, $p < .001$), and need a second operation (OR = 2.6 $p < .001$). Readmission, on the other hand, were equal (5.0% vs. 4.1%, $p = .38$). Conclusions: The NSQIP perioperative outcomes of PTA drainage are similar to previously reported observational studies suggesting good results.

E67. Improvement of Speech Discrimination with High Dose B Vitamin Therapy: A Case Series

Melba F. Lewis, MD, Austin, TX; Jessica K. Malsky, BA, Austin, TX; Joseph A. Malsky, MD, Houston, TX; Jenifer A. Rufin, PA-C, Austin, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to consider the use of high dose B vitamin therapy for treatment of patients with poor speech discrimination.

Objectives: Present a series of 7 patients with progressive sensorineural hearing loss (SNHL) who achieved improved speech discrimination (SD) with a high dose B vitamin (HDBV) regimen. Study Design: A retrospective review was conducted on records of hearing aid patients who presented with the complaint of worsening hearing. Audiograms of these

patients showed a disproportionate decline in SD versus pure tone scores when compared to previous audiograms. Otolologists recognize that loss of SD and loss of pure tones may occur due to separate mechanisms of injury (i.e. neural degeneration of the cochlear nerve versus hair cell injury). Furthermore, they recognize that cochlear nerve degeneration may resemble other sensory neuropathies. There is growing interest in using HDBV to treat sensory neuropathies such as macular degeneration, diabetic retinopathy, and peripheral neuropathy. Because poor SD limits the utility of amplification devices, and there are few other interventions for treatment of decreased discrimination, it seems reasonable to investigate HDBV therapy for patients with poor SD. Methods: The B vitamin combination of L-5-methylfolate, methylcobalamin, and pyridoxal-5-phosphate (LMF-MC-PLP) was initiated twice daily. Patients were evaluated with serial audiograms for up to 24 months; each patient had at least two audiograms per year during treatment. Results: Improvement of 12% to 64% in SD scores was observed in all patients (13 of 14 ears) by six months into treatment. Improvement was sustained for the duration of followup. Conclusions: HDBV therapy may be beneficial in patients with poor SD and deserves further study.

E68. Does Nasal Surgery Affect Voice Outcomes? A Systematic Review with Meta-Analyses

Friederike S. Luetzenberg, BS, Orlando, FL; Christopher Xiao, MD, Oakland, CA; Nancy Jiang, MD, Oakland, CA; Jonathan Liang, MD, Oakland, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the effects of nasal surgery on voice quality and list common voice outcome measurement tools.

Objectives: Changes in airflow dynamics after nasal surgery has implications on voice quality. Multiple heterogeneous studies have evaluated the impact of nasal surgery on voice using various outcome measures. We aim to systematically review the impact of nasal surgery on voice quality. Study Design: Systematic review with meta-analyses. Methods: We performed a literature search of PubMed, Ovid, Cochrane from 1997 to 2017. Inclusion criteria included English language studies containing original data on nasal surgery and voice with reported outcome measures. Two investigators independently reviewed all manuscripts and performed a comprehensive quality assessment. Meta-analysis was completed on quantitative voice measurements. Results: Of 463 identified, 20 studies with 697 patients fulfilled eligibility. Nasal surgeries performed included endoscopic sinus surgery (11/20), septoplasty (11/20), rhinoplasty (2/20), and turbinate reduction (2/20). Voice outcomes measured included nasalance (8/20), fundamental frequency (11/20), jitter (10/20), shimmer (10/20), harmonic to noise ratio (HRN) (8/20), formants (5/20), and voice handicap index (VHI) (4/20). Voice examinations were assessed preoperative, and commonly 1, 3, and 6 months postoperative. Meta-analysis revealed statistically significant changes in HNR ($p < 0.05$, 95% CI 0.10-2.02) and nasalance, divided into hyper-nasality ($p < 0.01$, 95% CI 3.80-12.96) and hypo-nasality ($p < 0.01$, 95% CI 2.58-10.58), at 1 month postoperative; there was no significant difference in nasalance at 6 months postoperative ($p > 0.05$). All other variables analyzed revealed no statistically significant differences. Conclusions: HNR and nasalance both increase significantly in the short term after nasal surgery. However, these effects are short term with no significant differences at 6 months postoperative. Counseling patients that nasal surgery will not affect voice outcomes long term is appropriate. Further high level studies can help substantiate these findings.

E69. Effectiveness of Adjunctive Mitomycin in Otolaryngologic Procedures: A Systematic Review

Kimberly Luu, MD, Vancouver, BC Canada; Paula Tellez, MD, Vancouver, BC Canada; Neil K. Chadha, MD MPH, Vancouver, BC Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) explain how topical mitomycin is used as an adjunct to otolaryngologic procedures; 2) compare the effectiveness of topical mitomycin in improving surgical success for various procedures; and 3) critically appraise the comprehensive list of current literature on the topic.

Objectives: Systematically review all literature on the adjunctive use of mitomycin in otolaryngologic surgeries to report the effectiveness and adverse events. Study Design: Systematic review. Methods: Following the PRISMA guidelines, a comprehensive search of Medline, EMBASE, CINAHL databases was performed including hand searching and reference cross-checking. The search was limited to humans, sample size greater than five, and study design with a comparative arm. Meta-analysis was deemed inappropriate due to heterogeneity of study design. Results: 500 unique abstracts and 98 full papers were reviewed. 67 studies were included in the final analysis. The available evidence ranged from case series to randomized controlled trials. 38 studies assessed the effectiveness of MMC in dacryocystorhinostomy, which is reported in a separate meta-analysis. All other 29 studies were categorized into otolaryngologic procedures including: choanal atresia ($n=6$), endoscopic sinus surgery ($n=8$), airway procedures ($n=7$), esophageal ($n=6$), and other ($n=2$). Topical MMC was consistently applied with a pledget in a dose range of 0.4-1 mg/ml applied for 3-10 minutes, with majority of studies using the lower dose. Overall, 62% ($n=18$) concluded that topical MCC use was associated with improved surgical outcomes. 83% of esophageal studies and 71% of airway studies reported success most commonly defined as decrease in mean repeat procedures. There were no reported major adverse events. Conclusions: The literature on the effectiveness of MMC is mixed, but suggests topical MMC improves surgical outcomes in certain otolaryngologic procedures, particularly esophageal and airway. However, data summarization was limited due to heterogeneity in primary outcome, procedure type, and study quality.

E70. Discrete Aerodynamic Pressure Waveform Analysis to Identify Partial Airway Collapse

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

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

complete, and no airway collapse using pressure tracing; 2) demonstrate understanding of Bernoulli's principle as a predictor of airway obstruction; and 3) explain how aerodynamic analysis may be applied to the human airway.

Objectives: To characterize pressure waveform characteristics that reliably identify partial airway collapse as opposed to complete or no airway collapse in patients with obstructive sleep apnea (OSA). **Study Design:** Single institution diagnostic study. **Methods:** Patients with OSA underwent airway evaluation with drug induced sleep endoscopy in conjunction with a fluid dynamic pressure transducer. Aerodynamic and soft tissue pressure data were obtained from the retropalatal region and oropharynx during three degrees of retropalatal obstruction: complete, partial, and no retropalatal collapse. Pressure waveform variables were analyzed using ANOVA testing between these three conditions, variables included negative and positive pressure deflections as well as pressure differentials. **Results:** Seventeen patients contributing 52 samples are included in this study. As measured in the retropalatal region, negative pressure deflections were noted to be significantly different between the three degrees of retropalatal collapse; these were -3.51 ± 0.32 mmHg for complete, -3.25 ± 0.32 for partial, and -1.35 ± 0.15 for no collapse ($p = 0.000$). Positive pressure differential was also noted to be significantly different between the three conditions of retropalatal collapse ($p = 0.028$). As measured in the oropharynx, negative pressure deflections were noted to be significantly different between the three degrees of retropalatal collapse; -8.05 ± 0.41 for complete, -4.16 ± 0.43 for partial, and -2.16 ± 0.49 no collapse, ($p = 0.000$). Positive pressure differential was also noted to be significantly different between the three conditions of retropalatal collapse ($p = 0.002$). **Conclusions:** Aerodynamic pressure waveform analysis may distinguish between various obstructive conditions and can identify partial retropalatal collapse.

E71. Utility of Smartphone Telemedical Consults for Peritonsillar Abscess Diagnosis and Triage

Jonathan R. Mallen, MD, Farmington, CT; Manan U. Shah, MD, Bowie, MD; Steven Wolfe, MD, Hartford, CT; Chia-Ling Kuo, PhD, Farmington, CT; Jinjian Mu, MS, Farmington, CT; Gregory Bonaiuto, MD, Hartford, CT

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the potential role of telemedicine in managing patients with suspected peritonsillar abscess (PTA); 2) appreciate the practical benefits, challenges, and limitations of recording and transmitting high quality cell phone video of oropharyngeal examination; and 3) recognize the potential of telemedical otolaryngology as a tool to safely and efficiently care for patients with suspected PTA.

Objectives: 1) Explore the potential of otolaryngology telemedical consultation in triaging and diagnosing patients with suspected peritonsillar abscess (PTA); and 2) assess the feasibility of recording high quality videos of oropharyngeal exams using a standard smartphone camera. **Study Design:** Prospective study. **Methods:** 31 patients with suspected PTA for whom ENT was consulted at three tertiary care hospitals were evaluated. Video recordings of patients' oropharyngeal exams were evaluated by five otolaryngologists blinded to the patient histories other than chief complaint. Otolaryngologists rated each patient on whether they were felt to have a PTA, whether they warranted prompt evaluation by ENT, and the quality of the videos. Predictions were compared to the gold standard of drainage or negative needle aspiration. **Results:** 16 of 31 patients had a confirmed PTA. Mean diagnostic accuracy was 81% with sensitivity and specificity of 70% and 93% respectively. The consensus diagnosis had sensitivity and specificity of 81% and 100%. Comparing patients who were deemed to require prompt ENT evaluation and those with PTA by gold standard, mean sensitivity and specificity were 90% and 76% for individuals and 100% and 80% respectively for the consensus opinion. Videos were rated to be of sufficiently quality for diagnosis in 154/155 videos (99.4%). **Conclusions:** Telemedical consultation of otolaryngologists is a viable, cost conscious, efficient and safe approach to PTA management. Otolaryngologists are able to determine with high sensitivity which patients require prompt ENT evaluation. As a result, this is well suited as an effective screening tool. Recording consistently high quality video using standard smartphone cameras is achievable without formal training.

E72. Recent Trends in Female and Racial/Ethnic Minority Applicants of US Otolaryngology Residency Programs

Erin M. Mamuyac, MD, Chapel Hill, NC; Zainab Farzal, MD, Chapel Hill, NC; Charles S. Ebert Jr., MD MPH, Chapel Hill, NC; Rupali N. Shah, MD, Chapel Hill, NC; Robert A. Buckmire, MD, Chapel Hill, NC; Adam M. Zanation, MD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the current and past trends of applicant demographics amongst otolaryngology-head and neck surgery residency programs. Specifically, they should be able to demonstrate an understanding of the trends in female and racial/ethnic minority applicants, and the role of these trends in the development of a diverse body of practicing physician surgeons.

Objectives: To analyze the recent trends in applicants of otolaryngology-head and neck surgery (Oto-HNS) residency programs, including evolutions in sex and racial/ethnic distribution within the applicant pool and subsequent residency cohort. **Study Design:** Retrospective database and literature review. **Methods:** Data regarding applicants to Oto-HNS programs as well as current Oto-HNS residents in the US from 2008 to 2017 was analyzed from ERAS, NRMP, and JAMA. **Results:** Average number of Oto-HNS programs has increased in recent years, with 273 positions offered in 105 programs in 2008 compared to 315 position offered in 112 programs in 2018 (+15.4%). There was an increase in number of unfilled positions in the 2017 and 2018 application cycles compared to recent years. The percentage of women in the applicant pool ranged from 29.5-35.5% over the last decade without an identifiable trend. However, the percentage of women in Oto-HNS residency programs has shown a steady increase from 29.8% to 35.9% (average +0.67% per year). There has been a decrease in percentage of self-reported minority applicants (average -0.51% per year). At the same time, the overall number of self-identified minority residents has increased from 481 in 2008 to 633 in 2017 (average +0.47% per year). **Conclusions:**

Women and minority racial and ethnic groups continue to be underrepresented amongst Oto-HNS applicants. However, the presence of these groups amongst current residents has increased. Understanding and tracking these national trends year to year is critical for training a diverse future otolaryngology workforce.

E73. Cost Savings of an Asynchronous Telemedicine Consult Management System in Military Otolaryngology

Kastley M. Marvin, MD, San Diego, CA; Art A. Ambrosio, MB MBA, San Diego, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the utility of telemedicine applications and potential cost implications of these systems.

Objectives: With military service members stationed around the world, access to subspecialty care frequently occurs at foreign medical facilities. This practice has direct costs associated with the medical care rendered as well as indirect costs such as difficulty navigating medical systems, access to medical records, and appropriate followup. Telemedicine has expanded access to otolaryngologic care where coverage has been deficient, but the cost impacts are not well defined or reported. The aim of this study was to determine the direct costs associated with use of a HIPAA compliant, store and forward telemedicine system available to overseas medical providers to obtain specialty consultation at a tertiary care military treatment facility. Study Design: Retrospective case series. Methods: We collected consults submitted through the system from February 2018 to May 2018. Consult management was performed by a deployed otolaryngologist. The direct cost associated with each consult was calculated and compared to the cost calculated had the patient been treated in the host nation. Results: There were 8 consults submitted and all consults during this timeframe were directed to a neurotologist/skull base surgeon for opinion. The estimated cost for treating these 8 patients overseas was \$129,969 while the estimated cost of retaining the patients in the military health system for treatment was \$29,476. Extrapolated to a 12 month period, the cost savings of this program could be over \$400,000 annually. Conclusions: The cost savings associated with asynchronous otolaryngology subspecialist consultation has the potential to be substantial. Additional benefits include enhancing graduate medical education, continuity of care, and patient familiarity with the medical system.

E74. The Role of Vitamin D in Recurrent Tonsillitis: A Systematic Review

Ahmad A. Mirza, MBBS, Jeddah, Makkah Saudi Arabia; Abdulrahman A. Alharbi, MBBS, Jeddah, Makkah Saudi Arabia; Hani Z. Marzouki, FRCSC, Jeddah, Makkah Saudi Arabia; Talal A. Al-khatib, FRCSC, Jeddah, Makkah Saudi Arabia; Faisal Zawawi, FRCSC, Jeddah, Makkah Saudi Arabia

Educational Objective: At the conclusion of this presentation, participants will be able to make an alignment for the conflicting results of vitamin D status in patients with recurrent tonsillitis articulating the established linkage of vitamin D deficiency with recurrent tonsillitis.

Objectives: To determine the association between vitamin D deficiency and recurrent tonsillitis based on the current literature. Study Design: Systematic review and meta-analysis. Methods: A systematic review was performed for all studies addressing the association of vitamin D deficiency with recurrent tonsillitis prior to October 2018. Data were collected from online medical databases - PubMed, Embase, and Cochrane Library. The data were collected on different phases; screening review using keywords and index terms followed by detailed review of screened articles based on inclusion and exclusion criteria, then a full review that includes screening the references of selected articles. Finally, qualitative and quantitative syntheses were then performed. Results: Forty-four studies were potentially eligible, of these 4 publications met the inclusion criteria and included in the quantitative synthesis. There was a statistically significant reduction of vitamin D levels in patients with recurrent tonsillitis as compared to healthy controls (SMD = - 0.92; 95% CI [-1.65, -0.18], p = 0.01). In addition, the odds of vitamin D insufficiency was observed significantly higher in patients with recurrent tonsillitis compared to the control group (OR = 4.37, 95% CI [2.78, 6.88], p<0.001). Conclusions: Vitamin D deficiency was present in patients with recurrent tonsillitis and might be associated with an increase in risk of recurrent tonsillitis. There is a need to emphasize these findings via clinical trials based on large populations.

E75. How Do We Determine the Necessity of Surgery for Deep Neck Infection?

Keisuke M. Mizuno, MD, Kobe, Hyogo Japan; Shogo S. Shinohara, MD PhD, Kobe, Hyogo Japan; Kiyomi H. Hamaguchi, MD PhD, Kobe, Hyogo Japan; Shinji T. Takebayashi, MD PhD, Kobe, Hyogo Japan; Keizo F. Fujiwara, MD, Kobe, Hyogo Japan; Yasushi N. Naito, MD PhD, Kobe, Hyogo Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to acquire knowledge of the factors which affected to the necessity of surgery for deep neck infection. Conservative treatment can be effective in selective cases.

Objectives: The purpose of this study is to identify factors which determine whether cases of deep neck infection need neck surgery or not. Study Design: Retrospective chart review. Methods: We reviewed the medical records of 47 patients who visited our department emergently with deep neck infection between 2011 and 2017 and evaluated the demographic characteristics, etiology, site of infection, white blood cell count, the value of CRP. In addition, we divided the cases into three groups. Group A: the group which underwent immediate surgery (n=20). Group B: the group which received antibiotics alone at first and underwent surgery later (n=15). Group C: the group which received antibiotics alone and cured (n=12). We investigated the necessity of surgery by compare group B with group C, because doctor's choice influenced and the surgery may have been unnecessary in group A. Results: Single space involvement was more frequent in group C than in group B (66.6% vs. 20.0%, P=0.022). Cases which had infection spread below and under to hyoid bone were not

different between group B and C (53.3% vs.33.3%). White blood cell count was higher in group B than in group C (16800 vs. 10500, P=0.044). Gender, age, the value of CRP, diabetic state, laryngeal edema were not different between the two groups. Conclusions: Although surgical drainage remains the main method of treating deep neck infection, conservative treatment can be effective in cases with infection in the only one potential space.

E76. Opioid Prescribing Patterns in Otolaryngology Residents

Alexander W. Murphey, MD, Charleston, SC; Shaun A. Nguyen, MD MA, Charleston, SC; Ted A. Meyer, MD PhD, Charleston, SC

Educational Objective: Discuss national trends in opioid prescribing patterns by resident physicians within otolaryngology training programs. Examine opioid prescribing for postoperative pain control after common otolaryngologic procedures and determine if any training or demographic factors influence prescribing.

Objectives: To evaluate national trends in opioid prescribing patterns by resident physicians within otolaryngology training programs. Specifically, to examine opioid prescribing for postoperative pain control after common otolaryngologic procedures and determine if any training or demographic factors influence prescribing. Study Design: National, cross-sectional survey study. Methods: The survey consisted of questions including demographics, most commonly prescribed analgesic, and the average number of opioid tablets prescribed postoperatively for eleven of the most common adult procedures within otolaryngology. One tablet was the equivalent to one 5-325 mg hydrocodone acetaminophen tablet. Results: Online survey was sent to every United States based otolaryngology training program. 144 subjects responded. 59.1% of the subjects were males. The mean age was 30 years old (range: 25 to 45). There was an even distribution of subjects in regards to residency year and region of residency training program. Hydrocodone acetaminophen was the most commonly prescribed narcotic at 62.3% followed by oxycodone at 45.5%. Tonsillectomy/uvulopalatopharyngoplasty had the highest average number of tablets prescribed at 36.6 (range: 10 to 100), while direct laryngoscopy had the lowest (6.9 tablets, range: 0 to 40). There was no significant difference found in opioid prescribing based on age or sex. Conclusions: There were no significant differences found in prescribing patterns based on residency training program region, age, sex, or training year; although there still remains high variability in current opioid prescribing patterns for otolaryngology residents. Establishment of standardized postoperative narcotic guidelines is likely warranted within training programs.

E77. Is the Gender Gap Closing in Academic Otolaryngology Subspecialties? An Analysis of Research Productivity Differences between Male and Female Otolaryngologists

Somtochi O. Okafor, BS, Dallas, TX; Ashleigh A. Halderman, MD, Dallas, TX; Kathleen M. Tibbetts, MD, Dallas, TX; Gopi S. Shah, MD, Dallas, TX; Brittny N. Tillman, MD, Dallas, TX; Ashley D. Agan, MD, Dallas, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss and compare gender differences in research and publishing activities between male and female academic otolaryngologists.

Objectives: The proportion of women specializing in otolaryngology-head and neck surgery (Oto-HNS) and also seeking fellowship training has steadily increased over the last several years. In academic Oto-HNS, gender differences exist in research productivity, scholarly impact, and funding. This study aimed to evaluate gender differences in academic productivity between otolaryngologists in early, mid, and later careers and within various subspecialties. Study Design: Database analysis. Methods: Departmental websites for all Oto-HNS residency programs were accessed and data including gender, academic rank, and fellowship training/subspecialty field was collected. Bibliometric data including h-index, publication years, number of citations, documents, and coauthors was obtained from the Scopus database. Career groups were defined as early (1-5 years) mid (6-15 years) and later (16+ years). Continuous data was compared using the t-test. Results: Data was collected on 1754 academic otolaryngologists (412 women, 1342 men). Overall, men exhibited significantly higher h-indices, number of documents, citations, and coauthors and actively published for more years compared to women ($p < 0.0001$ for all variables). Similar trends persisted across all subspecialties. When authors were broken down into career groups, differences emerged. Within otology, facial plastics, and rhinology, women and men showed similar productivity across all career groups. Conclusions: This study suggests female otolaryngologists within certain subspecialties are keeping pace with their male counterparts in publication productivity in their early and mid careers. This represents a change from prior where women have historically been less productive in those career periods.

E78. Sound Intensities Measured during Cadaveric Cortical Bone Drilling

Pranati Pillutla, BS, Lubbock, TX; James C. Wang, MD PhD, Cincinnati, OH; Steven Zupancic, PhD AuD, Lubbock, TX; Joshua C. Demke, MD, Lubbock, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to explain possible risks of noise induced hearing loss (NIHL) in patients and surgeons, secondary to cortical bone drilling/cutting during craniofacial surgery.

Objectives: Determine if sound intensities produced by various cutting instruments used in craniofacial surgery increases long term risk for NIHL in patients and surgeons. Study Design: Cadaveric laboratory study. Methods: Burrs (diamond and cutting) reciprocating saw, Sonopet Piezosurgery device, and craniotome were used to cut or drill one cortical layer of adult cadaveric skulls. Intensities and frequencies were measured at the levels of cadaveric skull and operator's ear. A custom MATLAB program was used to determine peak frequencies and intensities of recordings. Results: At the cadaver head level, drill generated sound intensities (SIs) ranged from 72-93 dBSPL; at the operator's ear level, SIs ranged from

70-91 dBSPL. SIs generated at the cadaver head level were compared for interoperator differences. Drilling by one operator showed consistent approximate peak frequency of 8.4 kHz with SIs (82-97 dBSPL). Drilling by the second operator showed peak frequency of 5.7 kHz with SIs (82-90 dBSPL). Intra-user measurements did not show significant shifts in frequency or intensity with extended use of drill bits. Interoperator differences in frequency and intensity generated may result from technique variation, such as applied force. Conclusions: Piezosurgery device was quietest at both operator and cadaver levels at 70 and 72 dBSPL respectively. Craniotome was loudest at the cadaver head level (93 dBSPL), while the reciprocating saw was loudest at the operator's level (91 dBSPL). Further studies are necessary to corroborate if extended exposure at these SIs may increase risk for NIHL.

E79. Clinical Outcomes of Expansion Sphincter Pharyngoplasty for Obstructive Sleep Apnea Compared to Continuous Positive Airway Pressure Therapy

Sophia E. Rokkas, BSc, Philadelphia, PA; Maurits S. Boon, MD, Philadelphia, PA; Colin T. Huntley, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to compare treatment efficacy in patients with obstructive sleep apnea treated with expansion sphincter pharyngoplasty to those treated with continuous positive airway pressure therapy.

Objectives: To compare outcomes of a cohort of patients with obstructive sleep apnea (OSA) treated with expansion sphincter pharyngoplasty (ESP) to those treated with continuous positive airway pressure therapy (CPAP) using the mean disease alleviation concept. This factors in the amount of time therapy is utilized each night to assess disease control. Study Design: Retrospective database analysis. Methods: Treatment efficacy, adjusted compliance, mean disease alleviation (MDA), and residual apnea hypopnea index (AHI) were calculated. All calculations were performed as previously published and we assumed a 7 hour total sleep time as this was not objectively measured. Results: We evaluated 55 patients undergoing ESP and 89 complying with CPAP over an 8 year period. At post-treatment followup, mean AHI was 5.62 ± 5.09 and 12.95 ± 13.39 ($p < 0.001$) in CPAP and ESP patients respectively. The mean hours of CPAP usage per day was 4.61 in the CPAP group. Treatment efficacy was 81.39 ± 12.10 and 44.78 ± 48.10 in CPAP and ESP patients respectively ($p < 0.001$). Patients with ESP had a lower residual AHI (13.04 ± 13.50) compared to the CPAP cohort (14.04 ± 9.47) ($p = 0.031$). MDA was similar between CPAP and ESP groups (51.10 ± 19.80 vs 44.78 ± 48.10 , $p = 0.397$). Baseline characteristics showed the ESP group to be significantly younger, with a lower BMI, and a lower preoperative AHI. Conclusions: Although ESP showed a higher post-treatment AHI compared to CPAP, it provides control of OSA during the entirety of the night. This allows for a lower residual AHI and similar MDA using this concept.

E80. Hypoglossal Nerve Stimulation Impact on Cardiovascular Risk: A Case Report

Sophia E. Rokkas, BSc, Philadelphia, PA; Colin T. Huntley, MD, Philadelphia, PA; Maurits S. Boon, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the cardiovascular risk associated with untreated obstructive sleep apnea and alleviation of these risks after treatment.

Objectives: 1) Investigate the impact of upper airway stimulation (UAS) on cardiovascular risk; 2) report a case of improved myocardial function following implantation of hypoglossal nerve stimulator in a patient with heart failure. Study Design: Case report. Methods: Patient chart analysis and literature review. Results: A 75 year old man with body mass index (BMI) of 30.5 and severe obstructive sleep apnea (OSA) with an apnea hypopnea index (AHI) of 72 was referred for UAS therapy. Past medical history was significant for cardiovascular disease including congestive heart failure due to ischemic cardiomyopathy with impaired left ventricular function and ejection fraction of 35%. His functional status was New York Heart Association (NYHA) class III. Following evaluation of clinical and polysomnographic data, he was deemed to be an appropriate candidate for UAS and underwent uncomplicated implantation. Three months postoperatively the patient had no sleep apnea events. Polysomnography showed a titrated AHI of 0 with subsequent home sleep study showing respiratory event index of 2.3. Followup cardiac evaluation revealed that ejection fraction had increased to 47% since implantation. Functional class had improved to NYHA I. No interval changes in his medications or BMI had occurred. Conclusions: This case demonstrates significant improvement in cardiovascular function in a patient treated for OSA with hypoglossal nerve stimulation. Given the high prevalence of OSA in patients with cardiovascular disease, UAS may become an important adjunct in the comprehensive multidisciplinary treatment of heart failure in these patients. Further clinical studies are required to investigate the impact of UAS on treatment and prognosis of heart disease.

E81. Atypical Mycobacterial Infection of the Preauricular Facial Skin

Victoria G. Fischman, BA, Boston, MA; Devin M. Ruiz, MD, Boston, MA; Elie E. Rebeiz, MD FACS, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify and discuss the clinical manifestations and treatment of atypical mycobacteria affecting skin of the head and neck.

Objectives: To describe the clinical presentation and management of atypical mycobacteria affecting the skin of the face in an adult patient. Study Design: Case report with literature review. Methods: The patient's medical record, including photographs and laboratory data, was reviewed. A literature review of cutaneous atypical mycobacteria, with emphasis on head and neck presentation, was performed. Results: A 66 year old Chinese patient presented to the emergency department of a tertiary medical center with a 6 month history of violaceous lesions of the right face. Lesions were associated with

pain and drainage of brownish fluid. History was notable for travel to China within 3 months of symptom onset. Consultation with otolaryngology and dermatology services lead to biopsy of the lesions. Culture results revealed acid fast bacilli (AFB) on a background of acute and chronic inflammation, suggestive of atypical mycobacteria. Infectious disease consultation led to the patient being started on oral doxycycline and azithromycin. At the time of writing, the patient is showing significant clinical improvement. Speciation of AFB culture is still pending, as indolent growth of these organisms necessitates a prolonged culture process. Conclusions: The term atypical mycobacteria refers to a multitude of species found in the environment, which can cause a range of diseases including infections of skin and soft tissues. Immunosuppression and history of foreign travel are common risk factors. High index of suspicion and multidisciplinary patient care are essential to appropriate diagnosis and management.

E82. Hypoglossal Nerve Stimulation in Veterans with Obstructive Sleep Apnea

Kathleen M. Sarber, MD, Cincinnati, OH; Katherine W. Chang, BS, Cincinnati, OH; Madison K. Epperson, BS, Cincinnati, OH; Stacey L. Ishman, MD MPH, Cincinnati, OH; Reena Dhanda Patil, MD, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the unique challenges of a veteran population and discuss the efficacy of hypoglossal nerve stimulation in the treatment of obstructive sleep apnea with regard to both objective and subjective measures.

Objectives: To determine whether hypoglossal nerve stimulator (HNS) implantation in a veteran population would result in improvements in 1) obstructive sleep apnea (OSA) severity; 2) quality of life; and 3) adherence similar to previous reports. **Study Design:** Consecutive case series retrospective. **Methods:** We included all patients who underwent HNS implantation (Inspire Medical Systems, Minneapolis, MN) from August 2016 to May 2018 at a veteran's affairs medical center. All patients previously failed positive airway pressure therapy. The primary outcome measures were apnea hypopnea index (AHI), Epworth Sleepiness Scale (ESS) score, and device usage in hours/night. **Results:** Thirty-one patients were included, 29 underwent titration polysomnography. Mean age was 61.6 years, 94% male. Common psychiatric comorbidities included depression (61%, 19/31), anxiety (29%, 9/31), and post-traumatic stress disorder (29%, 9/31). Mean AHI was significantly reduced after implantation from 37.8 ± 24.5 to 8.9 ± 17.6 events/hour ($P < 0.001$). Resolution of OSA (AHI < 5) was seen in 72% (21/29), and 86.2% (25/29) had $\geq 50\%$ reduction in AHI and an AHI < 20 events/hour. There were significant improvements in oxygen saturation nadir from $81 \pm 6\%$ to $89 \pm 3\%$ ($P < 0.001$), sleep efficiency from $72 \pm 13.6\%$ to $80.5 \pm 10.2\%$ ($P = 0.008$) and percent REM sleep ($P = 0.016$). ESS also improved from 11.3 ± 5.5 to 8 ± 4.6 ($P < 0.001$). Arousal index and mean BMI (30.6 ± 3.8) did not change significantly ($P = 0.19-0.62$). Mean device usage was 6.5 hours/night. **Conclusions:** HNS improved OSA severity and sleepiness in this consecutive series of veterans, similar to rates in other published series. In this cohort, excellent device usage was seen. These results are encouraging as this population includes a high rate of psychiatric illness, a comorbidity associated with decreased treatment adherence.

E83. Analysis of Pathogenic Bacteria and Complication Rates in Acute Sinusitis: A Nationwide Inpatient Study

Jonathan C. Simmonds, MD, Boston, MA; Elie E. Rebeiz, MD, Boston, MA

Educational Objective: At the end of this presentation, participants should be able to recognize the microbiology of sinusitis and which organisms could lead to a more complicated course of acute sinusitis. A secondary objective is to recognize the research potential of the new ICD-10-CM coding system within the field of otolaryngology.

Objectives: This study aims to leverage the power of the new ICD-10-CM codes to determine the microbiology of acute sinusitis in the inpatient setting and determine whether certain microbes are associated with an increased risk of complications. **Study Design:** Retrospective cross-sectional database analysis. **Methods:** Inpatients admitted with a primary diagnosis of acute sinusitis in 2016 were analyzed using the National Inpatient Sample. Patients were only included if their discharge diagnosis also included the pathogenic bacteria. Complications of acute sinusitis such as orbital cellulitis, meningitis, venous thrombosis, or intracranial abscess formation were evaluated. Z-tests were used to establish correlations between causative microbes and rates of complications. **Results:** In 2016, 5825 patients were admitted with a primary diagnosis of acute sinusitis. A total of 1040 causative agents were recorded in 909 of these patients. Staph spp. was seen in 255 (24.52%) patients 10.5 (22.7%) were MSSA and 90 (21%) of these were MRSA. Strep spp. accounted for 150 (14.42%) of infections, and pseudomonas spp. was 145 (26.6%). Strep spp. was the causative agent in 33.48% of patients with complicated sinusitis which was higher than expected. ($p < 0.0001$). Staph spp. was seen in 31.33% ($p = 0.086$) of cases. **Conclusions:** Sinusitis secondary to streptococcus infections have a higher than expected rate of complications. This study demonstrates the strength of ICD-10-CM based databases in the study of sinonasal disease.

E84. Neurophysiological Monitoring of Tongue Muscle Activation during Hypoglossal Nerve Stimulation

Joshua J. Sturm, MD PhD, New York, NY; Oleg Modik, PhD, New York, NY; Maria V. Suurna, MD FACS, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the nature of tongue muscle activation by hypoglossal nerve stimulation, and discuss how intraoperative neurophysiological monitoring of tongue muscle activation may provide essential data for stimulus optimization in the treatment of obstructive sleep apnea.

Objectives: Upper airway stimulation for obstructive sleep apnea (OSA) via hypoglossal nerve (HGN) implantation reduces airway obstruction by selectively stimulating nerve fibers that innervate tongue protruder muscles, while avoiding

fibers that innervate retractor muscles. This selective stimulation likely depends upon the location, intensity and type (bipolar vs. unipolar) of electrical stimulation delivered, yet the nature of muscle activation has not been fully elucidated. This study investigates tongue muscle activation by HGN stimulation using intraoperative nerve integrity monitoring (NIM) in conjunction with electromyography (EMG). Study Design: Case series. Methods: Case series of 10 patients undergoing unilateral hypoglossal nerve stimulator implantation for OSA. Data included EMG responses in tongue protrusor (genioglossus), retractor (styloglossus and hyoglossus) and intrinsic (transverse and vertical) muscles in response to intraoperative bipolar probe electrical stimulation of lateral and medial branches of HGN and to implantable pulse generator (IPG) unipolar and bipolar settings after placement of the stimulation cuff. Statistical analyses performed using GraphPad Prism (La Jolla, CA). Results: Stimulation of medial HGN branches resulted in EMG responses in protrusor muscles but not in retractors, whereas stimulation of lateral HGN branches drove responses in retractor muscles. Variable intrinsic muscle responses were observed with stimulation of lateral and medial branches. Unipolar and bipolar HGN stimulation configurations resulted in unique patterns of muscle activation. After electrode cuff placement, only included HGN branches robustly activated protrusor muscle responses. Conclusions: The relative activation of tongue protrusor, retractor and intrinsic musculature by HGN stimulation is determined by stimulus location, intensity and type. Intraoperative neurophysiological monitoring of tongue muscle activation enables proper electrode cuff placement and may provide essential data for stimulus optimization.

E85. Speaking Softly: Adherence to Subspecialty Guidelines in the Emergency Department

Zahrah M. Taufique, MD MBA, New York, NY; Micah Timen, MD, New York, NY; Jordan L. Swartz, MD MA, New York, NY; David R. Friedmann, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe current CPGs for Bell's palsy and otitis externa and be aware of the disparity between the guidelines and treatment practices in the emergency department.

Objectives: Evidence based clinical practice guidelines (CPGs) have been proliferated by the American Academy of Otolaryngology for several conditions. While these guidelines have been disseminated within the specialty journals, many patients' first presentation of otolaryngologic complaints are to primary and acute care settings including the emergency department (ED). It is less clear whether practice in these settings are in accord with specialty CPGs. Study Design: Retrospective review of medical records at an academic tertiary care center of patients presenting to the emergency department with diagnoses of 1) Bell's palsy/facial weakness; or 2) otitis externa (OE) during the defined time period. Methods: From May 2015-June 2018, all ED encounters for Bell's palsy and otitis externa were retrospectively reviewed. We assessed providers' adherence to CPGs with regards to recommended treatment as well as avoidance of those interventions which have been deemed unnecessary for such a presentation. For each condition and patient, charts were assessed for recommended treatments. Results: Of all patients who presented with presumed Bell's palsy 99% of these patients (N= 100/101) were prescribed oral steroids, concordant with guideline care. In terms of guideline nonconcordant care, 41% of these patients received a CT, 53% received laboratory tests, only 46% documented eye closure. In terms of otitis externa, the ED provided systemic antibiotics 63% (N=293/465) of the time, independent of age. Conclusions: CPGs are available however are not followed by providers in the acute care setting of a tertiary care institution. There is an opportunity to improve quality care by improving adherence to these guidelines.

E86. Impact of a Novel Teaching Paradigm on Surgical Training within the Otolaryngology-Head and Neck Surgery Residency Program in a Developing Nation

Seid Temam, MD, Mekelle, Ethiopia; Yikal Zemene, MD, Mekelle, Ethiopia; Joshua P. Wiedermann, MD, Mekelle, Ethiopia

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate how a change in the current paradigm of resident education may improve surgical preparedness.

Objectives: To assess the impact of a novel approach to surgical training among residents in a developing nation, we aim to measure their knowledge and confidence in performing routine otolaryngology-head and neck surgery procedures following the intervention. Study Design: Cohort study. Methods: Otolaryngology residents of a tertiary hospital in a developing nation will be randomized into the control and experimental groups. All residents will be assigned to a particular surgical procedure at least three weeks ahead of time. Residents in the control group will prepare for the surgical procedure with standard, self-directed learning methods. Residents in the experimental group will participate in a series of case specific, self-directed learning activities including assigned textbook chapters, imaging analysis, cadaveric dissection and practical simulation in the weeks prior to the procedure. All of these interventions will be directed toward learning about the case they are assigned to in the coming weeks. One resident from each cohort will participate in the assigned surgery and both will fill out a postoperative knowledge assessment and subjective survey to assess the impact of their individual training. Results: The study is currently in progress and will be completed by early spring, 2019. Conclusions: We hope to assess if case specific, self-directed learning activities better prepare residents for their day in surgery.

E87. Ambient Pressure Tympanometry with Respiratory Maneuvers: Use in Patients with Suspected Patulous Eustachian Tube

Anthony Thai, BA, Stanford, CA; Zahra N. Sayyid, BS, Palo Alto, CA; Davood K. Hosseini, MD, Palo Alto, CA; Austin Swanson, AuD, Palo Alto, CA; Jennifer Y. Lee, MD, Palo Alto, CA; Yona Vaisbuch, MD, Palo Alto, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the application of ambient pressure tympanometry testing at rest and with various respiratory maneuvers in the screening of patients with suspected patulous eustachian tube.

Objectives: To characterize respiration synchronous wave patterns observed in ambient pressure tympanometry (APT) of patients with suspected patulous eustachian tube (PET), at rest and under various respiratory maneuvers. **Study Design:** Retrospective study of adult patients referred to a PET clinic. **Methods:** APT was performed on all patients referred to our PET clinic. We retrospectively analyzed the APT recording at baseline and under the following maneuvers: forced respiration through the mouth, both nostrils and the ipsilateral nostril. APT findings were correlated with endoscopic findings and patient reported symptoms. We categorized positive waves as those with a frequency of 12-24 peaks/minute, and quantify their frequency and amplitude. **Results:** PET testing was performed on 218 patients. We identified 53 patients with respiratory synchronous APT waves on at least one of the respiratory maneuvers. Forced respiration through the ipsilateral nostril was the most sensitive in detecting respiratory synchronous waves. We quantify the correlation between positive APT findings on each breathing maneuver and at rest. Analyzing the baseline APT recording, we identified 11 patients with regular, respiratory synchronous wave patterns. At rest, APT waves averaged an amplitude of 0.02 mL while waves during respiratory maneuvers averaged 0.08 mL. **Conclusions:** Although ambient pressure tympanometry at rest and under various breathing maneuvers is currently employed as one diagnostic tool for PET, this test has not been systemically analyzed in a large patient cohort. Our data suggests that this test is a valuable addition to the PET diagnostic algorithm.

E88. Training as a Factor for Leadership Roles in Otolaryngology Residency Programs

Brian A. Walker, MD, Phoenix, AZ; S. Ryan Hall, MD, Phoenix, AZ; Michael J. Marino, MD, Phoenix, AZ

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the association between residency training background and leadership roles in current otolaryngology residency programs.

Objectives: To determine if training background was a factor for leadership roles in current otolaryngology residency programs. **Study Design:** Retrospective database review. **Methods:** All current otolaryngology residency programs were considered for study inclusion. The training history for current chairpersons and program directors (PD) was extracted from each program's website. Programs that were active prior to 2008 were divided into quintiles based on Doximity reputation rankings. Deviation from an expected quintile distribution for the graduating residency program of the chairperson and PD was analyzed by chi-square goodness of fit test. Subanalysis was completed where individuals assuming leadership roles at their home program were excluded. Secondary analysis was performed according to subspecialty training with expected distributions based on the number of fellowship positions filled in 2007. **Results:** The graduating program of chairpersons deviated from a quintile distribution ($p < 0.001$), with the first tier being overrepresented. This remained the case when controlling for individuals staying in their home program ($p < 0.001$). When all PDs were considered there was not a significant difference from expected quintile distribution ($p = 0.074$), although this became significant in the subanalysis ($p = 0.039$). The first quintile accounted for 62% of all chairpersons and 33% of all current PDs in these subanalyses. Chairpersons were more likely to have training in head and neck surgery or otology ($p < 0.001$), while PDs were more likely to have training in pediatrics or rhinology ($p = 0.014$). **Conclusions:** Graduating residency program tier and subspecialty appear to be associated with later leadership roles in otolaryngology residency programs. Deviations from expected distributions are stronger among chairpersons compared to PDs.

E89. Improving Surgical Training with SIGMA Surgical Software: Implementation with Simulation Temporal Bone Dissection

Michael S. Weinstock, MD, Bronx, NY; Jeremy M. Feintuch, BA, New York, NY (Presenter); Joshua D. Feintuch, BA, New York, NY; Marc J. Gibber, MD, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the advantages of using SIGMA software as an adjunct to otolaryngology surgical training.

Objectives: To determine if the use of SIGMA software is an effective adjunct to otolaryngology surgical training. **Study Design:** Otolaryngology residents were randomized to either a non-SIGMA (control) or SIGMA (variable) group. Subjects performed three mastoidectomies with the Voxel-Man temporal bone simulator using a preloaded temporal bone CT. **Methods:** Each step of the procedure was observed and timed, with only the variable group receiving SIGMA specific feedback after each trial. Pre- and post-test questionnaire data evaluating previous mastoidectomy experience and perceptions of SIGMA were collected. Metrics including timing of each surgical step, total surgical time and improvement in each mastoidectomy trial were analyzed. **Results:** A statistically significant difference was found in the mean improvement in time across successive mastoidectomy trials in the SIGMA (N=6) vs non-SIGMA (N=8) groups, (443 seconds vs 211 seconds; $P = .036$). The mean change of self-reported comfort ability with mastoidectomy was + 4.46/10 in the SIGMA group vs. +2.19/10 in the non-SIGMA. **Conclusions:** Using SIGMA as an augmentation to surgical training can aid trainees to become more proficient and comfortable performing surgeries compared to standard surgical training alone.

E90. Three Dimensional Anatomy Learning: A Randomized Comparative Study of a Computer Based Model of the Trigeminal Nerve

Douglas M. Worrall, MD, New York, NY; Joshua Zeiger, MD, New York, NY; Ann E. Powers, BA, New York, NY; David Y. Goldrich, BA, New York, NY; Alfred M. Illoreta, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the effectiveness of three dimensional model versus traditional materials for learning complex head and neck anatomy.

Objectives: Investigate the effectiveness of a three dimensional (3D) computer based model for teaching the anatomy of the trigeminal nerve compared to textbooks. Study Design: Randomized, controlled crossover trial. Methods: Recruited first year medical students watched a recorded lecture on the trigeminal nerve and were randomized into two groups, the first studied with a 3D computer model of the first and second divisions of the trigeminal nerve (V1/V2) while the second studied the same material with textbooks for 15 minutes. Subjects were crossed over to the other educational modality to study V3 for 15 minutes. After each study session, subjects completed a standardized survey to assess motivation. The 3D models were interactive and contained text information. Subjects then completed a subjective experience survey and a post-study quiz. Results: Twenty-five first year medical students participated in the study. Mean scores on the V1/V2 portion of the post-study quiz were not significantly different between the two experimental groups ($p=0.78$). However, the mean score on the V3 portion of the post-study quiz for the 3D group was 69.2% and the mean score for the textbook group was 58.2%, which approached statistical significance ($p=0.06$). Furthermore, students reported that the 3D materials were more useful, enjoyable, engaging, and they were more likely to recommend them to other students (all $p<0.05$). The 3D models also outperformed the textbook material on the standardized motivational survey ($p<0.05$). Conclusions: 3D anatomic models may serve as useful adjunct in medical education, improving student engagement and motivation as well as aiding conceptualization of complex head and neck anatomy.

E91. Neural Substrates of Motor Skill Acquisition in Surgical Trainees: An fMRI Study of Otolaryngology Residents

Nina W. Zhao, MD, San Francisco, CA; Patpong Jiradejvong, MS, San Francisco, CA; Lauren Y. Jacobs, BS, San Francisco, CA; Charles J. Limb, MD, San Francisco, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe how brain activity changes with motor skill training.

Objectives: To identify neural biomarkers of motor skill execution related to surgical training using functional MRI (fMRI). Study Design: Cross-sectional. Methods: We performed fMRI in a pilot study of 10 subjects (5 novice, 5 experienced) as they executed motor knot tying tasks in a block design paradigm: 1) familiar shoelace knot (learned-control), 2) two handed surgical square knot (learned-surgical), 3) unfamiliar double one handed knot (novel-control). We used Statistical Parametric Mapping (SPM) software to perform voxel by voxel statistical analysis of the fMRI data, using contrast analyses to reveal group differences during tasks. Blinded personnel objectively assessed the quality and quantity of surgical knots, and the data were analyzed by subject group using t-tests. Results: We found significant differences between experienced and novice subjects during fMRI scanning. Novice subjects (medical students) demonstrated higher levels of functional neural activity in sensory and motor areas (e.g. primary motor, premotor, visual cortices) than residents for equivalent knot tying tasks. Compared to novices, experienced subjects (senior surgical residents) exhibited functional deactivation in numerous cortical and subcortical areas, including the cerebellum. Although the two groups tied similar numbers of shoelace knots, residents tied significantly more two handed and double one handed knots than students ($p=0.0005$ and $p=0.0008$, respectively), and their performance was rated significantly better ($p=0.01$ and $p=0.004$, respectively). Conclusions: Training related changes in motor skill performance may be reflected as decreased brain activity in motor coordination areas, most likely reflecting increased efficiency of neural processing for trained motor tasks. This relative functional deactivation in experienced subjects may represent an objective neurobiological marker for surgical motor skill acquisition.

HEAD & NECK

E92. Recurrent Pigmented Villonodular Synovitis of the Temporomandibular Joint: Case Report and Management of Recurrence

Moriyike O. Akinosum, BS, Chicago, IL; Barry L. Wenig, MD, Chicago, IL; Virginie Achim, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the importance of a synovectomy as the gold standard for surgical resection in a patient presenting with pigmented villonodular synovitis of the TMJ to ensure complete excision and minimize recurrence.

Objectives: To describe a rare, benign, locally aggressive disease such as pigmented villonodular synovitis (PVNS) of the temporomandibular joint (TMJ) specifically to reinforce surgical principles for complete resection and guide treatment options when there is a recurrence. Study Design: Case report and review of the literature. Methods: The authors report the case of a 46 year old woman who underwent a soft tissue only resection of a PVNS of the TMJ at an outside institution and presented 7 years later with a recurrence. Reported cases in the literature are reviewed and goals of treatment are discussed. Results: Computed tomography (CT) imaging showed a 4.7 cm recurrence corresponding to the tumor location at initial presentation. The patient underwent a total parotidectomy, segmental mandibulectomy with resection of the TMJ as

well as free tissue transfer for reconstruction. Final pathology was confirmatory with clear margins. Conclusions: PVNS typically presents with osteoinvasion of the knee joint in 80% of cases. Overall there are < 50 published reports of PVNS of the TMJ and very few articles discuss principles of management when there is a recurrence. In a patient initially presenting with PVNS of the TMJ, synovectomy is the gold standard, and the surgical goal is complete resection. When recurrent, surgical excision is preferred if feasible as the role of radiotherapy is less clearly defined with only 7 reported cases.

E93. Meta-Analysis Utilizing Public Data Suggests Role of DKK1 in the Pathogenesis of Anaplastic Thyroid Carcinoma

David Z. Allen, BA, Columbus, OH; Ross Wanner, BS, Columbus, OH; Sean McDermott, BS, Columbus, OH; Jihad Aljabban, BA MMSc, Columbus, OH; Omar Latif, BA, Columbus, OH; Kris Jatana, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the value of public data in understanding the pathogenesis of anaplastic thyroid carcinoma and potential therapeutic targets derived from this meta-analysis.

Objectives: Anaplastic thyroid carcinoma (ATC) is a devastating disease that leads to high mortality. Treatment is largely palliative and limited to surgical resection with adjuvant chemoradiation. Historically, p53 gene mutations have been shown to contribute to the development of ATC. This analysis is meant to elucidate a more thorough understanding of ATC. Study Design: We tagged 46 ATC samples and 90 healthy thyroid samples as a control. Gene signatures were analyzed in Ingenuity Pathway Analysis, using statistical significance $p < 0.05$ and absolute log ratio > 0.5 between disease and controls. Methods: Search Tag Analyze Resource was employed to conduct meta-analysis using the National Center for Biotechnology's Gene Expression Omnibus to define ATC pathogenesis. Results: The top canonical pathways were associated with phagosome formation and GP6 (a known Jak2 small molecule inhibitor) signaling. The top upstream regulator was ERBB2 (a receptor tyrosine kinase), with a predicted activation. E2F7, a gene involved with cell cycle repression, was the highest upregulated molecule (log ratio 2.104). DKK1, an inhibitor of the wnt pathway, was also found to be heavily upregulated (log ratio 1.790). Dysregulation of the wnt pathway has been shown to contribute to the pathogenesis in cancer models. Interestingly, anti-DKK1 drugs are being developed for malignancies, such as multiple myeloma, and warrants consideration for ATC. Conclusions: While ATC has been shown to be associated with p53 gene mutations, the exact mechanism has eluded researchers. Here we give insights to ATC pathogenesis and potential targets, including ERBB2 (targeted by Trastuzumab) and DKK1.

E94. AZD4547 Inhibits Progression in a cSCC Mouse Tumor Cell Xenograft Model via mTORC1 and AKT Signaling

Kent L. Burton, MD, Shreveport, LA; Alok R. Khandelwal, PhD, Shreveport, LA; Xiaohua Rong, Shreveport, LA; Tara N. Moore-Medlin, PhD, Shreveport, LA; Xiaohui Ma, MD, Shreveport, LA; Cherie-Ann O. Nathan, MD, Shreveport, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the potential role of AZD4547 as an adjuvant therapy in the treatment of cSCC.

Objectives: Keratinocyte derived cutaneous squamous cell carcinoma (cSCC) is the most common metastatic skin cancer. Increased exposure to solar UVB (ultraviolet B) radiation is the primary etiologic factor for cSCC. Further, in organ transplant patients there is a 65-100-fold increased incidence of cSCC compared to the general population. Excision of cSCC of the head and neck results in significant facial disfigurement. Thus, novel mechanism based targeted approaches are needed for both prevention and treatment of aggressive cSCC. Analysis of fibroblast growth factor receptors (FGFR s) revealed an increased mRNA and protein expression in cSCC cells lines compared to normal human epidermal keratinocytes. Further, treatment of cSCC cells with a pan-FGFR inhibitor AZD4547 significantly inhibited cell proliferation, migration, motility and cell cycle traverse. Our objective was to translate our in vitro data to an in vivo model by investigating the role of AZD4547 in a cSCC tumor cell xenograft model and elucidate the underlying mechanism. Study Design: Tumor cell xenograft model in mice. Methods: SCID mice with SCC12A tumor xenografts were treated with AZD4547 (15mg/kg/b.w, twice weekly oral gavage) and the effect on tumor growth was investigated. Results: SCID mice with SCC12A tumor xenografts treated with AZD4547 (15mg/kg/b.w., twice weekly oral gavage) exhibited significantly decreased tumor volume compared to vehicle treatment group. Further, AZD4547 induced decrease in tumor cell volume was associated with a decrease in cell proliferation measured using immunohistochemistry for Ki67. Mechanistically, AZD4547 significantly downregulated mTORC1 and AKT activation markers suggesting an important role of mTOR and AKT pathway in FGFR mediated effects. Conclusions: These results provide evidence for the role of FGFR as a therapeutic potential in cSCC.

E95. Oral Human Papillomavirus Infections and History of Tonsillectomy in US Adults

Janet S. Choi, MD MPH, Los Angeles, CA; Alison J. Yu, BA, Los Angeles, CA; Uttam K. Sinha, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the prevalence of oral human papillomavirus (HPV) infections among US adults and recognize that there is no association between oral HPV infections and history of tonsillectomy.

Objectives: Oral HPV infection is a strong risk factor of oropharyngeal cancer that is rising in incidence in the US. Con-

currently, the rates of tonsillectomy have substantially decreased. We aim to investigate associations between oral HPV infections and history of tonsillectomy in US adults. Study Design: Population based cross-sectional study. Methods: We analyzed 2011-2014 National Health and Nutritional Examination Survey during which 4,825 participants aged 20-69 years each completed a tonsillectomy questionnaire and an oral rinse exam for detection of 37 types of HPV. Logistic regression was used to examine the associations between history of tonsillectomy and oral HPV infections. Results: The rate of any type of oral HPV infection among individuals with history of tonsillectomy was slightly lower at 7.2% [95%CI: 5.2-9.2%] in comparison to the rate among individuals without history of tonsillectomy at 8.6% [95%CI: 7.2-9.9%]--there was no significant difference in rates between the two groups (OR:0.82 [95%CI: 0.60-1.4]). There was no difference in rates of oral HPV16 infection between the two groups (OR:0.73 [95%CI: 0.25-2.12]). In a multivariate model adjusting for demographics, medical history, and sexual behavior, there was no associations between the history of tonsillectomy and any oral HPV infection (OR:0.85 [95%CI: 0.51-1.41]). Factors associated with oral HPV infections included male gender, Hispanic race, smoking history, and higher number of oral sex. Conclusions: Although the prevalence of oral HPV infections was slightly lower among individuals with history of tonsillectomy, there was no significant association between tonsillectomy and oral HPV infections suggestive of tonsillectomy playing any protective role against oral HPV infections.

E96. Head and Neck Cancer Surgery after Admission through the Emergency Department: Short Term Outcomes and Costs of Care

Alexander N. Goel, BA, Los Angeles, CA; Govind Raghavan, BA, Los Angeles, CA; Jennifer L. Long, MD PhD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain patient factors associated with urgent or emergent admission for head and neck cancer ablative surgery and the associated negative impact on mortality, complications, and resource utilization.

Objectives: Outcomes after nonelective surgery for head and neck cancer (HNCA) are poorly defined. Our objective was to compare outcomes of patients undergoing nonelective HNCA surgery after admission through the emergency department with patients receiving elective surgery. Study Design: Retrospective cohort study. Methods: The Nationwide Inpatient Sample was used to analyze patients undergoing resection of an oral cavity, oropharynx, larynx, or hypopharynx cancer from 2010-2014. Patient characteristics were compared between nonelective and elective surgery groups. Multivariable logistic regression was used to determine predictors of adverse outcomes and resource use. Results: Of 135,391 patients, 6,348 (4.7%) underwent nonelective surgery. They were significantly more likely to be nonwhite (34 vs. 19%), in the lowest income quartile (37 vs. 27%), have non-private insurance (78 vs. 61%), have one or more comorbidities (58 vs. 45%), treated at a nonteaching hospital (30 vs 14%), and have a laryngeal or hypopharyngeal tumor (64 vs. 31%). They had increased in-hospital mortality (3 vs.1%), major complications (24 vs. 12%), non-home discharge (24 vs 11%), median length of stay (12 vs. 7 days), and median in-hospital costs (\$25,877 vs. \$17,841). Nonelective surgery was an independent predictor of all postoperative outcomes, including 4.71-fold increased odds of mortality (95% CI, 2.65-8.37) and 2.28-fold increased odds of major complications (95% CI, 1.80-2.88). Conclusions: Nationally, 4.7% of HNCA ablative surgeries are performed after nonelective admission through the emergency department, which occurs more often in vulnerable populations and leads to worse outcomes. Recognizing factors contributing to nonelective surgery and designing strategies to decrease these occurrences may improve HNCA surgery outcomes.

E97. Systematic Review of Anastomotic Coupling Devices for Arterial Anastomoses in Microvascular Free Tissue Transfer

Abhijit R. Gundale, MD, Shreveport, LA; Yuro J. Berkhovic, MD, Shreveport, LA; Brent A. Chang, MD, Shreveport, LA

Educational Objective: At the conclusion of this presentation the participants should be able to discuss the feasibility of use of arterial couplers in microvascular reconstruction.

Objectives: To describe the safety and feasibility of using a microvascular coupling device for free flap arterial anastomosis. Study Design: Systematic review. Methods: A systematic review of English language literature was performed for studies that described use of an arterial coupler for microvascular free tissue transfer in human patients. A comprehensive search of Medline (January 1948 to August 2018), EMBASE (January 1974 to August 2018), and Web of Science was performed. Results: 15 studies were included. All studies were retrospective case series. A total of 395 arterial anastomoses were attempted with a coupling device. All studies except one used the 3M Unilink/Synovis coupling device. One study used a novel absorbable coupling device. The coupling device was abandoned in favor of suture techniques in 8.4% of attempted anastomoses. Rupture of the anastomotic device was reported in only 1 patient (0.3%). Thrombosis was also infrequent at 1.9%. Quality assessment showed high risk of bias in all studies. Conclusions: In selected patients, coupling device for arterial anastomosis has a good success rate with low rates of thrombosis.

E98. Influence of Tourniquet Duration on Postoperative Complications in Free Flap Reconstructive Head and Neck Cancer Surgery

John P. Marinelli, BS, Rochester, MN; Joshua R. Labott, BS, Rochester, MN; Jaime A. Aponte-Ortiz, MS, Rochester, MN; Eric J. Moore, MD, Rochester, MN; Christine M. Lohse, MS, Rochester, MN; Jeffrey R. Janus, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the influence intraoperative tourniquet duration during free flap harvesting for radial forearm and fibular free flaps has on primary site, donor site, and major postoperative complications.

Objectives: To determine the impact of tourniquet duration on donor site, reconstructive site, and major postoperative complications in patients undergoing free flap reconstructive head and neck oncologic surgery with either fibular or radial forearm free flaps. Study Design: Retrospective review. Methods: Review of all patients who underwent either radial forearm or fibular free flap reconstruction for head and neck oncologic surgery treated at a large tertiary referral center from 1/1/2000-12/31/2016. Results: Of 509 patients meeting inclusion criteria, 256 underwent fibular free flap reconstruction and 253 radial forearm free flaps. With every 15 minute increase in tourniquet duration, patients undergoing radial forearm free flap reconstruction were significantly more likely to experience primary site postoperative complications (HR, 1.14; p=0.035), whereas these results were not similarly observed for fibular free flaps (HR, 1.04; p=0.54). Neither donor site nor major postoperative complications were significantly impacted by tourniquet duration for both fibular and radial forearm free flaps. There was a statistically significant positive correlation between BMI and tourniquet time for fibula flaps (Pearson correlation coefficient 0.22; p<0.001) and for radial forearm flaps (Pearson correlation coefficient 0.16; p=0.010), indicating that tourniquet time increased as BMI increased. After adjusting for BMI, primary site complications were still associated with increasing tourniquet duration (HR, 1.13; p=0.060). Conclusions: Radial forearm free flaps may be more susceptible to prolonged intraoperative tourniquet duration compared to fibular free flaps. Taken together, these data facilitate improved understanding of postoperative risk stratification of patients undergoing fibular and radial forearm free flap reconstructive head and neck cancer surgery.

E99. Aggressive Recurrent Fibromatosis with Laryngeal Involvement - A Case Report and Literature Review

Daniel K. Nguyen, BS, Lubbock, TX; Rahul Varman, MD, Lubbock, TX (Presenter); Joehassin Cordero, MD, Lubbock, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss the pathophysiology of aggressive fibromatosis of the head and neck; and 2) understand the clinical progression of a rare case of AF involving the larynx.

Objectives: To investigate in the literature the incidences of aggressive fibromatosis in the head and neck region, particularly involving the larynx, along with finding different treatment modalities with the best outcomes for such a rare lesion. Study Design: A case study along with literature review in order to find best treatment modalities. Methods: Chart review of the case along with literature review of AF through PubMed and other online medical databases. Results: Literature review shows AF is more aggressive variant of fibromatosis when seen in the head and neck region. It tends to be locally aggressive and has been seen to erode and invade bone, soft tissues, and vital structures. There is little supporting literature to guide treatment. Treatment modalities include surgery, chemotherapy, radiotherapy, hormonal therapy, or a combination. Primary surgical excision with clear margins is believed to have the least chance to recur but there have been studies saying recurrence of AF is independent of surgical margin status. It also seems that positive margins do not affect overall survival rate or 5 year disease free survival. With few cases reported, it seems that total or hemilaryngectomy has mainly been used for AF that involves the larynx. It also seems that radiotherapy seems to have a role of reducing local recurrence rates of AF but had severe complications. Overall, recurrence is so high and followup is very important for surveillance regardless of treatment modality. Conclusions: There is still much controversy on treatment and management of AF in the head and neck region. With the limited amount of literature on AF in the head and neck, there is even less on AF that involves the larynx. Surgery seems to always be the initial treatment but management for recurrence is still highly controversial. Treatment and management needs to be tailored towards each individual patient, and education on risk and benefits of treatment modalities must be heavily emphasized due to no guarantee of prevention of recurrence. More research needs to be done in order to improve the overall mortality and morbidity of AF in the head and neck region especially when involving the larynx.

E100. Thyroid Carcinoma Presentation and Treatment Outcomes between a County Hospital and a Private Hospital

Margaret C. Nurimba, BA, Los Angeles, CA; Sheng Zhou, AB, Los Angeles, CA; Brian Cameron, BS, Los Angeles, CA; Guy Talmor, BS, Los Angeles, CA; Kevin Hur, MD, Los Angeles, CA; Tamara N. Chambers, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss and compare whether sociodemographic differences affect disease presentation and treatment outcomes of patients with thyroid carcinoma.

Objectives: Assess differences in presentation and treatment outcomes of thyroid cancer patients between a county and

private hospital. Study Design: Retrospective cohort study of patients with thyroid carcinomas identified from thyroidectomy specimens from January 2016 - December 2017 at a private hospital and county hospital. Methods: Sociodemographic and disease presentation data was collected between hospitals. Main outcome measures were recurrence, adjuvant radioactive iodine requirement, and treatment outcomes including length of hospital stay and presence of postoperative complications including hematoma and hypocalcemia. Results: 51.8% of private hospital patients (n=85) were Caucasian and 85.9% spoke English as their primary language compared to 83.3% of county hospital patients (n=60) who were Hispanic and 73.3% Spanish speaking (p<0.005). 65.9% of private hospital patients held private insurance while 81.7% of county patients had Medicaid (p<0.005). There were significant differences in tumor stage (p=0.005) and nodal metastasis (p<0.001) but no significant differences in tumor histological type (p=0.212), primary tumor size (p=0.119), or distant metastases (p=1.000) between cohorts. There were no differences in surgery duration (p=0.124), length of stay (p=0.294), or incidence of postoperative complications (p=0.485). Private hospital patients were more likely to undergo adjuvant radioactive iodine therapy (OR=4.942, 95% CI 0.641-38.12) but there was no difference in recurrence between hospitals (p=0.631). Conclusions: At a county hospital, where the patient population is defined by income, ethnicity, and insurance status, patients were less likely to undergo adjuvant radioactive iodine therapy. Despite this, disease presentation, postoperative outcomes and recurrence of thyroid carcinomas after thyroidectomy are similar between a county and private hospitals.

E101. Endoscopic Multispectral Relative Fluorescence Lifetime Imaging for Detection of Oral Carcinoma

Yong Hu, PhD, Los Angeles, CA; Peter A. Pellionisz, BS, Los Angeles, CA; Ameet Braganza, , Los Angeles, CA; Khuzaima Rungwalla, Los Angeles, CA; Warren Grundfest, 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 explain the utility of an endoscopic imaging device to aid clinicians in oral mucosal lesion detection.

Objectives: The five year survival for patients diagnosed with advanced stage oral squamous cell carcinoma is under 30%. A noninvasive imaging modality is needed for earlier lesion detection without increasing the number of invasive tissue biopsies. We have previously shown that wide field dynamic optical contrast imaging (DOCI) is capable of delineating tumor margins. Our aim was to revise the system to include a coupled rigid endoscope in order to access areas (e.g., base of tongue) that are difficult to visualize. Study Design: Acquire DOCI and visible images of oral lesions in patients undergoing clinical evaluation of suspect lesions and demonstrate the feasibility and utility of this new tool. Methods: The new iteration of our system couples a zero degree rigid endoscope of 10mm diameter to a nanosecond gated and intensified detector. The ability of the system to identify at risk tissue (hyperplasia, dysplasia, carcinoma in situ, invasive carcinoma) will be evaluated with histology as the gold standard. Results: The unique spectral features from intrinsic fluorescence lifetime enabled classification of clinician determined regions of interest in DOCI images in order to establish measures of internal and external validity of our novel device. Quantitative analysis revealed that OSCC exhibited a significantly decreased (p<0.05) average relative fluorescence lifetime compared to healthy tissue at the site of biopsy. Conclusions: Preliminary results suggest a clinical imaging system is developed using multispectral acquisition via dynamic optic contrast imaging with an endoscope extension. This work demonstrates the potential of relative fluorescence lifetime for label free demarcation of oral lesions.

E102. Reconstruction of Open Maxillectomy Defects

Nicholas J. Thompson, MD, Chapel Hill, NC; Jeffrey M. Blumberg, MD, Chapel Hill, NC; Eugenie Du, MD, Boston, MA; Adam M. Zanation, MD, Chapel Hill, NC; Brian D. Thorp, MD, Chapel Hill, NC; Samip N. Patel, MD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the reconstructive options for open maxillectomy defects and discuss the evolving trends in this area.

Objectives: Detail the reconstructive patterns of open maxillectomy defects over the course of a decade at a single high volume center and examine trends and outcomes of the specific reconstructive techniques utilized. Study Design: Retrospective medical records review. Methods: Review of subjects undergoing open maxillectomy procedures from 2008-2017. Results: Sixty-eight subjects undergoing open maxillectomy with reconstruction were identified. The majority of subjects underwent resection for malignancy (84%), with squamous cell carcinoma being the most common. Seventy percent of subjects presented with T4 disease. Fifty percent of subjects (n=34) were reconstructed using free tissue transfer. The most common donor sites were scapular tip (n=16), latissimus (n=7), and anterolateral thigh (n=6). Locoregional reconstructions included pericranial, temporalis, and cervicofacial advancement flaps among others. Subjects undergoing free tissue transfer had more advanced tumors, longer intraoperative times, and longer hospital stays. There was no increased incidence of wound complications or need for revision surgery, but a trend towards an increased incidence of major complications was noted between reconstruction modalities. Over the study time period there was a trend towards increased numbers of open maxillectomy procedures performed along with increased utilization of free tissue transfer. No patients have undergone dental rehabilitation. Conclusions: Our experience suggests advances in surgical technique resulted in a trend towards increasing primary reconstruction of open maxillectomy defects with free tissue transfer without significant increase in overall complication rates. Expertise in free tissue transfer allows for complex primary reconstruction of open maxillectomy defects and is an integral part of the reconstructive armamentarium.

E103. Reconstructive and Oncologic Outcomes in Solid Organ Transplant Patients Undergoing Microvascular Free Tissue Transfer for Locally Advanced Cutaneous Squamous Cell Carcinoma

Ray Y. Wang, MD, Houston, TX; Andrew T. Huang, MD, Houston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss considerations for patients with solid organ transplant undergoing microvascular free tissue transfer for cutaneous squamous cell carcinoma of the head and neck, specifically the impact of immunosuppression on wound healing and oncologic outcomes.

Objectives: Patients with solid organ transplants are at increased risk for cutaneous malignancy due to their immunosuppressive therapy. However, there is limited data regarding reconstructive and oncologic outcomes after surgical management requiring microvascular free tissue transfer for locally advanced disease. Study Design: Retrospective cohort study. Methods: Chart review of patients with and without solid organ transplants who underwent microvascular free tissue transfer for locally advanced cutaneous squamous cell carcinoma of the head and neck between January 2016 and June 2018. Preoperative comorbidities, cancer stage, flap complications, and oncologic outcomes were recorded. Results: Seven solid organ transplant patients with cutaneous squamous cell carcinoma underwent microvascular free tissue transfer during the study time period. Compared to the control cohort (n=10), there was not a statistically significant difference in preoperative head and neck Charlson Index comorbidity score (p = 0.27). There was no statistically significant difference in hospital length of stay (6.9 vs 8.9, p = 0.07). Transplant patients had smaller defects than control patients (77.3cm² vs 153 cm², p = 0.01). There were no flap failures in either cohort. Wound complications (dehiscence) occurred in 2/7 transplant patients and 2/10 control patients. There was no significant difference in locoregional recurrence (3/7 vs 3/10, p = 0.64) or disease specific mortality (1/7 vs 1/10, p = 1.00). Conclusions: Microvascular free tissue transfer is a safe reconstructive option for solid organ transplant patients with locally advanced squamous cell carcinoma of the head and neck. There was a low rate of reconstructive complications; however a high rate of local recurrence affects both groups.

E104. Meta-Analysis Delineating the Molecular Pathogenesis behind the Development of Nasopharyngeal Carcinoma

Ross Adam Wanner, BS, Columbus, OH; Sean McDermott, BS, Columbus, OH; Jihad Aljabban, AB MMSc, Columbus, OH; Vikrum Thimmappa, MD, Columbus, OH; Nora Ibrahim, MD, Columbus, OH; Kris Jatana, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the value of meta-analysis of public data and its utility in elucidating nasopharyngeal carcinoma pathogenesis.

Objectives: Nasopharyngeal carcinoma (NPC) prevalence is increasing within pediatric populations. Childhood NPC is poorly differentiated, presenting at a more advanced stage when compared to NPC in adults. Given the common late stage presentation, a deeper understanding of NPC pathogenesis is paramount to controlling the disease. Study Design: We tagged 111 NPC tumor samples and 43 healthy nasopharyngeal epithelium controls. Gene signatures were analyzed in Ingenuity Pathway Analysis, using statistical significance p<0.05 and absolute experimental log ratio >0.15 between disease and controls. Methods: Search tag analyze resource was employed to conduct meta-analysis using the National Center for Biotechnology's gene expression omnibus to define NPC pathogenesis. Results: Meta-analysis identified hepatic stellate cell activation and cellular adhesion/diapedesis as top canonical pathways, with strong activation of lipopolysaccharide induced tissue injury. LPS, IL1, and SB203580 were top regulators of NPC pathogenesis. Tumorigenic proteins like homeobox A10 and matrix metalloproteinases 1 and 3 (MMP1/3) were highly upregulated. We noted dysregulated cellular survival, through upregulated chondrosarcoma associated gene 2/3 protein and downregulated lactotransferrin; metabolism, through downregulated alcohol dehydrogenase 1B; and intercellular interaction, through upregulated fermitin homolog 1, plakophilin 1, and MMP1/3. Many proteins associated with healthy nasal epithelium were downregulated, indicating decreased functional and structural integrity of nasal mucosa. Nasal epithelium disruption begets maladaptive inflammation, driving NPC pathogenesis. Conclusions: Analysis illustrates that NPC pathogenesis is complex and multifactorial. Some drivers include extracellular matrix and nasal epithelial barrier dysregulation, maladaptive immune response, and loss of cellular replicative and metabolic integrity. Our results clarify the intricacy of NPC and propose possible biomarkers and therapeutic targets.

E105. HPV Related Multiphenotypic Sinonasal Carcinoma: A Case Report and Literature Review

Matthew L. Ward, MD, San Antonio, TX; Mikelle L. Kernig, DC, San Antonio, TX; Thomas J. Willson, MD, San Antonio, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the clinical presentation, histologic features, and treatment outcomes of HPV related multiphenotypic sinonasal carcinoma.

Objectives: To report the clinical presentation, histologic features, treatment, and management outcomes of patients with HPV related multiphenotypic sinonasal carcinoma (HMSC), a recently characterized sinonasal malignancy with aggressive morphology. Study Design: Case report with literature review. Methods: A case of HMSC is reported and a review of all cases of HMSC reported in the English literature from January 2000 through May 2018 in the Medline, EMBASE, and Scopus databases. Case data from selected articles was pooled along with the presented case and analyzed. Results: Including the present case report, a total of 57 cases of HMSC were identified. Of the 42 cases with staging information, 25 (60%) presented as early stage disease (T1, T2). No nodal metastasis or disease specific mortalities were reported. Among the 44 cases with post-treatment followup data, 16 cases (36.4%) developed local recurrence. The majority of recurrences

occurred 24-60 months post-treatment, although reports of recurrence 10 and 29 years post-treatment do exist. Nearly half of patients with perineural invasion or bone invasion developed local recurrence. Patients who developed local recurrence had a longer disease free interval when treated with adjuvant radiotherapy, which approached statistical significance. Conclusions: HMSC is a distinct entity with paradoxically aggressive morphology paired with an indolent clinical course characterized by high rates of local recurrence but no reported disease specific mortalities to date. Surgery with or without adjuvant radiotherapy is the most common treatment modality, and adjuvant radiotherapy may be associated with an increased disease free interval among patients with local recurrence.

LARYNGOLOGY/BRONCHOSOPHAGOLOGY

- E106. Evaluating the Role of Simulation in Cricothyrotomy Training: A Systematic Review and Meta-Analysis**
James Alrassi, BA, Stony Brook, NY; Kevin J. Fujita, BS, Stony Brook, NY; Melissa M. Mortensen, MD, Stony Brook, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the different models available for simulation training in cricothyrotomy, discuss the literature and studies currently published on cricothyrotomy, and explain the role simulation training plays in the education of healthcare professionals.

Objectives: The aim is to determine whether simulation training using models such as manikins, cadavers, animals, etc. can effectively instill cricothyrotomy skills in healthcare professionals. Study Design: Systematic review and meta-analysis. Methods: A systematic review and meta-analysis were undertaken in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis. We systematically searched for literature involving simulation training and cricothyrotomy from the following databases: Medline, Scopus, CINAHL, Cochrane, and Embase. All studies were screened, using predetermined inclusion and exclusion criteria, and subsequently qualitatively and quantitatively assessed. Three reviewers independently screened, reviewed, and assessed all studies. Results: From a total of 346 studies, 37 met our inclusion criteria. Of these 37 studies, five studies evaluated the cricothyrotomy procedural time before and after simulation training. The average time to completing a cricothyrotomy was 196.52 seconds (95% CI 143 to 250) before simulation training. This time decreased to 104.25 seconds (95% CI 80.5 to 128) immediately following simulation training. Subjects were able to maintain these skills for up to 12 months. Conclusions: Cricothyrotomy simulation training for healthcare professionals with limited experience may help decrease procedural time and may result in skill acquisition for months after simulation training. Further studies are needed to determine if simulation training directly translates into clinical skills and to determine the effects of simulation training on patient outcomes.

- E107. Ulcerative Laryngitis in Patients on Chronic Steroids: A Case Series**
Vaninder K. Dhillon, MD, Bethesda, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to consider ulcerative laryngitis in chronic steroid users, diagnose lesions on videostroboscopy, and to consider medical management in the form of combination antibiotic and antifungal for treatment.

Objectives: To discuss the treatment of three cases of ulcerative laryngitis diagnosed on videostroboscopy in patients on chronic steroids who presented with symptoms of dysphonia and cough for greater than 6 weeks duration. Study Design: This study is a retrospective review of three patient cases, demographic data with attention to prolonged steroid use, videostroboscopy images and VHI-10 before and after medical management, and duration of antibiotic and antifungal treatment. Methods: Retrospective review of three clinical cases. Results: After prolonged treatment with fluconazole and sulfa-TMP over the course of 6 weeks, there was complete resolution of ulcerative lesions on the true cords. All patients were on concurrent steroids at the time of diagnosis, and all steroids were stopped during the treatment regimen. VHI-10 scores demonstrated improvement and cough resolved after treatment for all three patients. Conclusions: Patients on chronic steroids and dysphonia or cough should be evaluated for ulcerative laryngitis. Evidence of ulcerative changes on the vocal folds on videostroboscopy should be considered for combination antibiotic and antifungal therapy. Prolonged treatment may be required.

- E108. First Case of Transglottic and Tracheal Histoplasmosis in the Setting of Known Sarcoidosis**
Zachary M. Helmen, BBA, Milwaukee, WI; Jennifer P. Rodney, MD, Nashville, TN; Kyle S. Kimura, MD, Nashville, TN; Alexander H. Gelbard, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand several core principles of the presentation, diagnosis, and management of laryngeal histoplasmosis; 2) explain the similarities and differences in presentation, workup and treatment of sarcoidosis and histoplasmosis; and 3) recognize the need for further workup due to new symptoms even in a patient with known chronic granulomatous disease.

Objectives: 1) Understand several core principles of the presentation, diagnosis, and management of laryngeal histoplasmosis; 2) explain the similarities and differences in presentation, workup and treatment of sarcoidosis and histoplasmosis; and 3) recognize the need for further workup due to new symptoms even in a patient with known chronic granulomatous disease. Study Design: Case report. Methods: A case report and literature review was performed. Results: Chronic granulomatous diseases, including histoplasmosis and sarcoidosis, are difficult to distinguish and often misdiagnosed due to their rarity and similar clinical presentation. We present the first case of laryngeal and tracheal histoplasmosis in the set-

ting of previously diagnosed sarcoidosis. A 45 year old male with a 4 year history of sarcoidosis treated with prednisone and methotrexate presented with a 4 month history of hoarseness, solid food dysphagia and odynophagia. Operative endoscopy demonstrated nodular mucosal lesions extending from the supraglottis into the larynx and through the entire length of the trachea (sparing the mainstem bronchi). Histology and culture results demonstrated histoplasma capsulatum. Additionally, urine histoplasmosis antigen level was positive at 6.88, serum histoplasmosis antigen level was positive at 12.23, and serum IgM antibodies to histoplasmosis were positive with histoplasma mycelia ratio of 1:1024 and histoplasma yeast ratio of 1:32. The patient was successfully treated for histoplasmosis with an extended course of intravenous amphotericin B and long term itraconazole with resolution of physical exam findings, laboratory abnormalities, and functional complaints. This case uniquely highlights several core principles of the presentation, diagnosis, and management of laryngeal histoplasmosis. Conclusions: We present the first case of laryngeal and tracheal histoplasmosis in the setting of previously diagnosed sarcoidosis. We review the complaints, physical exam findings, and treatment of this unique case. We urge clinicians to consider the differential diagnosis of chronic granulomatous disease even in a patient with a definitive diagnosis, as new complaints can signify a new disease process.

E109. Association between Chemotherapy, Hormonal Therapy and Onabotulinum Toxin A (BoNT-A) Efficacy in the Treatment of Adductor Laryngeal Dystonia

Nikita V. Kohli, MD, New York, NY; Andrew Blitzer, MD DDS FACS, New York, NY; Diana N. Kirke, MBBS Mphil FRACS, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the existence of a connection between chemotherapy, hormonal therapy and subsequent dose fluctuations in the dosage of BoNT-A for the treatment of adductor laryngeal dystonia. The results will help providers to counsel patients on potential for dose variation during treatment.

Objectives: The therapeutic efficacy of BoNT-A has been well established in the treatment of laryngeal dystonias. At our center, we start with 1.0 unit dose of BoNT-A under electromyography (EMG) guidance into each thyroarytenoid for adductor laryngeal dystonia. Patients call the office within 3 weeks, and typically a regimen is established within 4 office visits. Generally, dosages remain stable over time. We have anecdotally observed that patients undergoing chemotherapy have experienced a decreased efficacy of their dose. To our knowledge, no study has reported a connection between chemotherapy or hormonal therapy and variation in BoNT dose. Animal studies suggest that BoNT potentiates the effects of chemotherapy and radiation by promoting tumor perfusion. Here, we aim to describe and quantify dose variation in BoNT during chemotherapy and hormonal treatment. **Study Design:** Case series with chart review. **Methods:** We reviewed records of six female patients with adductor laryngeal dysphonia who underwent chemotherapy and/or hormonal therapy treatment for breast cancer and one patient for mantle cell lymphoma. **Results:** Dose reductions of 22-60 percent occurred in two patients. Three patients experienced dose increases of 25-30 percent. One stopped BoNT treatment for six months during hormonal treatment due to reduced efficacy. One patient's dosages remained stable. **Conclusions:** This is the first study to suggest that chemotherapy and/or hormonal therapy may alter the BoNT's efficacy. While the mechanism remains unclear, it may relate to increased stress during cancer treatment, which exacerbates symptoms of dystonia or altered toxin absorption. Further research is necessary to elucidate a mechanism between chemotherapy, hormonal therapy and toxin effects.

E110. Management of an Aortotracheal Fistula: A Case Report

Andrew B. Rees, BS, Nashville, TN; Jennifer P. Rodney, MD, Nashville, TN; Alexander H. Gelbard, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to: 1) understand the anatomy of an aortotracheal fistula as it relates to a double aortic arch; 2) demonstrate competence in recognizing the presentation of an aortotracheal fistula; and 3) explain the management of an aortotracheal fistula.

Objectives: To demonstrate a rare case of aortotracheal fistula in a patient with history of double aortic arch status post repair with development of an aortic aneurysm and explain its management. **Study Design:** Case report. **Methods:** Case report. **Results:** Double aortic arch is a rare vascular malformation known to compromise tracheal function. We present a case of double aortic arch with aneurysmal dilation of a dominant retrotracheal limb leading to both severe tracheomalacia and aortotracheal fistula. A 46 year old male with a history of DiGeorge syndrome and double aortic arch repair as an infant (which left a dominant posterior limb), presented after admission to an outside hospital for pneumonia requiring intubation and subsequent tracheostomy. CT scan revealed an aneurysmal dilation of the retrotracheal dominant limb that extended to the great vessels. Endoscopy showed a large ulcer in the posterior tracheal wall at the site of the tracheostomy with exposed aortic intima. Despite utilization of multiple distinct airway prosthesis, the posterior tracheal wall ulcer progressively enlarged. To prevent rupture of the aneurysm into the trachea, the patient underwent successful aortic reconstruction with decompression of the retrotracheal aneurysm and rerouting of blood flow via through an aortic graft anterior to the trachea. Decompression of the aneurysm allowed the posterior tracheal wall fistula to heal. **Conclusions:** We present a rare case of double aortic arch and aortic aneurysm resulting in compression of the trachea leading to airway obstruction and aortotracheal fistula formation.

E111. Pharyngeal and Laryngeal Dynamics during Wind Instrument Performance

Adam T. Schwalje, MD DMA, Iowa City, IA; Henry T. Hoffman, MD, Iowa City, IA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss functional anatomy of the head and neck during expert musical performance on wind instruments.

Objectives: Professional musicians are susceptible to disorders of pharyngeal and laryngeal muscle coordination in a manner similar to dysfunction of other systems affecting elite athletes. The dynamic function of the laryngopharynx during wind instrument performance has been sparsely studied. Analysis of the mechanics of wind performance are necessary to help understand, avoid, and manage disorders to help facilitate optimal performance. Study Design: Observational case series. Methods: All procedures were approved by the local institutional review board. Six professional (all doctoral level) wind instrumentalists were recruited from the Midwest region. Video with concurrent audio was recorded through multiple synched cameras including a high definition flexible distal chip scope placed transnasally to image the laryngopharynx. In addition to concurrent external video imaging done for all subjects, one musician was evaluated with two flexible intranasal endoscopes deployed to simultaneous image the laryngopharynx through one nostril and the dorsal velopharyngeal port through the other nostril. All subjects played through a set of exercises designed to elicit standard techniques including vibrato, articulation, and dynamics. Extended techniques were also analyzed and included circular breathing, flutter tonguing, uvular trills, and singing while playing in all registers. Video with audio recordings were synched and analyzed using Adobe Premiere Pro. Results: Each musical technique was associated with characteristic movements of the muscles of the pharynx and larynx. Variability in the observed method of production was observed for each of these techniques among the six musicians tested. Conclusions: The muscles of the pharynx and larynx are active during expert wind performance in a manner similar to that employed by vocalists. Professional wind musicians warrant medical attention to disorders of the laryngopharynx in a manner similar to that provided to professional vocalists.

E112. Voice and Swallowing Quality of Life in Patients with X-Linked Dystonia Parkinsonism

Sungjin A. Song, MD, Boston, MA; Phillip C. Song, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate understanding of the swallowing and voice quality of life measurement tools as well as the changes seen in X-linked dystonia parkinsonism.

Objectives: The primary objective was to determine the progression of voice and swallowing quality of life in patients with X-linked dystonia parkinsonism (XDP) over a two year interval. Study Design: Retrospective matched cohort study. Methods: Patients diagnosed with XDP were surveyed from 2016 to 2018. They underwent a battery of tests aimed to assess swallowing status, aspiration risk with the penetration aspiration scale (PAS), self-reported psychosocial measure, and voice quality of life with the Voice Handicap Index (VHI) and Voice Related Quality of Life Survey (VRQL). Results: Ten patients were included. Mean followup was 2 years. Mean initial age of patient was 49.2 +/- 8.6 years. Mean PAS score increased from 4.2 +/- 1.87 to 5.1 +/- 1.66 (p=0.27), eating duration increased from 0.9 +/- 1.29 to 2.89 +/- 0.93 (p=0.001), symptom frequency increased from 13.4 +/- 7.0 to 24.2 +/- 9.08 (p=0.01). Mental health or social measures did not significantly change. VHI increased from 81.0 +/- 28.5 to 109.7 +/- 31.8 (p=0.048) and VRQL increased from 26.7 +/- 8.8 to 38.8 +/- 10.8. Out of the three domains of voice perception, only emotional effect of the voice on daily life showed a statistically significant increase from 25.3 +/- 10.4 to 36 +/- 11.9 (p=0.046). Conclusions: There is a negative impact on swallowing and voice quality of life in XDP with progressive worsening in the eating duration, symptom frequency and worsening VRQL and VHI, especially with regard to the emotional component of voice perception.

E113. Prediction of Effectiveness of Antacid Treatment on Abnormal Sensation in the Throat: Use of GETS-J

Nao Takahashi, Niigata, Japan; Kaori Ikeda, Niigata, Japan; Hironori Baba, PhD, Niigata, Japan; Takano Sasaki, Niigata, Japan; Arata Horii, Niigata, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to point the responders to the antacid treatment among patients with abnormal sensation in the throat.

Objectives: Abnormal sensation in the throat (AST) that cannot be explained by local findings through routine inspection is frequently seen complaint of ENT outpatient clinic. We aimed to determine the group of AST patients who would respond to antacid treatment. Study Design: Prospective study. Methods: GETS-J, the Japanese version of Glasgow Edinburgh Throat Scale (GETS) that is consisted of three subscales of throat symptoms, e.g. globus sensation, pain/swelling of the throat, and dysphagia, Frequency Scale for the Symptoms of GERD (FSSG), and Hospital Anxiety and Depression Scale (HADS) were used in 31 AST patients before and after antacid treatment (20mg/day of PCAB for four weeks). Results: GETS-J showed that pain/swelling subscale but no other subscales decreased after treatment and that improvement ratio (post/pre) of somatic distress due to the disease was correlated with that of pain/swelling subscale, suggesting that pain/swelling rather than globus was the characteristic symptom responding to antacid treatment in AST patients. In responders who showed more than 40% decrease in pain/swelling symptoms (n=14, 45%), subscale of pain/swelling and globus, and somatic distress were significantly higher than nonresponders before treatment. Receiver operating characteristics curves for these items showed that area under the curve of pain/swelling, globus, and somatic distress was 0.792, 0.819, and 0.706, respectively. Acid reflux subscale of FSSG and anxiety subscale of HADS also decreased after treatment. Conclusions: At least part of AST patients may have gastroesophageal reflux disease. Effective rate of antacid treatment was 45% and responders to antacid treatment could be predicted by pain/swelling subscale of GETS-J.

E114. Triticeous Cartilage Identified at Autopsy: Prevalence in Different Ancestries and Its Association with Agenesis of the Superior Horn of Thyroid Cartilage

Spencer D. Uetz, BS, Grand Forks, ND; Walter L. Kemp, MD PhD, Grand Forks, ND

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the development of the triticeous cartilage and its prevalence across different ancestries. Participants should also be able to discuss the relationship between the triticeous cartilage and the superior horn of the thyroid cartilage to better understand the development of these cartilages. Participants will be able to compare the data from this study with other similar studies that utilized CT imaging techniques or cadaveric dissection.

Objectives: The aim of this study was to determine the prevalence of triticeous cartilage by sex and ancestry using a series of autopsy cases and to investigate the relationship between the triticeous cartilage and the development of the superior horn of the thyroid cartilage. Study Design: Retrospective review of autopsy reports. Methods: 398 autopsy reports conducted by a single forensic pathologist over a three year period were reviewed. At the time of autopsy, the presence or absence of triticeous cartilage was determined by visual inspection and manual palpation. Data analyses were performed with R. Results: Triticeous cartilage was identified in 54% of decedents (71% bilateral and 29% unilateral), in 59% of males and 43% of females (p-value 0.008), and in 71% of Native Americans and 52% of whites (p-value 0.02). Agenesis of the superior horns of the thyroid cartilage was identified in 3.5% of decedents (bilateral in 43% and unilateral in 57%). All 14 decedents with agenesis, bilateral or unilateral, had triticeous cartilage present. Conclusions: This study is the first to describe the prevalence of the triticeous cartilage in a series of autopsy cases. Overall prevalence was similar to previous studies using CT imaging techniques and higher than those utilizing cadaveric dissection. This study is the first to describe the prevalence in a Native American population and the first to describe the relationship of agenesis of the superior horn of the thyroid cartilage and concomitant presence of triticeous cartilage.

E115. Spontaneous Regression of Laryngeal Squamous Cell Carcinoma after Biopsy

Mariel O. Watkins, MHS, Nashville, TN; Alan D. Tate, MD, Nashville, TN; Catherine G. Garrett, MD MMHC, Nashville, TN

Educational Objective: At the conclusion of this poster presentation, the participants should be able to appreciate a rare case of spontaneous regression of laryngeal squamous cell carcinoma after biopsy, recognize possible mechanisms of spontaneous regression of malignant tumors as discussed in the literature, and consider how immune response may play a role in spontaneous laryngeal cancer regression.

Objectives: Regression of carcinoma of the larynx without definitive therapy is exceptionally rare. Approximately seven cases of spontaneous regression of adult laryngeal carcinoma have been published in the literature since 1900. We report a case of spontaneous regression of larynx squamous cell carcinoma after biopsy. Study Design: Case report. Methods: A case is presented. Results: A 62 year old male presented with a six month history of hoarseness. He was subsequently diagnosed with a large T1aN0M0 left true vocal fold squamous cell carcinoma after a small biopsy. The patient then had a case of influenza, with apparent regression of the tumor on photodocumentation in the midst of being referred to radiation oncology. One month following the initial biopsy, histopathological findings on repeat biopsy revealed absence of malignancy and regression of the tumor without radiation. Conclusions: Spontaneous regression of laryngeal squamous cell carcinoma has been identified in an adult in the absence of definitive treatment. There has been no evidence of tumor recurrence seven years after diagnosis. This case exemplifies how immune modulation may play a significant role in the spontaneous regression of laryngeal squamous cell carcinoma.

OTOLOGY/NEUROTOLOGY

E116. Diagnostic Pathways for Dizziness: Factors Associated with Setting of First Diagnosis

Meredith E. Adams, MD, Minneapolis, MN; Pinar Karaca-Mandic, PhD, Minneapolis, MN; Schelomo Marmor, PhD MPH, Minneapolis, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the characteristics of patients and providers driving initial health service utilization for dizziness between outpatient and emergency room settings.

Objectives: Diagnostic pathways for dizziness need to be understood from time of initial presentation to address unwarranted variations in care. We aimed to determine how diagnoses, patient characteristics, and providers vary by outpatient (OP) versus emergency room (ER) presentations. Study Design: Cross-sectional analysis. Methods: We conducted this study using the OptumLabs® Data Warehouse (OLDW). The OLDW contains de-identified retrospective administrative claims data, including medical claims and eligibility information from a large national U.S. health insurance plan, as well as electronic health record data from a nationwide network of provider groups. Among adults who received new dizziness diagnoses between 2006 and 2014, we analyzed factors (diagnoses, sociodemographics, providers) associated with OP versus ER presentations using multivariable regression models. Results: Of 928,645 patients with new dizziness diagnoses (81% OP, 19% ER), 62% were female, 62% were under age 60, and 54% had significant medical comorbidities. The most common diagnoses were dizziness and giddiness (85.9%), BPPV (5.7%), and labyrinthitis/vestibular neuritis (3.7%). Although most first OP presentations were to primary care physicians (PCPs), otolaryngologists were proportionately less

likely to assign nonspecific diagnoses than PCPs, neurologists, and cardiologists. In regression models, patients first presenting to OP settings were significantly younger, more educated, had lower levels of comorbidity, and were more likely to receive a specific vestibular diagnosis ($p < 0.05$). Conclusions: While costs and variation in ER evaluations of dizziness garner significant attention, most new presentations occur in OP settings where patients are younger with less comorbid illness. Tailoring best practice protocols for dizziness evaluation to presentation setting is necessary to improve patient care.

E117. Melanoma of the External Auditory Canal: A Review of Seven Cases at a Tertiary Care Referral Center
Eric N. Appelbaum, MD, Houston, TX; Neil D. Gross, MD FACS, Houston, TX; Adi Diab, MD, Houston, TX;
Paul W. Gidley, MD FACS, Houston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the presentation and management strategies of external auditory canal melanoma.

Objectives: Examine the presentation and management characteristics of seven patients with melanoma of the external auditory canal. Study Design: Case series. Methods: Records of seven patients from 2003 to 2017 experiencing melanoma of the external auditory canal at a single tertiary care center were reviewed for characteristics of presentation, subsequent management, and outcomes. A thorough review of relevant literature was performed. Results: Seven patients are included experiencing melanoma of the external auditory canal. The average age is 56 years with four females. The average Breslow depth was 2.77 mm with five patients having a Clarke level of IV or greater on presentation. Five patients underwent lateral temporal bone resection and 2 patients underwent wide local excision. Superficial spreading was the most common histologic subtype. Sentinel lymph node biopsy was performed in three patients with an average of 1.67 positive lymph nodes identified. All three went on to selective neck dissection. Five patients underwent adjuvant radiation and two received chemotherapy. Three patients experienced recurrence an average of 20 months following end of primary therapy. Average followup is 3 years. At followup, four were found to be disease free, two had active disease, and one was deceased from melanoma. Conclusions: Primary external auditory canal melanoma is a rare entity, infrequently reported, comprising 0.3% of all auricular melanomas. Patients with external auditory canal melanoma present with higher reported Breslow thickness and stage relative to all external ear melanomas. Management should include lateral temporal bone resection for oncologic margins and sentinel lymph node biopsy with consideration of adjuvant radiation and chemotherapy. This is the largest single series of patients with external auditory canal melanoma reported in peer reviewed literature.

E118. Endoscopic Pediatric Ossiculoplasty Following Surgery for Chronic Ear Disease
Christen L. Caloway, MD, Boston, MA; Anthony M. Tolisano, MD, Dallas, TX; Razan A. Basonbul, MPH, Boston, MA; Daniel J. Lee, MD, Boston, MA; Brandon Isaacson, MD, Dallas, TX; Michael S. Cohen, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand applications of endoscopic ossiculoplasty for chronic ear disease in children.

Objectives: Rigid endoscopes can improve visualization within the tympanic space during ossiculoplasty compared to traditional microscopic techniques. This study investigates whether use of endoscopes during ossiculoplasty affects audiologic outcomes compared to microscopic ossiculoplasty when performed in children following chronic ear surgery. Study Design: Comparative cohort study at two tertiary care centers. Methods: Charts were reviewed for 200 pediatric ear cases where ossiculoplasty was performed following cholesteatoma removal or management of chronic ear disease from February 2009 to March 2018. Results: 100 ears underwent microscopic and endoscopic ossiculoplasty, respectively. The mean age was 11 years (range, 4 - 18 years) with 63% males. There were no significant differences in these parameters in the two groups. Subjects underwent either primary ossiculoplasty or ossiculoplasty during second look procedures. There was no significant difference in air conduction pure tone average (PTA) after microscopic cases compared to endoscopic cases (-12.5 dB versus -10.5 dB, $p = 0.40$). These results were independent of prosthesis type. Microscopic ossiculoplasty was significantly more likely to use a postauricular approach ($p = 0.0001$). The complication rate in the two groups was equivocal. The malleus was more likely to be absent or removed prior to endoscopic ossiculoplasty ($p = 0.0004$) with no significant difference in PTA between groups. Conclusions: In this study EES ossiculoplasty was found to have equivalent audiometric outcomes with significantly fewer postauricular approaches and no increase in complications compared to microscopic ossiculoplasty. While the malleus was more likely to be absent in endoscopic cases, this did not appear to affect PTA.

E119. Bilateral IgG4 Related Disease of the Temporal Bone and Middle Ear
Esther A. Cheng, MD, Maywood, IL; Scott I. Mayer, BS, New Orleans, LA; John P. Leonetti, MD, Maywood, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the characteristic features for the diagnosis of IgG4 related disease of the temporal bones.

Objectives: To present a unique case of recurrent tumor-like masses of the temporal bones in a single patient. Study Design: Case report and literature review. Methods: We present a case of a patient referred to a tertiary care academic center and performed a literature review of similar cases. Results: A 29 year old man with a remote history of tuberculosis presented with progressive hearing loss in his left ear. Four years prior, the patient underwent a canal wall-up right mastoidectomy at an outside institution for a tumor-like mass infiltrating the right temporal bone, and a revision to a canal wall-down four months later for recurrent disease. Pathology at that time revealed benign inflammatory cells. Physical exam revealed a pars tensa perforation with purulent drainage in the right ear and mucoid effusion in the left ear. Imaging of the

temporal bones demonstrated total opacification of the middle ear and bilateral diffuse erosion of the temporal bones. A left canal wall-up mastoidectomy was performed with findings of granulation tissue over an exposed sigmoid sinus and exposed dura. Pathology revealed reactive tissue with dense plasma cell infiltration, no necrosis, no granulomas, and no evidence of malignancy. Immunostains revealed greater than 100 IgG4 positive plasma cell count per high powered field. This raised suspicion for IgG4 related disease (IgG4-RD). The patient was referred to a rheumatologist for further evaluation and treatment with high dose steroids, immunosuppressants, and rituximab. Conclusions: This case illustrates characteristic features for the diagnosis of IgG4-RD of the temporal bone, a rare disease with fewer than 10 bilateral cases reported.

E120. Metastatic Adenocarcinoma to the Cerebellopontine Angle

Esther A. Cheng, MD, Maywood, IL; John P. Leonetti, MD, Maywood, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the differential diagnosis of cerebellopontine angle tumors as well as signs and symptoms suggestive of metastatic lesions.

Objectives: To present a unique case report of metastatic gastric adenocarcinoma to the cerebellopontine angle (CPA) and review similar cases reported in the literature. Study Design: Case report and literature review. Methods: We present a case report of a patient referred to a tertiary care academic center with a CPA mass and performed a literature review of cases of metastasis to the CPA. Results: Our patient presented with rapidly worsening headaches, nausea, vomiting, and ear fullness. He was noted to have a 5 cm right CPA mass on magnetic resonance imaging, which was removed through a retrosigmoid craniotomy and found to be metastatic adenocarcinoma. Imaging revealed a gastric tumor, which was treated with radiation and chemotherapy. Twenty-two case reports of metastasis to the CPA were found in the literature. The most common primary sites were lung and breast, and the most common presenting symptoms were hearing loss and facial palsy. Only two of the reported CPA metastases were from primary gastric tumors. MRI findings suggestive of metastatic CPA lesions include bilateral involvement, high signal on T1 weighted images, heterogeneous contrast enhancement, or thick linear and extranodular contrast enhancement. Conclusions: Rapidly progressive seventh and/or eighth cranial nerve deficits as well as unusual imaging findings should raise suspicion for metastatic CPA lesions. While there are two previously reported cases of metastasis of gastric carcinoma to the CPA, both were reported in the Korean literature. To the best of our knowledge, this is the first known case of metastatic gastric adenocarcinoma to the CPA documented in the English literature.

E121. Evaluating the Relation between Vestibular Migraine and Motion Sickness Susceptibility

Dillon C. Cheung, BS, Orange, CA; Tiffany T. Pham, MS, Irvine, CA; Jack L. Birkenbeuel, BS, Irvine, CA; Omid Moshtaghi, MD, San Diego, CA; Harrison W. Lin, MD, Orange, CA; Hamid R. Djalilian, MD, Orange, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that there is a connection between vestibular migraine and motion sickness and further explore this connection.

Objectives: To determine the relation of vestibular migraine (VM) with motion sickness susceptibility (MSS). Study Design: Cross-sectional study. Methods: A cross-sectional survey study was conducted at a university from October 2017 to January 2018. Surveys were distributed to healthy undergraduate students and included the Motion Sickness Susceptibility Questionnaire (MSSQ), a questionnaire to assess family history of motion sickness, and a questionnaire to explore dizziness and migraine related symptoms. Total MSSQ scores were calculated by adding the motion sickness susceptibility scores during childhood (MSSQA) and adulthood (MSSQB) together. Participants were then diagnosed with VM based on the criteria of the International Classification of Headache Disorders (ICHD). Results: Of the 277 preliminary participants, 154 (57%) were found to be susceptible to MS. Of those participants who were susceptible to MS, 78 (49%) patients met ICHD criteria for definite VM (dVM). The mean MSSQA, MSSQB, and total MSSQ scores for the participants with dVM were 47.3, 28.1, and 75.4 respectively. The mean MSSQA, MSSQB, and total MSSQ scores for the participants without dVM were 38.7, 21.4, and 59.5 respectively. The mean difference of the MSSQA, MSSQB, and total MSSQ scores between patients with and without VM were 9.1 (p=.031; 95% CI, 8.3 to 9.8), 6.9 (p=.017; 95% CI, 5.9 to 7.8), and 15.9 (p=.008; 95% CI, 15.4 to 16.5) respectively. Conclusions: Participants who met the criteria for dVM had a higher mean MSSQA, MSSQB, and total MSSQ scores than participants without dVM. This finding suggests that patients with VM are more susceptible to MS.

E122. Radial Forearm Free Flap for Cochlear Implant Coverage in a Post-Irradiated Field

Nicholas A. Dewyer, MD, Boston, MA; Rosh K. Sethi, MD, Boston, MA; Alisa Yamasaki, MD, Boston, MA; Derrick T. Lin, MD, Boston, MA; Daniel J. Lee, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the pitfalls of placing a cochlear implant in a post-irradiated field and the merits of using a radial forearm free flap for implant coverage.

Objectives: To describe how a radial forearm free flap can be used, in a single stage, for coverage of a cochlear implant (CI) in a post-irradiated field. Study Design: Single patient case report. Methods: A 53 year old woman had a brainstem astrocytoma as a child that was treated with surgical resection and radiation therapy. She had a good oncologic response, but the radiation eventually caused bilateral profound sensorineural hearing loss and osteoradionecrosis of the temporal bones with severe fibrosis of the overlying soft tissues. She previously underwent bilateral sequential tympanomastoid obliterations, pedicled temporoparietal fascia flap reconstruction of postauricular defects and revision cochlear implantation, with both implants eventually extruding and requiring explantation. Three years ago, right revision cochlear implantation was

successfully performed, in a single stage, with soft tissue coverage by a radial forearm free flap. She recently underwent the same procedure on the left side. Results: There were no perioperative complications. At 3 years postop, the patient is getting good results with her revision right CI (most recent CNC scores ~70%) and has not had any further issues with wound healing, infection, or device extrusion. Donor site morbidity from the radial forearm free flap has been minimal. Her second side operation and perioperative course was uncomplicated and she has been healing well. She is scheduled for CI activation in the near future. Conclusions: Single stage cochlear implantation with radial forearm free flap for soft tissue coverage is a viable option for patients with compromised wound healing of the temporal bone and postauricular soft tissues.

E123. Trends in Hearing Rehabilitation Use among Vestibular Schwannoma Patients

Madeleine Drusin, MD MSc, New York, NY; Brienne Lubor, BS, New York, NY; Tasher Losenegger, BS, New York, NY; Samuel Selesnick, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the use of hearing rehabilitation devices among the vestibular schwannoma patient population.

Objectives: Most patients with vestibular schwannoma (VS) will have significant hearing loss in the affected ear as a result of either their tumor or their treatment. Several hearing rehabilitation options exist to aid patients with unilateral hearing loss, however, there is a paucity of data on which options, if any, are preferred by patients with VS. Our study aims to analyze the use of hearing rehabilitation devices among VS patients. Study Design: Patient survey and chart review. Methods: Patients with unilateral VS treated at our institution from January 2008 through August 2018 were identified. Those with bilateral VS, profound hearing loss in the contralateral ear, neurofibromatosis type 2 and inadequate followup were excluded. Patients who met inclusion criteria were asked to complete two online questionnaires. The first was an 8 item instrument designed to assess participants' use of hearing rehabilitation devices and the second was the Abbreviated Profile of Hearing Aid Benefit (APHAB), a validated 24 item instrument. Results: Of 212 patients who were eligible for the study, 57 completed surveys. The majority of patients (72%) were unable to hear in the affected ear, but less than a third had used a hearing rehabilitation device. Of those who had, 29% had used conventional hearing aids and 29% had used CROS, while only a handful had used BAHA or CI. Patients who did not pursue hearing rehabilitation appeared to have good functionality despite their deficit. Conclusions: We found that while most patients with VS had a significant hearing loss, the majority did not pursue hearing rehabilitation and were able to maintain good functional performance.

E124. Endoscopic versus Microscopic Lateral to Malleus Underlay Tympanoplasty (LMUT): A Retrospective Comparative Analysis

Shanik J. Fernando, MD, Nashville, TN; Nauman F. Manzoor, MD, Nashville, TN; Robert J. Yawn, MD, Nashville, TN; Marc L. Bennett, MD, Nashville, TN; David S. Haynes, MD, Nashville, TN; Alejandro C. Rivas, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, participants should be able to discuss surgical and audiometric outcomes for endoscopic and microscopic lateral to malleus underlay tympanoplasty. Further, participants should have knowledge regarding the advantages and disadvantages of each technique and appropriate patient selection to undergo each procedure.

Objectives: Compare surgical success, complications and audiometric outcomes of endoscopic versus microscopic lateral to malleus underlay tympanoplasty (LMUT). Study Design: Retrospective chart review at a tertiary care otologic practice. Methods: Patients undergoing either microscopic or endoscopic LMUT tympanoplasty. Only cases with intact/mobile ossicular chains were included. Patients with ossicular discontinuity, fixation, and/or ossicular chain reconstruction were excluded. Outcome measures included graft medialization or lateralization, reperforation, postoperative air bone gap. Results: Two hundred and five tympanoplasties were retrospectively analyzed between 2003-2018. One hundred forty-one ears underwent postauricular microscopic (PM) approach while sixty-four ears underwent endoscopic transcanal (TEES) approach. In the early postoperative period 99.2% (140/141) postauricular grafts and 98.4% (63/64) TEES grafts were intact. At an average of 32.1 months (range 4-89), 85.8% (121/141) PM grafts were intact without retraction or reperforation. At an average of 16.0 months (range 3-38) 89.0% (57/64) TEES placed grafts were intact without retractions or reperforation. Both PM and TEES groups had improvement of air bone gap postoperatively ($P < .05$.) The most recent mean postoperative air bone gap was 14.1 dB (SD. 9.3) for the PM group compared to 11.7 dB (SD. 8.26) for the TEES group ($P = .056$). Surgery was not associated with long term bone conduction threshold shift. Conclusions: Endoscopic LMUT is a viable alternative to traditional microscopic LMUT with no differences in operative success, complication profile and audiometric improvement. Its major advantage is in avoiding a postauricular incision. Both techniques have minimal risk of sensorineural hearing loss. While graft lateralization is a concern with LMUT technique, this complication has not been observed in our series.

E125. Trends in Vestibular Schwannoma Treatment Management and Access to Care

Khodayar Goshtasbi, BS, Irvine, CA; Omid Moshtaghi, MD, San Diego, CA; Marlon Maducdoc, MD, Irvine, CA; Mehdi Abouzari, MD, Irvine, CA; Harrison W. Lin, MD, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to have a newer understanding of vestibular schwannoma patients' specialist consultations, insurance and financial endeavors, and chosen treatment institutions.

Objectives: To assess the treatment sites, specialists involved, and financial aspects of vestibular schwannoma (VS) management. **Study Design:** VS patients completed a voluntary and anonymous online survey. **Methods:** Surveys were distributed to the Acoustic Neuroma Association (ANA) members from January to March 2017. All participants had a diagnosis of VS. **Results:** A total of 789 patients completed the online survey with a reported average age of 52 years and tumor size of 2.02 cm. The three main treatment modalities were surgery, radiation, and observation in 53%, 28%, and 15% of participants, respectively. Most of the cohort had visited a neurosurgeon (700, 89%) and a neurotologist (549, 70%), while 307 (39%) had visited a radiation oncologist prior to making a decision. The most influential specialist in discussing treatment options were neurosurgeons in 325 (41%), neurotologists in 301 (38%), general otolaryngologists in 92 (12%), and radiation oncologist in 56 (7%) of the participants. Of the surgical cohort, 175 (42%) deemed neurosurgeons most influential while 185 (45%) designated the neurotologists. Of the participants, 5% had to pay out of pocket for VS related care while 3% changed insurance plans for treatment. Most patients (54.0%) were treated at academic institutions though the post-decision satisfaction was equal (3.9/5) between academic and private institutions. **Conclusions:** Treatment and access to care for VS patients can be multifaceted. Neurosurgeons and neurotologists were most influential in the decision making process of the overall cohort and surgical subcohort, respectively. Decision making and treatment satisfaction was not different between private and academic centers.

E126. Safety Relevant Environmental Sound Identification Skills among Cochlear Implant Candidates and Experienced Cochlear Implant Users

Benjamin L. Hamel, BS, Milwaukee, WI; Kara J. Vasil, AuD CCC-A, Columbus, OH; Valeriy Shafiro, PhD, Chicago, IL; Aaron C. Moberly, MD, Columbus, OH; Michael S. Harris, MD, Milwaukee, WI

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the importance of environmental sound awareness in cochlear implant users and have a basis for counseling patients regarding possible post-CI environmental sound awareness.

Objectives: Improved access to nonspeech environmental sounds is one of the most commonly expressed motivations among adults with sensorineural hearing loss considering cochlear implant (CI) surgery. The primary aim of this study was to quantify the degree to which environmental sound awareness (ESA) for safety relevant sounds differs between experienced CI users and CI candidates. We hypothesized that awareness for safety relevant sounds would be superior among experienced CI users compared to CI candidates and an inverse relationship would be seen between age at implantation and accuracy of ESA for safety relevant sounds. **Study Design:** Cross-sectional study. **Methods:** A sample of 19 adult, postlingually deaf CI candidates and 47 experienced CI users were assessed for ESA using Familiar Environmental Sound Test Identification (FEST-I), a closed set, forced choice paradigm that required identification of 25 individual environmental sounds. A subset of 11 safety relevant FEST-I sounds along with demographic and audiologic factors were evaluated. **Results:** Analysis of the safety relevant subset of FEST-I stimuli revealed no significant difference in safety relevant ESA skills between experienced CI users and CI candidates (68.1%, 67.9%, respectively; $p = 0.49$) with both scores being substantially lower than normal hearing adult peers. FEST-I scores were significantly negatively correlated with the chronological age of only experienced CI users at time of testing ($p = 0.006$, $r = -0.395$). **Conclusions:** Our findings support the hypothesis that ESA is highly negatively correlated with the chronological age at testing of experienced CI users. However, the hypothesis that experienced CI users would demonstrate significantly higher safety relevant ESA skills compared to CI candidates was not supported by our findings.

E127. Fungal Osteomyelitis of the Temporal Bone: Case Series and Review of the Literature

Vivian F. Kaul, MD, New York, NY; Aron Y. Soleiman, BS, New York, NY; Zachary G. Schwam, MD, New York, NY; Cameron L. Budenz, MD, New York, NY; Maura K. Cosetti, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate a better understanding of the clinical presentation, imaging characteristics, clinical course and different treatment modalities for fungal temporal bone osteomyelitis.

Objectives: To describe a case series of fungal temporal bone osteomyelitis, including the clinical presentation, diagnosis, clinical course, and treatment as well as review of the current literature. **Study Design:** Retrospective case series. **Methods:** Reviewed the demographics, symptomatic presentation, imaging characteristics, pathology, microbiology and treatment of patients with fungal osteomyelitis of the temporal bone ($n=4$). **Results:** All four patients presented with otalgia and otorrhea. Diabetes mellitus was a risk factor for all patients, one was also immunocompromised from a renal transplant. Two patients presented with granulation tissue in the external auditory canal (EAC); no one had any facial nerve deficits at presentation. CT demonstrated bony sequestrum consistent with osteomyelitis and initial culture from EAC were inconclusive in all cases. All patients were started on intravenous broad spectrum antibiotics, yet three patients developed progressive facial nerve deficits. Three patients underwent canal wall-up tympanomastoidectomy; one underwent local bony and soft tissue debridement. Intraoperative specimens were sent for culture and pathology. All four patients showed fungus on pathologic analysis (including bone specimens) and experienced improvement of pain within five days of starting antifungal agent. **Conclusions:** In all cases, pathologic visualization of fungus in intraoperative specimens was the cornerstone of diagnosis. Early operative intervention may be an important factor in diagnostic algorithm of osteomyelitis. Challenges inherent in fungal culture may limit species identification, and judicious use of genetic speciation techniques may be clinically useful. Specimen directed therapy is crucial to treatment, halting disease progression and limiting morbidity. Additional data is needed to better understand this unique and potentially devastating infection.

E128. Surgical Repair of Tegmen Dehiscence Correlates with Postoperative Eustachian Tube Dysfunction

Judith S. Kempfle, MD, Boston, MA; Rosh Sethi, MD MPH, Boston, MA; Lei O. Tanaka, MD, Paris, France; Joseph Yeb, Boston, MA; Daniel J. Lee, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the pathophysiology of eustachian tube dysfunction and tegmen dehiscence and be aware of a correlation between eustachian tube dysfunction and tegmen defects.

Objectives: Lateral skull base or tegmen defects are unusual conditions that can be associated with cerebrospinal fluid (CSF) leak or herniation of the dura mater or brain into the air filled spaces of the temporal bone. Patients can present with ear fullness and hearing loss from middle ear involvement and CSF otorrhoea. This study aims to investigate the prevalence of eustachian tube dysfunction (ETD) after middle fossa craniotomy in the setting of lateral skull base defects with meningoencephalocele. Study Design: Retrospective case review. Methods: 122 adult patients between 2009 and 2017, with tegmen dehiscence and meningoencephalocele, or with isolated superior canal dehiscence (SCD), that had a minimum of 6 months of followup from a single surgeon practice, underwent middle fossa craniotomy (MFC) for repair of isolated superior canal dehiscence (n=39) or tegmen repair for meningoencephalocele (n=83) with or without CSF leak. Prevalence of pre- and postoperative eustachian tube dysfunction after MFC in patients with tegmen defect was measured. Results: Tegmen dehiscence and meningoencephalocele were significantly correlated with an increased prevalence of eustachian tube dysfunction (n=39, 46.99%,) compared to superior canal dehiscence (n=3, 7.69%), p<0.0001. In fact, prevalence of postoperative ETD was more than x10 times higher after MFC for tegmen defects with meningoencephalocele (n=28, 33.7%) than for SCD (n=1, 2.56%), p<0.0001. Conclusions: Repair of tegmen defects with meningoencephalocele is correlated with postoperative eustachian tube dysfunction.

E129. The Role of Microvascular Free Tissue Transfer in Patients with Cochlear Implants: A Case Series and Literature Review

Nathan R. Lindquist, MD, Houston, TX; Daniel B. Vinh, MD, Houston, TX; Jeffrey T. Vrabec, MD, Houston, TX; Andrew T. Huang, MD, Houston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role of microvascular free tissue transfer (MVFTT) for defects of the scalp and lateral temporal bone in patients with cochlear implants.

Objectives: We aimed to better delineate the role of microvascular free tissue transfer (MVFTT) for defects of the scalp and lateral temporal bone in patients with cochlear implants (CI) through a retrospective case series and literature review. Study Design: Case series and literature review. Methods: The retrospective review of patients with a history of CI and MVFTT at our institution as well as Medline search was performed using key search terms. Results: Two patients were identified at our institution. The first patient had a functional, extruded CI and underwent MVFTT without explantation and maintains stable audiologic parameters. The second patient with locally advanced squamous cell carcinoma of the auricle underwent the first reported instance of primary cochlear implantation at the time of oncologic lateral temporal bone resection (LTBR) and MVFTT with good function of the CI postoperatively. Including the current series, a total of six patients with both cochlear implants and MVFTT of the scalp or lateral temporal bone were identified, with no apparent flap failure. Four patients underwent MVFTT for CI extrusion, with two requiring explantation prior to MVFTT but none with recurrent electrode extrusion. One patient underwent CI after MVFTT for osteoradionecrosis of the temporal bone after previous irradiation. Conclusions: MVFTT is a safe and effective option for patients with functional CI extrusion hoping to avoid prolonged antibiotic therapy or multiple locoregional revision surgeries. Primary cochlear implantation at the time of oncologic LTBR and MVFTT is a safe method of hearing rehabilitation, even in the setting of possible adjuvant radiation therapy.

E130. Cutaneous Angioinvasive Fungal Infection of the Auricle

Justin Loloi, BS, Hershey, PA; Robert A. Saadi, MD, Hershey, PA; Nicole C. Williams, MD, Hershey, PA; Johnathan D. McGinn, MD, Hershey, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand a rare, angioinvasive fungal infection of the auricle in a patient with rheumatoid arthritis treated with methotrexate and abatacept.

Objectives: To present an unusual cause of auricular infection in an immunocompromised patient and to highlight the importance of opportunistic infection in the differential diagnosis of external ear lesions in an immunocompromised host. Study Design: Case report and review of literature. Methods: In the present study we describe a rare case of cutaneous, angioinvasive, fungal infection of the auricle. Results: A 77 year old female with rheumatoid arthritis (RA) on immunosuppression with methotrexate and abatacept presents with multiple black eschars and shallow ulcerations on the pinna of the left ear. She underwent surgical debridement and resection of skin and cartilage of the left ear lesions. Histologic evaluation of the left ear lesion demonstrated marked necrosis of skin and septate fungal organisms with focal invasion into cartilage. Postoperatively, she started levofloxacin 750 mg PO daily and voriconazole 200 mg PO q12h for fusarium skin infection with angioinvasion. At two month wound care followup with ENT, she had no signs of recurrent or persistent disease. Conclusions: To the authors' knowledge, this is the first report of a cutaneous angioinvasive fungal infection of the auricle. It is important for clinicians to treat angioinvasive fungal infections aggressively. We recommend early operative debridement and empiric coverage of opportunistic infections. Our patient responded well to early removal of necrotic

lesions and antifungal therapy and made a full recovery. Reconstruction with a full thickness skin graft was performed with satisfactory cosmetic result.

E131. Chronic Traumatic Encephalopathy for the Otolaryngologist: Emerging Evidence Regarding Audiovestibular Dysfunction

Rory J. Lubner, BS, Boston, MA; Renata M. Knoll, MD, Boston, MA; Ryan A. Bartholomew, BS, Boston, MA; Aaron K. Remenschneider, MD MPH, Boston, MA; David H. Jung, MD PhD, Boston, MA; Elliott D. Kozin, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the range of audiovestibular symptoms reported in the literature for patients with CTE.

Objectives: While motor disorders and cognitive decline are well documented clinical manifestations of chronic traumatic encephalopathy (CTE), auditory and vestibular symptoms have also been reported. In this systematic review, we aim to identify audiovestibular symptomatology in patients with CTE to better understand the potential role of otolaryngologists in this emerging patient population. Study Design: Systematic review. Methods: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were followed. MeSH terms included chronic traumatic encephalopathy, punch drunk syndrome and dementia pugilistica from years 1928 to 2018. Search engines included PubMed, Embase and Cochrane Library. Primary outcomes included documentation of auditory and/or vestibular symptoms in patients diagnosed with CTE. Results: Fourteen papers met study criteria corresponding to 107 patients with CTE. Twenty-two total individuals (21%) were specifically documented to have audiovestibular dysfunction. Major vestibular symptoms included unsteadiness (59%), disequilibrium (18%), dizziness (18%), vertigo (9%), and lightheadedness (5%). Auditory symptoms included hearing loss (14%) and persistent tinnitus (9%). The most common sports included boxing and American football. The average age of symptom onset was 35 years, the mean career duration was 13 years. An average of 10 episodes of loss of consciousness occurred per patient. No quantitative vestibular or auditory testing was described. Conclusions: Vestibular and auditory dysfunction appear to be present in patients with CTE. These data support the need for additional study to better delineate the constellation of auditory and vestibular symptoms, as well as potential pathophysiology.

E132. Characterization of the Microbiome of the Healthy External Auditory Canal via 16s rRNA Profiling

Rachel Marie McCabe, BS, Baltimore, MD; Yang Song, PhD, Baltimore, MD; Ryan D. Vanyperen, PhD, Baltimore, MD; Claire M. Fraser, PhD, Baltimore, MD; Ronna P. Hertzano, MD PhD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be familiar with species of the external auditory canal (EAC) microbiome and how these findings could ultimately shape management of acute otitis externa (AOE).

Objectives: To define and examine the EAC microbiome in healthy individuals. Study Design: Sample swabs were obtained from a total of 28 healthy adult EACs and sequenced. Methods: Culture independent 16s rRNA sequencing was performed using Illumina MiSeq, and taxonomic (genus level) classification performed using the Ribosomal Database Project trained on the Greengenes database. Results: 16 distinct classes of microbes were isolated from EACs of healthy adults. Propionibacterium and staphylococcus genera composed the majority of microbial flora in 23/29 individuals. Pseudomonas was isolated from 16/28 (57%) of individuals and constituted 4.5% of the total bacterial abundance. The most abundant genera detected after propionibacterium (34.5%) and staphylococcus (21.4%) were corynebacterium (5.8%), pseudomonas (4.5%), and Alloicoccus (4.5%). Conclusions: In contrast to previous culture based studies, the anaerobic propionibacterium was the most abundant constituent of the EAC microbiome. While propionibacterium, staphylococcus and corynebacterium are abundant constituents of the skin microbiome, pseudomonas is far more prevalent in the EAC of healthy individuals than previous culture based examinations had shown. Environmental exposures that promote the growth of pseudomonas (high pH, moisture, and EAC occlusion) could make these individuals more susceptible to acute otitis externa and could benefit from prophylactic measures that reduce pseudomonas colonization. These studies also provide new insight into the microbiome of the EAC, with implications for various EAC diseases. Future directions will include evaluation of the microbial changes induced by antiseptic solutions.

E133. Cochlear Implant Indications: A Review of Third Party Payers' Policies

Lindsey E. Moses, MD, New York, NY; David R. Friedmann, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe current best practices for cochlear implantation and how they differ from criteria employed by major third party payers in determining the medical necessity of CI for patients.

Objectives: As cochlear implant (CI) candidacy has expanded, third party payers have varied in their adoption of new criteria, muddling diagnostic audiologists' knowledge about appropriate patients for referral. This review seeks to understand how third party payers classify the medical necessity of cochlear implants. Study Design: Policy and literature review. Methods: We compared policies of the six largest commercial payers in our region, focusing on clinical scenarios for which many centers experience difficulty obtaining preauthorization. These include: 1) CI in children under 12 months; 2) speech perception criteria in children; 3) sequential bilateral CI; 4) electroacoustic stimulation; 5) impending cochlear ossification; and 6) single sided deafness (SSD). Results: Clinical scenarios: 1) Age requirement of greater than 12 months by three companies. 2) Audiologic and speech perception criteria are more stringent for children than adults across all policies includ-

ing pure tone average greater than 90 dB and speech scores less than 20% on MLNT or less than 12% on PB-K tests. 3) Sequential bilateral CI requires retesting by one company. 4) All follow FDA indications for hybrid CI except one that considers electroacoustic stimulation investigational. 5) For impending cochlear ossification from meningitis, hearing aid trial still required by two companies. 6) SSD considered investigational by all policies. Conclusions: Third party payers employ variable criteria regarding the medical necessity of CI, many of which are not contemporaneous with clinical knowledge and best practices. This may impact referral patterns among audiologists. More methodologically rigorous clinical trials may help shift such restrictive policies to benefit a greater number of patients, especially infants and children.

E134. A Comparison of Patients Meeting Vestibular Migraine Criteria and Those not Meeting any Diagnostic Criteria

Omid Moshtaghi, MD MS, San Diego, CA; Khodayar Goshtasbi, BS, Irvine, CA; Mehdi Abouzari, MD, Irvine, CA; Dillon Cheung, BS, Irvine, CA; Harrison Lin, MD, Irvine, CA; Hamid R. Djalilian, MD, Irvine, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand criteria for vestibular migraine.

Objectives: To characterize a cohort of patients suspected of having VM who did not meet diagnostic criteria for migraine headache or VM according to ICHD. Study Design: Retrospective review of patient characteristics followed up with a prospective assessment of symptomatic improvement post treatment. Methods: Questionnaires were provided to patients at an outpatient neurotology clinic assessing ICHD diagnostic criteria for VM and migraine. All patients were provided migraine treatment which included lifestyle changes and medical therapy. Pre-and post-dizziness score (DS) was calculated by determining the average duration of dizziness experienced per day. Results: In a larger cohort of patients we found 26% met criteria for VM, and 48% met no criteria (MNC) for either migraine headache or VM. The remaining population met criteria for migraine headache only with concurrent dizziness. All subjects demonstrated a significant migraine history yet the MNC and VM groups were significantly different in almost all features relating to migraine, vertigo and quality of life. However, both VM (n=12) and MNC (n=23) groups demonstrated a significant change in DS score pre- and post-treatment ($p=0.001$, and $p=0.005$ respectively). MNC criteria group improved from a mean of 119 minutes/day pre-treatment to 3.4 minutes/day after treatment. Conclusions: The MNC group described in this population may describe a benign recurrent vertigo cohort who lack features necessary to achieve ICHD criteria for migraine or VM. In these cases, there is evidence that migraine may play a significant role in vertigo symptoms, leading to a possible therapeutic improvement with migraine prophylaxis.

E135. Comprehensive Balance Testing Correlates Closely with Radiologically Documented Lateral Semicircular Canal Absence in a Competitive Gymnast with 22q11.2 Deletion Syndrome

Lindy M.R. Moxham, BSc, Vancouver, BC Canada; Arthur Ian Mallinson, PhD, Vancouver, BC Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the incidence of radiologic abnormalities of the vestibular system in the temporal bone in 22q11.2 deletion syndrome as well as their physiologic manifestations in a patient who is a competitive gymnast.

Objectives: To report an interesting case of a patient with 22q11.2 deletion syndrome who is also a competitive gymnast and her responses on formal comprehensive balance assessment which reflect her underlying absence of lateral semicircular canals bilaterally as well as review the current literature. Study Design: Case report with literature review. Methods: Case report including radiology findings, comprehensive balance assessment findings, with review of relevant literature. Results: We present the case of a patient who is known to have 22q11.2 deletion syndrome. She is a competitive gymnast who was noted to be having some very specific issues related to balance under conditions of competition, specifically on the balance beam. Comprehensive balance assessment provided evidence of absence of lateral semicircular canal function which correlated with computed tomography findings and also correlated perfectly with her symptomatology. Her ability to adapt to her underlying pathology under intense vestibular stress was remarkable. Conclusions: Absence of lateral semicircular canals is one of several known anomalies of the temporal bone associated with the 22q11.2 deletion syndrome. In this case we have presented a competitive gymnast who has comprehensive balance assessment findings which clearly demonstrate the functional aspect of this anomaly.

E136. Persistence of Adult Derived Porcine Inner Ear Cell Characteristics in Culture

Desmond A. Nunez, MBBS MD, Vancouver, BC Canada; Printha Wijesinghe, PhD, Vancouver, BC Canada (Presenter); Boyuan Zheng, BSc, Vancouver, BC Canada; Elizabeth Hui, PhD, Vancouver, BC Canada; Germain Ho, BSc, Vancouver, BC Canada; Juser Kakal, MSc, Vancouver, BC Canada

Educational Objective: At the end of the presentation the audience should be able to describe genetic and protein marker characteristics of inner ear cells.

Objectives: To test the feasibility of a porcine inner ear cell model, the inter-passage stability of adult porcine labyrinth harvested inner ear cell characteristics was determined. Study Design: Prospective laboratory study. Methods: Cochlear and vestibular tissues were harvested from adult pigs, cultured, and characterized at different passages (P). Genetic and protein expression of inner ear hair (myosin VIIa, prestin) and supporting cell (Nestin, cytokeratin 18 and vimentin) markers were determined using RT-qPCR and immunofluorescence. Relative target gene expression in cell cultures P2-P8 was measured with reference to cochlear and vestibular P0 cells by comparative cycle threshold (Ct). The strength of associ-

ation between the mRNA copy numbers of the target genes was statistically analyzed using Spearman's rank correlation coefficient. Results: From P1 to P8, the relative standardized mRNA expression levels in cochlear and vestibular cell cultures respectively were as follows in: vimentin, 130,000 - 640,000 and 57,000 - 450,000 copies; Nestin, 230 - 3900 and 2000 - 11,600 copies; prestin, 0.1 - 10.5 and 0.2 - 6.0 copies; myosin VIIa, 0.2 - 2.0 and 35 - 270 copies; and cytokeratin 18, 0.5 - 9.0 and 3.5-7330 copies in cochlea and vestibular cultures respectively. In vestibular cultures, from P1 to P8, cytokeratin 18 and vimentin were negatively correlated [$p < 0.05$, Spearman correlation $r_s = -0.79$]. Within cochlea cultures, cytokeratin 18 and Nestin were negatively correlated ($p < 0.05$, $r_s = -0.76$). Conclusions: Prosensory and neural stem cells genes and proteins were present through several in vitro culture passages of porcine inner ear cells suggesting the persistence of inner ear sensory and stem cell characteristics.

E137. Novel Scoring Systems for Preoperative Evaluation of Tympanic Membrane Perforation

Koshi Otsuki, MD PhD, Fukushima, Japan; Mitsuyoshi Imaizumi, MD PhD, Fukushima, Japan; Shigeyuki Murono, MD PhD, Fukushima, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to preoperatively evaluate the state of tympanic membrane perforation.

Objectives: To introduce simple scoring systems for evaluating tympanic membrane perforation (TMP) preoperatively in order to improve the rate of perforation closure. Study Design: Retrospective chart review. Methods: We developed two simple scoring systems, namely, TMP score and postoperative prognosis (PP) score, to preoperatively evaluate the state of TMP and the condition of the patient. The TMP score evaluates 1) size of perforation, 2) viewability of the perforation from the external auditory canal, 3) degree of tympanic membrane calcification, and relationships to the 4) malleus and 5) annulus. The PP score evaluates 1) otorrhea, 2) comorbidities, 3) mastoid pneumatization, 4) smoking, and 5) age. A retrospective chart review was conducted to compare the treatment outcomes of tympanoplasty and myringoplasty for TMP at our hospital before and after the introduction of these scoring systems in 66 patients (32 males and 34 females; mean age, 34.7 [range, 5-82] years; 73 ears) who had undergone surgery from January 2006 to December 2016. The post-operative followup period was for 6 months. Results: Postoperative TMP closure rate was 69.2% and 90.5% before and after introduction of the scoring systems, respectively. The rates of selecting tympanoplasty and myringoplasty were 44.2% and 55.8%, respectively, before introduction of these systems and 76.2% and 23.8%, respectively, after their introduction. Conclusions: These results indicate that our new scoring systems are useful and expected to be used especially by inexperienced surgeons to improve postoperative closure rate of TMP.

E138. Poor Speech Perception Is Predictive of Greater Benefit from User Directed Music Re-Engineering for Enhancing Music Enjoyment

Tiffany Peng, MD, New York, NY; Joshua J. Sturm, MD PhD, New York, NY; Lisa Tian, BA, New York, NY; Francesco Caruana, BA, New York, NY; Dean Mancuso, AuD, New York, NY; Ilana P. Cillum, AuD, New York, NY; Anil K. Lalwani, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate understanding of music re-engineering as a strategy for improving music enjoyment among cochlear implantees. They should be able to explain the relationship between speech perception and music enjoyment and discuss important rationales as to why this relationship exists.

Objectives: Music enjoyment is limited after cochlear implantation (CI). We previously demonstrated the efficacy of a novel web based audio mixer to improve music enjoyment among cochlear implantees. We investigate the relationship between speech perception outcomes and music enjoyment. Study Design: Case series. Methods: This is a study of 6 adult subjects after cochlear implantation at an academic cochlear implant center. All subjects were evaluated after CI with AZBio® Sentences in Quiet/Noise and CNC Words/Phonemes on binaural speech testing. All subjects were provided with a web based audio mixer and asked to rate enjoyment in response to original recordings and self-directed/user mixed recordings from five difference genres of music. Results: All 6 subjects had bilateral hearing impairment. One subject had bilateral CI and the remaining 5 subjects were unilaterally implanted and aided in the non-implanted ear with a hearing aid. Average AZBio scores were 83% (56-100%) in quiet and 70.5% (51-87%) in noise. Average CNC scores were 81% (68-96%) for words and 91% (83-98%) for phonemes. Speech perception was not correlated with enjoyment. 5 of 6 subjects reported that use of the audio mixer increased their enjoyment of music. The one subject reporting no increased enjoyment had the highest speech scores. The two subjects rating the mixer most highly had the lowest speech scores. There was no correlation with bilateral or unilateral implantation status. Conclusions: Music re-engineering is effective in enhancing music enjoyment. CI patients with poorer speech perception experienced greater music enjoyment from self-directed music re-engineering suggesting that they are more responsive to changes in music presentation.

E139. Cochlear Nerve Aplasia as a Predictor of Brainstem Morphology in Children Who Are Candidates for the Auditory Brainstem Implant (ABI)

Ahad A. Qureshi, MD, Boston, MA; Pranav Parikh, BS, Boston, MA; Merritt C. Brown, PhD, Boston, MA; Katherine Reinshagen, MD, Boston, MA; Daniel J. Lee, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the volumetric difference in brainstem morphology of pediatric auditory brainstem implant (ABI) candidates with a cochlear nerve

(hypoplastic or normal) and without a cochlear nerve versus controls, and its significance to ABI outcomes.

Objectives: Normal cochlear nerve development suggests structural fidelity of downstream networks within the brainstem necessary for hearing. Children with congenital deafness associated with cochlear nerve aplasia are not candidates for the cochlear implant (CI) but pediatric ABI outcomes have been modest. We hypothesize that pediatric ABI candidates with cochlear nerve aplasia have smaller brainstem volumes compared to children who have normal or hypoplastic nerves. Herein, we perform a volumetric analysis of brainstem morphology in children with severe cochlear nerve anomalies and compare these data to controls. **Study Design:** Retrospective review. **Methods:** Children who had high resolution MRI and either cochlear nerve hypoplasia (group 1) or aplasia (group 2) were included. A control group was matched for age and gender. Three dimensional (3D) reconstruction of the brainstem was performed from the level of the upper atlas to the Circle of Willis using 3DSlicer software. **Results:** We included MRI analyses from eight congenitally deaf children and compared these to matched controls. Mean brainstem volume for group 1 was 13.66 cc \pm 1.89 cc (controls: mean 19.88 cc \pm 3.31 cc). Mean brainstem volume for group 2 was 8.14 cc \pm 3.58 cc (controls: 20.79cc \pm 3.51cc). 2 sample t-test showed significantly decreased brainstem volume for group 2 ($p < 0.05$) when compared to both group 1/controls. **Conclusions:** Children with cochlear nerve aplasia have significantly decreased brainstem volume compared to children with cochlear nerve hypoplasia or normal cochlear nerve morphology. Severe anomalies may predict underdevelopment of the auditory brainstem and may explain the modest outcomes following pediatric ABI surgery.

E140. Implementation of Neural Network Based Visual Speech Recognition Program on Bamford-Kowal-Bench Speech in Noise (BKB-SIN) Test

Arun M. Raghavan, BS, Cincinnati, OH; Gavriel D. Kohlberg, MD, Cincinnati, OH; Noga Lipschitz, MD, Cincinnati, OH; Joseph T. Breen, MD, Cincinnati, OH; Ravi N. Samy, MD FACS, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, participants should be aware of the potential benefits and structure of a visual speech recognition program for augmenting human speech perception.

Objectives: Evaluate the accuracy and speed achieved by a visual speech recognition program (VSRP) based upon a long short term memory (LSTM) neural network. **Study Design:** Prospective study. **Methods:** A dual video/infrared camera was used to continuously track 35 points around the lips during speech in real time. A real time geometric transformation was implemented to normalize all tracked points to a common three dimensional axis. A VSRP consisting of three separate LSTM neural networks with Softmax classification layers was developed to identify 42 sentences from the Bamford-Kowal-Bench Speech in Noise (BKB-SIN) test using these data. Each neural network was put through a 10-fold cross validation on 2800 samples representing 14 sentence subsets of the 42 BKB-SIN sentences. The network input consisted of a sequence of data frames each consisting of 105 features, and each network had 800 hidden units. Classification time, defined as the time elapsed between the network receiving an input dataset and providing a classification result, was evaluated across all 2800 samples. **Results:** The VSRP achieved an average accuracy (across the three networks) on 10-fold cross validation of 75.90 \pm 8.42 (\pm SD). The average classification time was 7.3 \pm 2.3ms (\pm SE). **Conclusions:** The VSRP achieved a high level of accuracy across sentences taken from a common speech battery. Further evaluation is needed to demonstrate the use of this system in augmenting human speech perception. It may assist those with hearing loss, such as hearing aid or cochlear implant users.

E141. Association between Cardiometabolic Risk Factors and Dizziness in African-Americans

Amrita Ray, DOMPH, Jackson, MS; Christopher Spankovich, AuD PhD MPH, Jackson, MS; Charles E. Bishop, AuD PhD, Jackson, MS; Dan Su, MS, Jackson, MS; John M. Schweinfurth, MD, Jackson, MS

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss similarities in prevalence of balance dysfunction in African-Americans to the general U.S. population, possible etiologies for balance dysfunction and cardiometabolic markers that appear to be associated with balance dysfunction in this population.

Objectives: To characterize vestibular dysfunction presentation in an African-American cohort and their associated cardiometabolic profiles. **Study Design:** Cross-sectional analysis. **Methods:** 1314 participants in our heart study were presented a hearing health screening questionnaire; 24% reported dizziness and completed a secondary dizziness questionnaire. Baseline data regarding demographics, vitals and cardiovascular health was collected for this cohort. Descriptive analysis was used to compare the cohort's social demographic and cardiometabolic characteristics versus the 997 participants who denied dizziness on the initial screening questionnaire. Cardiometabolic markers were compared for participants who affirmatively answered questions that allude to specific etiologies of dizziness. Logistical regression models were adjusted for age, sex, education, reported noise exposure and hearing sensitivity. **Results:** Respondents who noted dizziness were slightly older, predominantly women, and had significant complaints of hearing loss, tinnitus, and history of noise exposure ($p < 0.001$). These respondents also had a higher prevalence of hypertension, blood pressure medication use and higher BMI. Individuals with symptoms alluding to an orthostatic or migraine etiology had significant differences in prevalence of hypertension, blood pressure medication use and BMI. However, participants with vestibular type dizziness complaints did not demonstrate any particular cardiometabolic profile. **Conclusions:** Dizziness appears to affect African-Americans in a similar age and sex distribution compared to the general U.S. population. In our study, individuals noting dizziness were found to have significant difference in BMI and blood pressure regulation, especially if they also noted orthostatic or migraine type symptoms. However, this relationship does not appear to be conserved in individuals whose symptoms allude to a vestibular etiology.

E142. Practices and Perceptions of Cognitive Assessment for Adults with Age Related Hearing Loss

Mallory J. Raymond, MD, Atlanta, GA; Annika C. Lee, BS, Atlanta, GA; Nikhila R. Raol, MD MPH, Atlanta, GA; Esther Vivas, MD, Atlanta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the trends of assessment for cognitive impairment (CI) in adults with age related hearing loss (ARHL).

Objectives: To investigate the landscape of CI screening for adults with ARHL amongst otolaryngologists and audiologists. To identify provider factors and patient characteristics that impact rates of CI screening and referral. Study Design: Cross-sectional survey. Methods: A 15 question online survey was sent to members of our state's otolaryngology society, audiology academy, American Otological Society and American Neurotology Society (AOS/ANS) and posted on the web forum for the hearing disorders special interest groups within the American Speech Language Hearing Association (ASHA). Responses were collected anonymously. Chi-square tests were used to compare responses. Results: Of the 60 respondents (estimated response rate of 10%), 52% were otolaryngologists and 40% were audiologists. Respondents were significantly more likely to refer patients for CI assessment than to screen (57% versus 23%, $p < 0.0002$). Training completion year, practice type, and visit length did not affect screening or referral. However, respondents who see less than 10 adults with ARHL weekly were more likely to screen for CI (45% versus 16%, $p < 0.03$), and general otolaryngologists, as compared to neurotologists and audiologists, were less likely to refer patients for CI testing (23%, 72% and 63% respectively, $p < 0.04$). The complaint of a neurological symptom would prompt screening or referral for only 48% and 67% of respondents, respectively. 42% suggested CI screening with the MMSE vs. 17% with the MOCA. Conclusions: Despite recommendations for cognitive assessment in high risk populations, such as older adults with ARHL, the practice of CI screening and referral is not yet commonplace amongst otolaryngologists and audiologists. These providers have a unique opportunity to assess adults with ARHL for CI and ensure appropriate referral.

E143. Thirty Day Readmission and Prolonged Length of Stay in Malignant Otitis Externa

Zachary G. Schwam, MD, New York, NY; Rocco Ferrandino, MD, New York, NY; Vivian Z. Kaul, MD, New York, NY; George B. Wanna, MD, New York, NY; Maura K. Cosetti, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to compare risk factors for unintended readmission and prolonged length of stay in patients hospitalized for malignant otitis externa.

Objectives: To determine independent risk factors for 30 day readmission, prolonged index admission, and facility discharge for those with malignant otitis externa. Study Design: Retrospective cohort study. Methods: Patients hospitalized with malignant otitis externa (International Classification of Diseases, 9th edition code 380.14) were identified in the Nationwide Readmissions Database (2013-2014). Overall and disease specific complication and mortality data were analyzed using chi-square and multivariate analysis. Results: There were 1,109 cases of malignant otitis externa extracted. A prolonged length of stay (LOS) of ≥ 8 days (90th percentile) was found in 12.0% ($n=133$) of patients, and 11.0% ($n=122$) were discharged to a facility. Patients were readmitted within 30 days at a rate of 12.5% ($n=159$). Uncomplicated diabetes was found in 42.1% and complicated diabetes in 17.8%. Factors independently associated with prolonged LOS included high mortality risk (odds ratio [OR] 2.59, $p=.005$), and disposition to a facility (OR 5.97, $p<.001$). Independent risk factors for disposition to a facility included high mortality risk (OR 2.55, $p=.005$), significant weight loss (OR 4.81, $p<.001$), and prolonged LOS (OR 6.06, $p<.001$). Readmission was independently linked to Medicaid (OR 1.92, $p=.040$) and discharge to a facility (OR 3.42, $p<.001$). Conclusions: Thirty-day readmission, prolonged index admission, and ultimate discharge to a facility were common. Readmission, prolonged admission, and disposition were closely intertwined. Despite the classic association between diabetes and malignant otitis externa, it was not an independent risk factor for any of our outcomes.

E144. Use of Google Trends to Evaluate for Geographical or Seasonal Variation in Search Terms for Meniere's Disease

Josh R. Sen, BA, Syracuse, NY; Alex J.F. Tampio, MD, Syracuse, NY; Shaelyn M. Cavanaugh, MPH, Syracuse, NY; Brian D. Nicholas, MD, Syracuse, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to better utilize big data research tools in the context of otolaryngology.

Objectives: Google Trends is an online tool that allows visualization and extraction of Internet search data. Despite being used to research various health topics, its viability as a research tool remains in question, specifically in the field of otolaryngology. Looking at Meniere's disease, a disease with suspected relationships to environmental factors, we assessed the consistency and accuracy of Google Trends as a research tool. Study Design: Retrospective database study. Methods: Linear regression analysis was performed assessing predictive relationships between pressure and search frequency of terms related to Meniere's disease. Similarly, linear regression was performed on change in pressure with appropriate terms. Temperature was controlled for in both analyses. Analyses were performed on datasets from multiple cities in the continental United States. Results: No predictive relationship was found between pressure or change in pressure with any of the search terms. Temperature was found to have a significant predictive relationship with searches for hearing loss and tinnitus in some cases. Conclusions: Prior studies have demonstrated that changes in barometric pressure are associated with an increase in Meniere's disease symptomatology among some people. Our analysis performed on Google Trends data demonstrates that this hypothesis is not supported, likely reflective of a lack of sensitivity of Google Trends to predict relationships between continuous variables. We offer suggestions on how Google Trends data can be altered to

benefit scientific research.

E145. Utility of Inpatient Imaging during the Workup for Vertigo: A Nationwide Analysis

Jonathan C. Simmonds, MD, Boston, MA; Jonathon S. Sillman, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the utility and limitations of obtaining a CT head or MRI brain during the workup of vertigo in the inpatient setting.

Objectives: This study aims to determine the utility of obtaining a CT head or MRI brain during the workup of vertigo in the inpatient setting. Study Design: Retrospective cross-sectional database analysis. Methods: Patient admitted with a primary diagnosis of vertigo who underwent either a CT head or MRI brain were analyzed using the National Inpatient Sample from 2000-2014. The frequency of associated diagnoses such as cerebrovascular disease, neoplasms, and other CNS lesions typically diagnosed by imaging were determined. Demographic information of patients was also analyzed. Results: Between 2000-2014, 550,047 patients were admitted with a primary diagnosis of vertigo. An MRI brain was obtained in 28,929 (5.26%) and CT head in 30,576 (5.56%) of patients. Cerebrovascular disease (either acute or chronic) was seen in 4177 (9.35%) of patients who underwent imaging. Multiple sclerosis was seen in 167 (0.37%) of patients and a benign intracranial neoplasm was diagnosed in 353 (0.79%). When evaluating differences across the United States, rates of CT head and MRI brain were notably higher rate in the mid-Atlantic region; despite only having 19.57% of all vertigo admissions, patients in the mid-Atlantic accounted for 56.6% of all CT head ($p < 0.001$) and 44.91% ($p < 0.001$) of all MRI brain studies in the United States. Conclusions: Almost 10% of patients who are admitted for vertigo and undergo imaging have evidence of cerebrovascular disease. Less than 1% of patients have evidence of a benign intracranial neoplasm. Higher rates of imaging are seen in the mid-Atlantic states.

E146. Oticara Otic: Topical, Single Dose Application Utilized in 178 Cases of Fungal Otitis Externa

Patrick William Slater, MD, Austin, TX; Neha Korla, MDS, Austin, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the benefits of Oticara Otic in the treatment of fungal otitis externa. Clinicians will learn how to identify fungal otitis externa. Learn practical use of Oticara Otic.

Objectives: To evaluate the clinical effectiveness of Oticara Otic in the treatment of fungal otitis externa. Study Design: Retrospective review, tertiary neurotology referral center. Methods: Medical records of 1,739 diagnoses of otitis externa were reviewed over a six year period (years 2011-2017). 178 out of the 1,739 were diagnosed with fungal otitis externa by clinical observation. All fungal otitis externa infections were treated with Oticara Otic (a combination of broad spectrum antifungal, steroid, and a mucoadhesive) by the primary author. Improvement in the symptoms (presence of fungal debris, pain, discharge and itching) was considered the primary clinical outcome measure. Results: 171 out of 178 (96%) fungal infections observed resolution of symptoms after a single dose application. 33 of the 178 fungal infections (18.5%) underwent a repeat application of Oticara Otic due to various other associated factors such as history of eczema, chronic use of hearing aid, and persisting erythema. 7 of the 178 fungal infections were given concurrent antibiotic therapy along with a single application of Oticara Otic. There were no adverse side effects reported. Conclusions: Oticara Otic, single dose, appears safe and effective in treating fungal otitis externa and potentially superior to current off label treatments available. Despite its prevalence of 10% in the studied population, and as high as 30.4% in external studies, there is currently no FDA approved treatment for fungal otitis externa. Oticara Otic is undergoing additional studies to support FDA approval for treating fungal otitis externa.

E147. Bilateral Uveitis and Sensorineural Hearing Loss in a Man with Stage IV Malignant Melanoma after Nivolumab Immunotherapy

Alex J.F. Tampio, MD, Syracuse, NY; Abirami Sivapiragasam, MD, Syracuse, NY; Robert T. Swan, MD, Syracuse, NY; Brian D. Nicholas, MD, Syracuse, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss various possible autoimmune side effects of nivolumab immunotherapy, including but not limited to, sudden sensorineural hearing loss.

Objectives: Present the case of a 67 year old male with stage IV malignant melanoma who presented with acute uveitis and sudden sensorineural hearing loss (SNHL) while on nivolumab and review the literature for likely etiologies. Study Design: Case report and literature review. Methods: A case presentation and review of the literature was conducted. Results: A 67 year old male with stage IV malignant melanoma was treated with nivolumab. 12 days after his fourth cycle, the patient presented with blurry vision and was diagnosed with bilateral grade II uveitis. Within this time frame the patient also complained of vertigo and hearing loss. Audiometry showed bilateral moderate sloping to moderate-severe SNHL. The patient was placed on a three week course of high dose oral corticosteroids and topical steroid eye drops. Nivolumab enhances the antitumor activity of T cells by inhibiting the programmed death 1 receptor. While nivolumab has shown great promise in the treatment of many types of cancers, it has also been associated with many autoimmune side effects such as autoimmune hemolytic anemia, thyroiditis, myocarditis, rheumatoid arthritis, and type one diabetes, among others. We propose the etiology of this 67 year old male's uveitis and sudden SNHL are the result of an autoimmune process secondary from the augmented T cell response induced by nivolumab. Conclusions: While immunotherapeutic agents such as nivolumab have shown great promise in the treatment of cancer, one should maintain an awareness and caution of autoimmune side effects, such as uveitis and sudden SNHL.

E148. Resting Ambient Pressure Tympanometry Provides Key Information Suggesting Alternative Diagnoses in Patients Tested for Patulous Eustachian Tube

Anthony Thai, BA, Stanford, CA; Zahra N. Sayyid, MD, Palo Alto, CA; Davood K. Hosseini, MD, Palo Alto, CA; Matthew B. Fitzgerald, PhD, Palo Alto, CA; Jennifer Y. Lee, MD, Palo Alto, CA; Yona Vaisbuch, MD, Palo Alto, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential application of ambient pressure tympanometry testing in screening of patients with suspected patulous eustachian tube.

Objectives: To introduce the use of baseline ambient pressure tympanometry (APT) recording, which is already part of patulous eustachian tube (PET) workup, to identify patients with potential alternative otologic conditions. Study Design: Retrospective study of adult patients referred to a PET clinic. Methods: PET testing was performed on all patients referred to our PET clinic. The APT recording at baseline was retrospectively analyzed and compared to patient medical records, with a focus on diagnoses confirmed on computerized tomography (CT). To identify positive waves, we analyzed amplitude and frequency of APT waves, assessing for regularity of waves and excluding waves with frequencies consistent with respiration. Results: PET testing was performed on 141 patients (277 ears). Analyzing the baseline APT recording, we identified 71 patients (111 ears) with regular, sinusoidal wave patterns that are inconsistent with respiratory rates (50.3% of patients, 40% of ears). Of these patients, 26 had temporal bone CT scans. Imaging studies confirmed alternative pathologies in 8 patients, including 5 cases of SSCD, 3 cases of tegmen dehiscence, 1 case of jugular bulb dehiscence and 1 case of cholesteatoma. Conclusions: APT is a simple, feasible test that is already performed in PET tympanometry testing, although focus is placed on waves resulting from patient maneuvers. This study suggests that interpretation of the baseline APT recording may direct suspicion toward other otologic diagnoses in patients receiving PET testing.

E149. No Shortage of Decibels in Music City: Evaluation of Noise Exposure in Urban Music Venues

Sarah M. Tittman, MD, Nashville, TN; Robert J. Yawn, MD, Nashville, TN; Nauman F. Manzoor, MD, Nashville, TN; Matthew M. Dedmon, MD PhD, Nashville, TN; David S. Haynes, MD MMHC, Nashville, TN; Alejandro Rivas, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the use of smartphone sound measurement applications using external microphones, explain noise measurement terminology, appreciate the significant noise exposure at urban music venues, and be able to compare noise exposure measurements to National Institute of Occupational Safety and Health (NIOSH) guidelines.

Objectives: 1) Measure and report noise exposure at urban music venues using smartphone based technology; and 2) assess the risk of noise induced hearing loss by comparing these measures to the National Institute of Occupational Safety and Health (NIOSH) guidelines. Study Design: Observation study. Methods: The SoundMeter X (Faber Acoustical, LLC) app was installed and calibrated on an iPhone (Apple Inc.) device, and sound levels were measured using the iMM-6 Calibrated Measurement Microphone (Dayton Audio) at several venues. The maximum sound level, peak level, equivalent continuous sound level, and statistical noise levels (L10, L50, L75, L90) were recorded. Results: The absolute peak level recorded was 141.08 dB. The average equivalent continuous sound level was 113.69 (+/- 2.43) dB, and the average maximum sound level was 127.05 (+/- 1.68) dB. The L90 average (sound levels at or above this loudness for 90% of measured exposure time) was 103.36 (+/- 1.98) dB, and the L10 average was 116.7 (+/- 2.63) dB. Based off of NIOSH guidelines, noise exposure duration at the L10 average should not exceed 18 seconds and those at the L90 average should not exceed 7 minutes and 30 seconds. Conclusions: Smartphone applications using external calibrated microphones can provide useful noise measurements. Preliminary data shows that randomly sampled music venues may have noise levels that place patrons without hearing protection at risk for noise induced hearing loss with prolonged exposure.

E150. Auditory and Head and Neck Imaging Findings in Neurofibromatosis Type 1

Jennifer R. White, MD, Washington, DC; Hung J. Kim, MD, Washington, DC; Victoria Y. Idowu, BA, Bethesda, MD; Carmen C. Brewer, PhD, Bethesda, MD; Kelly A. King, AuD PhD, Bethesda, MD; Chris K. Zalewski, PhD, Bethesda, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the auditory characteristics of neurofibromatosis type 1; 2) recognize head and neck imaging findings that can be seen in this patient population; and 3) discuss the potential impact of head and neck pathology on the auditory presentation in neurofibromatosis type 1 patients.

Objectives: To characterize the auditory phenotype of neurofibromatosis type 1 (NF1) and its association with head and neck imaging findings. Study Design: Retrospective cross-sectional analysis. Methods: A retrospective review was conducted on a cohort of 102 NF1 patients aged 5-45 years (median= 14 years) at a quaternary medical research institute from 1/2008 to 3/2018. Comprehensive audiologic evaluations and neurodiagnostic auditory testing were analyzed. This data was then compared to head and neck magnetic resonance imaging (MRI) findings to evaluate for an association. Results: Hearing loss, defined as a 4 frequency (0.5, 1, 2, 4 kHz) pure tone average > 20 dBHL, was observed in 11 (10.8%) patients (8 conductive, 3 sensorineural). Auditory brain responses (ABR) were abnormal in 17/90 (18.9%) patients suggestive of retrocochlear pathology. Two or more auditory processing tests (APT) were abnormal in 36/56 (64.3%) patients. Chi-square analysis revealed no significant correlation between MRI findings of intracranial spongiform gliosis and sensorineural hear-

ing loss ($p=0.753$) or abnormal ABR ($p=0.660$). The finding of abnormal performance on two or more APTs was associated with the presence of spongiform gliosis ($p=0.032$). Head and neck plexiform neurofibromas were common (54.9% patients). Of those involving the temporal, parotid, and parapharyngeal regions, there was a significant association with conductive hearing loss ($p=0.001$). Conclusions: In this select population of NF1 patients, head and neck plexiform neurofibromas were frequently seen on MRI. Large skull base plexiform neurofibromas may be associated with conductive hearing loss. Poor performance on measures of auditory processing is common amongst this patient population and is associated with spongiform gliosis.

E151. A Comparison of Outcomes of Two Intratympanic Steroid Protocols for Meniere Disease

Erika A. Woodson, MD, Cleveland, OH; Elizabeth O. Shay, BA, Cleveland, OH (Presenter); Amy S. Nowacki, PhD, Cleveland, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) compare two intratympanic steroid protocols for the treatment of Meniere disease (MD) vertigo; and 2) discuss the effectiveness of various intratympanic steroid injection protocols in delaying progression to invasive and/or ablative treatment modalities.

Objectives: Determine if two intratympanic dexamethasone (ITD) protocols differ in their ability to control Meniere disease (MD) vertigo and delay progression to other treatment modalities. Study Design: Retrospective cohort study. Methods: Treatment data were collected for MD patients, receiving ITD (24mg/ml), for vertigo (2010–2017). The cohort was divided into three groups for relevant analyses: single injection (1X) on demand, planned series of 3 injections (3X) over six weeks and switched (S) patients having undergone both protocols. Ninety-three ears (68% 1X, 16% 3X, 16% S) were analyzed. After completion of the initial protocol, time to a subsequent injection (log rank) and number of injections received after (Kruskal-Wallis) were compared as a proxy for vertigo control. Time to progression to other treatment modalities was explored. Results: There was a clinically important delay before receiving a second treatment in the 3X vs 1X group, although not statistically significant (median 31.6 vs 18.2 months, $p=0.09$). There was no significant difference in the number of injections received within 3 (mean 0.00 3X, 0.24 1X, 0.47 S, $p=0.11$) or 6 months (mean 0.23 3X, 0.41 1X, 0.67 S, $p=0.11$) of initial protocol completion. The number of injections in the ensuing 12 months statistically differed only between 3X and S (mean 0.27 3X, 1.21 S, $p=0.04$). Eleven (13%) patients progressed to another treatment modality; however, time to another therapy did not differ significantly ($p=0.71$). Conclusions: Serial planned intratympanic steroid injections did not differ in effectiveness of providing vertigo control or progressing to other treatment modalities when compared to single injections.

PEDIATRICS

E152. Practice Patterns in Pediatric Endoscopic Sinus Surgery for Chronic Rhinosinusitis

Michael C. Baxter, MD MSc, San Diego, CA; Matthew T. Brigger, MD, San Diego, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss and compare the characteristics and proportion of children with chronic rhinosinusitis who are managed with functional endoscopic sinus surgery compared to those managed primarily with adenoidectomy. Additionally, frequent comorbidities, the extent of surgery, use of balloon sinus dilation, and use of image guidance are quantified.

Objectives: Pediatric chronic rhinosinusitis (pCRS) is a major cause of morbidity and is frequently managed with medical and surgical treatments. Adenoidectomy for pCRS has long been viewed as the primary surgical intervention, but endoscopic sinus surgery (ESS) has played an increasing role. Using the experience of a large single state, this study details the use of ESS in the pediatric population for pCRS. Study Design: Cross-sectional database analysis. Methods: The State Ambulatory Surgical Database for Florida in 2014 was queried for children with pCRS managed surgically. Descriptive statistics of surgically managed pCRS were produced and chi-squared and logistic regression were performed to identify predictors of performance of ESS and use of image guidance. Results: Of 2900 children 12 and under with pCRS managed surgically in Florida in 2014, ESS was performed on a total of 569 (19.6%). 250 (8.6%) underwent concurrent primary adenoidectomy, and primary adenoidectomy only was used in 2,331 (80.3%). Balloon sinus dilation was used in 23.9% of ESS cases, and when performed, it was combined with primary adenoidectomy 67.6% of the time. Nasal polyposis (NP) was present in 3.3% and cystic fibrosis (CF) in 4.0% of patients undergoing ESS. CF associated with performance of ESS (OR 2.57 95% CI 1.55-3.89). Image guidance (IG) was used in 7.8% of cases and NP increased odds of IG usage (OR 2.54, 95% CI 1.54-3.52). Conclusions: ESS plays a significant part in management of pCRS alongside adenoidectomy. The use of a state specific database provides detailed data regarding utilization that can be difficult to obtain via large inpatient specific databases.

E153. Transpalatal Approach to Repair of Bilateral Choanal Atresia in a Child with Craniofacial and Skull Base Anomalies: Revisiting an Historic Technique

Rebecca A. Compton, MD, Boston, MA; Robert J. Scagnelli, BA, Albany, NY (Presenter); Jonathan C. Simmonds, MD, Boston, MA; Andrew R. Scott, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to review the indications for use of the transpalatal approach for repair of choanal atresia as well as to describe the surgical steps to this repair. Participants should also be able to discuss the challenges of choanal atresia repair in children with craniofacial anomalies.

Objectives: To describe an unusual case of bilateral bony choanal atresia in an infant born with multiple craniofacial

anomalies and skull base dysplasia that required repair using a transpalatal approach. Study Design: Case report. Methods: Case report and review of literature. Results: We present a unique case of bilateral choanal atresia in an infant boy with anophthalmia, Tessier 1 facial cleft, and cranioschisis. The atresia was detected several days after birth when mild respiratory distress was noted with feeding, owing to the presence of an alternate airway through the cleft alveolus. Genetic testing was inconclusive and the child's presentation was felt inconsistent with any particular syndrome. Imaging revealed bony atresia with a particularly low lying skull base. Due to the thickness of the atretic plates and his skull base abnormalities, a transpalatal approach was used for resection of the palatal bone, atretic plates, and vomer. Mucosal flaps were sutured to line to newly formed choanae which accommodated 16 French nasal trumpets. The child's stents were removed after two days and he had a notably improved nasal airway. Few recent uses of the transpalatal approach are described in the literature, and most relate to children with CHARGE syndrome. Conclusions: Bilateral choanal atresia is not uniquely associated with syndromic CHARGE. Repair in the setting of craniofacial anomalies may require use of the transpalatal approach to avoid injury to the skull base and to maximally resect the bony atresia, highlighting the relevance of this historic technique.

E154. Weight Gain Velocity as Predictor of Severe Obstructive Sleep Apnea among Obese Adolescents--A Case Control Series

Ajay Narayanan, BS, Dallas, TX; Romaine F. Johnson, MD, Dallas, TX; Alexander Hansen, MD, Dallas, TX; Ahana Yogesh, BA, Dallas, TX; Gopi B. Shah, MD MPH, Dallas, TX; Ron B. Mitchell, MD, Dallas, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the relationship between the velocity of weight gain and obstructive sleep apnea severity in obese adolescents.

Objectives: To evaluate a cohort of obese adolescents with OSA to determine if those with severe OSA had increased yearly weight gain when compared to those without severe OSA. Study Design: A case control series. Methods: Adolescents, ages 12-17 years, referred for full night polysomnography (PSG) were analyzed. We examined demographics, weight classifications, yearly weight gain from age six onward, PSG data (apnea hypopnea index), tonsil size, asthma, GERD, and allergic rhinitis. We performed a mixed effect linear regression model to test whether the velocity of weight gain was more significant in obese patients with severe OSA when compared to those without severe OSA while controlling for possible confounding variables. Results: This study included 166 patients--105 were obese without severe OSA, and 61 were obese with severe OSA. The average age was 14 years and was predominately male (57%) or Hispanic (44%). The regression analysis found that the yearly change in weight among obese adolescents with severe OSA was significantly higher than those without severe OSA ($B = 1.4$, $SE = 0.50$, $p = .005$, $95\% CI = 0.42$ to 2.4). For the group with severe OSA, weight increased 6.5kg every year before their PSG. This finding held even after controlling for asthma, tonsillar hypertrophy, allergic rhinitis, or GERD. Conclusions: The results suggest that the rate of weight gain over time, in addition to the current weight, should be considered when evaluating for severe OSA in obese adolescents.

E155. Current Evaluation and Management of Plastic Bronchitis in the Pediatric Population

Youjin Li, MD, Boston, MA; Natasha D. Dombrowski, BA, Boston, MA (Presenter); Ryan A. Williams, MD, Boston, MA; Francis Fynn-Thompson, MD, Boston, MA; Kevin P. Daly, MD, Boston, MA; Gary A. Visner, DO, Boston, MA; Reza Rahbar, DMD MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe our multidisciplinary approach to the treatment of plastic bronchitis in the pediatric population and compare evaluation and management techniques in the congenital heart disease population to the pediatric population as a whole.

Objectives: To describe a multidisciplinary approach for the treatment of plastic bronchitis (PB) in children. Study Design: Retrospective chart review of children with PB between 1997 and 2017. Methods: Data regarding clinical presentation, diagnosis, management, and outcomes were analyzed. Results: Of 35 patients presenting with PB, 24 had single ventricle (SV) heart disease, 10 had pulmonary disease, and one had no underlying disease. Median (IQR: interquartile range) age at the time of PB diagnosis was 5.5 years (IQR: 3.1-12.1). Presenting symptoms included cough productive of casts ($n=27$, 77%), wheezing ($n=5$, 14%), dyspnea ($n=18$, 51%), hypoxia ($n=31$, 89%), and intubation or tracheostomy requirement ($n=9$, 26%). Diagnosis was made based on clinical evaluation, bronchoscopy findings, and/or pathology of casts. Treatment methods included bronchoscopy for cast removal (25% of SV patients, 91% of non-SV patients), chest physiotherapy (SV: 92%, non-SV: 45%), albuterol (SV: 79%, non-SV: 73%), inhaled steroids (SV: 75%, non-SV: 18%), nebulized hypertonic saline (SV: 29%, non-SV: 9%), nebulized heparin (SV: 8%, non-SV: 55%), nebulized t-PA (SV: 33%, non-SV: 9%), inhaled dornase alfa (SV: 54%, non-SV: 9%), antibiotics (SV: 46%, non-SV: 45%), systemic steroids (SV: 13%, non-SV: 45%), and lymphatic embolization (SV: 8%, non-SV: 45%). Of SV patients, 11 had no recurrence, 5 underwent heart transplantation, one awaits transplant, and 3 died due to cardiac disease. Three patients with respiratory disease had recurrent PB and one died due to MRSA pneumonia. Conclusions: PB is a highly morbid disease with limited treatment options. Bronchoscopy and chest physiotherapy for airway clearance are among the most utilized therapies.

E156. How Pediatric Anesthesiologists Manage Children with OSA

Christopher A. Roberts, MD, Morgantown, WV; Raihanah S. Sayegh, , Kuwait City, Kuwait; Pavithra R. Ranganathan, MD, Morgantown, WV; Khaled A. Sedeeq, MD, Hershey, PA; Michele M. Carr, MD, Morgantown, WV

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the variation in pediatric anesthesiologist approach to children with OSA.

Objectives: Otolaryngologists should be aware of how anesthesia protocols can affect their patients. The purpose of this study was to describe typical anesthesia practices for children with obstructive sleep apnea (OSA). Study Design: Multicenter survey study. Methods: We surveyed pediatric anesthesiologists using REDCap and used both descriptive statistics and nonparametric comparisons. Results: 108 respondents were included. 45.4% worked in a freestanding children's hospital and 33.3% worked in a general hospital. 74.8% taught residents. 45.4% had at least 1 child with OSA per week, 25% had them daily. On a 100 mm VAS, respondents rated their comfort with managing these children as 84.94 (std 17.59). For children with severe OSA, 54.6% gave oral midazolam preoperatively, but 25% typically withheld premed and had the parent present for induction. 68.5% would typically use nitrous oxide for inhalational induction. 69.4% used fentanyl intraoperatively, while 19.4% used morphine. 61.7% reduced their intraop narcotic dose for children with OSA. 98.1% used intraoperative dexamethasone, 61.5% used 0.5 mg/kg for the dose. 98.1% used ondansetron, 65.4% used IV acetaminophen, and 8.3% used IV NSAIDs. 83.3% extubated awake; 10.2% of the total extubated awake in PACU. 28.3% of respondents stated that their institution had standardized guidelines for perioperative management of children with OSA undergoing adenotonsillectomy. People who worked in children's hospitals were significantly more comfortable dealing with children with OSA than people who worked in general hospitals or surgery centers (p=0.004). Conclusions: Apart from using intraop dexamethasone and ondansetron, management varied. These children would likely benefit from best practices perioperative management guidelines.

E157. Pediatric Endoscopic Nasal Septal Perforation Repair: A Systematic Review and Report of a Novel Technique

Lindsey E. Ryan, MD, Tampa, FL; Gary D. Josephson, MD, Jacksonville, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the pertinent anatomy and blood supply related to the nasal septum as it relates to septal perforation and options for repair. Participants should demonstrate understanding of available literature on nasal septal perforation repair in the pediatric patient population. A novel technique is presented and illustrated for the audience to consider in their surgical armamentarium in repairing this difficult to treat entity.

Objectives: To perform a systematic review over the past 20 years on the endoscopic surgical repair of nasal septal perforations in children and describe a novel technique. Study Design: Systematic review and description of a novel technique. Methods: A systematic review of the literature was performed searching PubMed to collect all the pertinent cases and series in the English language of endoscopic nasal septal perforation repair in children. Date range, 1998-2018. Results: A total of 19 cases of nasal septal perforation repair in the pediatric population were identified including our two cases. Of these, five were performed through an endoscopic approach. Ages ranged from 8 to 17 years. Mean age at repair was 12.4 years. There was 1 male patient, 1 female, and in 3 cases gender was not specified. Septal perforation sizes ranged from 11-25 mm. Etiology of the perforation included button battery injury, foreign body, previous septoplasty, chronic nasal picking, and trauma. Primary repair was successful in 4 of 5 patients. The remaining patient had partial closure. Followup ranged from 5-20 months. Conclusions: Nasal septal perforation is a rare finding in the pediatric population. Surgical repair is difficult due to limited mucosa for coverage and a small operative field with open approaches more commonly reported. We identified five pediatric cases that utilized the endoscopic approach. Four cases had complete closure and one case partial closure including our two cases. The endoscopic approach is a viable option for closure of septal perforations in children. Larger studies using this technique in children are necessary.

E158. Screening for Obstructive Sleep Apnea in Children with Sickle Cell Disease: A Pilot Study of 100 Patients

Anthony M. Sheyn, MD, Memphis, TN; Stephen R. Larson, MD, Memphis, TN (Presenter); Jeremie Estep, MD, Memphis, TN; M. Boyd Gillespie, MD, Memphis, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to compare sleep disordered breathing in children with sickle cell disease and children without sickle cell disease.

Objectives: To determine whether children with sickle cell disease are at higher risk of having obstructive sleep apnea relative to the general population. Study Design: Prospective. Methods: IRB approval was obtained. A screening questionnaire was presented prospectively to 100 consecutive patients with SCD regardless of complaints of SDB. Data analysis was then performed. Results: Out of 100 patients, 51 were female. The average age, BMI, BMI% and IMSLEEPY score of the entire cohort were: 3.95 years, 15.972, 55.3%, and 1.63. A score of lower than 3 indicates a low likelihood of having a positive polysomnogram. 20/100 patients had a positive sleep apnea screening score. The average age BMI, BMI%, and IMSLEEPY score were: 3.77, 16.67, 65%, and 3.95. Other than age all were higher when compared to overall cohort. 6 patients have completed PSG with 2 diagnosed sleep apnea. Conclusions: While more sleep studies are yet to be collected, this pilot study demonstrates a higher incidence of at least SDB in the sickle cell population relative to non-SCD population (20% vs. 11%). While more PSG reports and further testing is needed to determine whether the results hold, this

may indicate that children with SCD should at least undergo OSA screening in the office even with absence of symptoms.

E159. Lateral Neck Radiography in Preoperative Evaluation of Adenoid Hypertrophy

Liuba Soldatova, MD, Philadelphia, PA; Hansel J. Otero, MD, Philadelphia, PA; David Saul, MD, Philadelphia, PA; Christian A. Barrera, MD, Philadelphia, PA; Lisa M. Elden, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to: 1) acquire knowledge about various methods of radiographic assessment of nasopharyngeal airway size and adenoid hypertrophy on lateral neck radiographs; 2) learn about the predictive value of lateral neck radiographs in preoperative assessment of adenoid hypertrophy and upper airway obstruction; and 3) appreciate additional supplemental information that can be gained from lateral neck radiographs prior to adenoidectomy.

Objectives: To determine the predictive value of lateral neck radiographs in quantifying adenoid size prior to adenoidectomy. **Study Design:** Retrospective chart review. **Methods:** The percent airway obstruction was calculated as a ratio of adenoid size to the size of the nasopharyngeal airway on the lateral neck radiographs of children who underwent adenoidectomy. **Quantitative radiologic grading of adenoids was correlated with the intraoperative grading. Results:** The gamma correlation coefficient between radiologic and intraoperative adenoid grading was 0.54 (N=426, $p < 0.0001$) indicating positive correlation. **Secondary data review included selection of cases in agreement between quantitative radiologic and intraoperative adenoid grading and analysis of the moderately obstructive and severely obstructive adenoid categories (mildly obstructive category was omitted due to a small number of cases within the sample). The percent airway obstruction was significantly different between severely obstructive (N=137, mean=94.71, SD 6.55, range [72.00; 100.00]) and moderately obstructive adenoids (mean=78.53, SD 6.91, range [63.67; 98.08], N=93) within clinically relevant age groups ($p < 0.0001$) and for the entire data set ($p < 0.0001$). Conclusions:** The percent airway obstruction was significantly different between moderately obstructive and severely obstructive intraoperative categories for the cases in agreement with radiographic grading. A cut-off point of 65% obstruction can be inferred from the present data set (value two standard deviations below the mean for moderately obstructive category). Depending on clinical symptoms, it can provide supplemental information to be used when deciding to proceed with adenoidectomy, and if validated by future outcome studies, can become a useful adjunct in clinical settings.

E160. Effect of Ibuprofen Dosing Interval on Post-Tonsillectomy Outcomes

Levi D. Stevens, MD, Morgantown, WV; Christopher Aaron Roberts, MD, Morgantown, WV; Krysta Henderson, MS-3, Morgantown, WV; Denise Holcomb, RN, Morgantown, WV; Michele M. Carr, DDS MD PhD, Morgantown, WV

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the outcomes of post-tonsillectomy bleeding rates, ER visits, and calls for pain before and after a change in ibuprofen dosing interval was implemented. The participants should be able to understand and explain the purpose and use of run charts to display pre-post intervention data trends.

Objectives: To determine if lengthening our current dose interval of standing ibuprofen after pediatric tonsillectomy improves the bleeding rate without increasing ER visits for pain/dehydration or nurse phone calls about pain. **Study Design:** Nonrandomized, pre-post intervention study. **Methods:** Charts of all children undergoing tonsillectomy with one surgeon from June 2017 to June 2018 were reviewed for: 1) discharge medications; 2) phone calls to our clinic about pain; 3) visits to the ER for reasons other than bleeding; and 4) bleeding episodes within 2 weeks after surgery. On January 1, 2018 our ibuprofen regimen changed from q6h standing to q8h standing for the first 48 hours after surgery. Parents were given written instructions on discharge. **Perioperative nursing staff were involved in patient counselling. Results:** There were 83 children prior to the intervention and 102 children after. Phone calls about pain, ER visits, and bleeding episodes after tonsillectomy were reduced after the intervention started. Run charts were created for each variable. **Conclusions:** Improvement has been seen in the target outcome (bleeding after tonsillectomy) and also in the areas of concern about possible adverse side effects (ER visits and phone calls about pain control problems). This may be related to more attention paid to parent counselling about postop pain control. **Areas for further work include:** parental understanding of postop instructions, actual usage of postop pain medications, and other unanticipated side effects of this regimen.

E161. Effectiveness of Drug Induced Sleep Endoscopy or Cine MRI Driven Adenoidectomy for Children with Obstructive Sleep Apnea

James C. Wang, MD PhD, Cincinnati, OH; David R. Lee, MD, Cincinnati, OH; Erin Harvey, BS, Cincinnati, OH; David F. Smith, MD PhD, Cincinnati, OH; Stacey L. Ishman, MD MPH, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the utility of DISE or cine MRI directed adenoidectomy in regards to improvement of obstructive sleep apnea.

Objectives: Drug induced sleep endoscopy (DISE) and/or cine MRI have been utilized to identify surgical management for pediatric patients with obstructive sleep apnea (OSA). This study examines polysomnographic (PSG) outcomes for children with OSA undergoing DISE or cine MRI directed adenoidectomy. **Study Design:** Single institution retrospective case series. **Methods:** We reviewed children (2-18 years old) diagnosed with OSA (obstructive apnea hypopnea index [oAHI] >1 event/hour) treated with adenoidectomy after DISE or cine MRI between 2008-2017. Patients were excluded if

they did not have pre- and post-treatment polysomnograms. Demographic data and comorbid diagnoses were collected. We assessed pre- and post-treatment sleep variables including oAHI, oxygen saturation nadir, and end tidal carbon dioxide (ETCO₂) >50mmHg. Results: We assessed 23 children (43% female, 87% white, median BMI percentile=99.9), with a median age of 7.0 years (95% confidence interval (CI):2.4-16.3). Comorbidities included Down syndrome (30.0%), craniofacial abnormalities (65%) and craniosynostosis (13%). 78% had at least one comorbidity. After treatment, there were significant improvements in the AHI from 11.9 (95% CI:3.9-89.9) to 5.8 events/hour (95% CI:1.1-38.7, P=0.035). The oAHI improvement was not significant [7.6 events/hour (95% CI:1.6-22.3) to 4.0 events/hour (95% CI:1.1-28.6, P=0.86)]. After surgery, no children had an oAHI<1 and 13 (56%) had an oAHI<1 event/hour; 11/18 (61%) with moderate/severe OSA had mild OSA after adenoidectomy. Conclusions: Adenoidectomy improved but did not resolve OSA for children undergoing DISE or cine MRI directed adenoidectomy. Overall, 56% had mild OSA after surgery. Additional surgical options should be considered in these children.

E162. Shared Decision Making and Decisional Conflict in Otolaryngology Patients

Habib G. Zalzal, MD, Morgantown, WV; Reena Razdan, BA, Morgantown, WV; Rodrigo O. Reyna, BA, Morgantown, WV; Alex S. Mason, BA, Morgantown, WV; Amy M. Schattel, BA, Morgantown, WV; Michele M. Carr, MD, Morgantown, WV

Educational Objective: At the conclusion of this presentation, the participants should understand the components affecting patient decision making and whether they can be influenced from a physician standpoint to reduce decisional conflict regarding medical decision making.

Objectives: To determine if shared decision making (SDM) and decisional conflict (DC) vary between individuals seeing specific otolaryngologists or otolaryngology subspecialties. Study Design: Cross-sectional observational study. Methods: Consecutive patients consented for surgery were surveyed using validated scales for SDM and DC. Demographic details included respondent age, gender, education level, marital status, whether the consent was for themselves or their child, disease process, and surgery. Scores were evaluated for all demographic variables, as well as individual surgeon, surgeon gender, surgeon age, and specialty (general, pediatric, and head and neck oncology). Significance value of P < 0.05 with a Bonferroni correction was used. Results: A total of 150 patients completed the surveys. Females comprised 118 (78.7%) of respondents, and 84 participants (62.7%) signed consent for a child. Fifteen otolaryngologists were enrolled with 12 (80%) being male. Seven otolaryngologists were < 40 years old. No significant differences were found among individual and total scores for SDM and DC when compared among or between patient demographics (P>0.05). No significant difference was found when SDM and DC were evaluated for surgeon characteristics as well (P>0.05). Conclusions: SDM and DC scores do not vary depending on patient characteristics, otolaryngologist characteristics, and otolaryngology subspecialty. Some factors affecting SDM and DC may not be controllable by the otolaryngologist.

Triological Society National Awards

The Triological Society Gold Medal

1933. Max. A. Goldstein, MD
2001. Byron J. Bailey, MD
2005. Michael M.E. Johns, MD

2009. Patrick E. Brookhouser, MD
2013. Harold C. Pillsbury, MD

Patrick E. Brookhouser, MD Award for Excellence

2013. Gerald B. Healy, MD FACS
2014. H. Bryan Neel III, MD PhD FACS
2015. Robert H. Miller, MD MBA FACS
2016. Frank E. Lucente, MD FACS

2017. Charles M. Luetje, MD FACS
2018. Roger L. Crumley, MD MBA FACS
2019. Stanley M. Shapshay, MD FACS

Executive Secretaries

1896 to 1900 Robert C. Myles, MD
1901 to 1906 Wendell C. Phillips, MD
1907 to 1916 Thomas J. Harris, MD
1917 to 1924 William H. Haskins, MD
1925 to 1936 Robert L. Loughran, MD
1936 to 1962 C. Stewart Nash, MD
1962 to 1968 Victor R. Alfaro, MD
1968 to 1974 Louis E. Silcox, MD
1974 to 1980 Richard R. Ruggles, MD

1980 to 1984 William M. Tribble, MD
1984 to 1988 Frank N. Ritter, MD
1989 to 1992 Michael M.E. Johns, MD
1993 to 1996 Robert H. Miller, MD
1997 to 2004 Patrick E. Brookhouser, MD
2005. Gerald B. Healy, MD
2006 to 2011 Patrick E. Brookhouser, MD
2011 to 2013 Gerald B. Healy, MD

Executive Vice President

2013 to 2019 Myles L. Pensak, MD

Presidents

*1896 Edward B. Dench, MD
*1897 Frank Hyatt, MD
*1898 William H. Daley, MD
*1899 S.E. Solly, MD
*1900 D. Brayden Kyle, MD
*1901 Robert C. Myles, MD
*1902 Charles W. Richardson, MD
*1903 J.A. Stuckey, MD
*1904 Norval H. Pierce, MD
*1905 Frederick F. Cobb, MD
*1906 James E. Logan, MD
*1907 Wendel C. Phillips, MD
*1908 Ewing W. Day, MD
*1909 Christian R. Holmes, MD
*1910 James F. McKenna, MD
*1911 Chevalier Jackson, MD
*1912 G. Hudson Jakuen, MD
*1913 H. Holbrook Curtis, MD
*1914 Joseph A. White, MD
*1915 Robert Levy, MD
*1916 S. MacCuen Smith, MD
*1917 Thomas J. Harris, MD
*1918 George L. Richards, MD
*1919 Herbert S. Birkett, MD
*1920 Harris P. Mosher, MD
*1921 Lee Wallace Dean, MD
*1922 Lewis A. Coffin, MD
*1923 Dunbar Roy, MD
*1924 Hanau W. Loeb, MD
*1925 William H. Haskin, MD

*1926 John M. Ingersoll, MD
*1927 Burt R. Shurly, MD
*1928 John F. Barnhill, MD
*1929 Hill Hastings, MD
*1930 Ross Hall Skillern, MD
*1931 Max A. Goldstein, MD
*1932 Edmund Prince Fowler, MD
*1933 Joseph C. Beck, MD
*1934 J.W. Jervy, MD
*1935 Perry G. Goldsmith, MD
*1936 Thomas E. Carmody, MD
*1937 George M. Coates, MD
*1938 Samuel J. Kopetzky, MD
*1939 Harold I. Lillie, MD
*1940 Lee M. Hurd, MD
*1941 J. Mackenzie Brown, MD
*1942 James A. Babbitt, MD
*1943 James G. Dwyer, MD
*1944 H. Marshall Taylor, MD
*1945 Albert C. Furstenberg, MD
*1946 Albert C. Furstenberg, MD
*1947 Harry W. Lyman, MD
*1948 Lyman G. Richards, MD
*1949 John J. Shea, MD
*1950 Robert C. Martin, MD
*1951 Louis H. Clerf, MD
*1952 C. Stewart Nash, MD
*1953 Francis E. LeJeune, MD
*1954 Leroy A. Schall, MD
*1955 Kenneth M. Day, MD

Presidents cont'd

*1956	Dean M. Lierle, MD	*1987	Roger Boles, MD
*1957	Percy E. Ireland, MD	*1988	Harold G. Tabb, MD
*1958	Lawrence R. Boies, MD	*1989	Malcolm H. Stroud, MD
*1959	Gordon D. Hoople, MD	1990	M. Stuart Strong, MD
*1960	Theodore E. Walsh, MD	*1991	Paul H. Ward, MD
*1961	Fletcher D. Woodward, MD	*1992	A. Paul Keller, Jr., MD
*1962	John R. Lindsay, MD	*1993	Frank N. Ritter, MD
*1963	Howard P. House, MD	1994	Richard R. Gacek, MD
*1964	John E. Bordley, MD	*1995	Patrick J. Doyle, MD
*1965	George E. Shambaugh, Jr., MD	*1996	William R. Hudson, MD
*1966	Francis W. Davison, MD	1997	H. Bryan Neel, MD
*1967	Shirley H. Baron, MD	1998	Stanley M. Blaugrund, MD
*1968	G. Slaughter Fitz-Hugh, MD	*1999	Mansfield F. W. Smith, MD
*1969	Jerome A. Hilger, MD	2000	Charles W. Gross, MD
*1970	Joseph L. Goldman, MD	2001	Edward L. Applebaum, MD
*1971	Victor Goodhill, MD	2002	Gerald B. Healy, MD
*1972	Victor R. Alfaro, MD	2003	Roger L. Crumley, MD
*1973	Walter P. Work, MD	*2004	Robert A. Jahrsdoerfer, MD
*1974	Raymond E. Jordan, MD	*2005	Patrick E. Brookhouser, MD
*1974	Louis E. Silcox, MD	2006	Stanley M. Shapshay, MD
*1975	David D. DeWeese, MD	*2007	David F. Wilson, MD
*1976	James A. Harrill, MD	2008	Harold C. Pillsbury, MD
*1977	Joseph H. Ogura, MD	2009	Myles L. Pensak, MD
*1978	Daniel Miller, MD	2010	Frank E. Lucente, MD
*1979	Francis A. Sooy, MD	2011	Gerald S. Berke, MD
*1980	Beverly W. Armstrong, MD	2012	Robert H. Ossoff, DMD MD
*1981	G. O'Neill Proud, MD	2013	Jesus E. Medina, MD
*1982	John A. Kirchner, MD	2014	Jonas T. Johnson, MD FACS
*1983	Robin Michelson, MD	2015	Derald E. Brackmann, MD
*1984	Carl N. Patterson, MD	*2016	Fred D. Owens, MD
*1985	William H. Saunders, MD	2017	Charles W. Beatty, MD FACS
*1986	Wesley H. Bradley, MD	2018	Mark S. Persky, MD FACS
		2019	Sigsbee W. Duck, MD FACS

* deceased

Guests of Honor

1947	J. McKenzie Brown, MD	1972	Carlos Munoz-MacCormick, MD
1948	Harold Walker, MD	1973	Dean Lierle, MD
1949	Claude C. Cody, Jr., MD	1974	Raymond Jordon, MD
1950	Harris P. Mosher, MD	1975	Frank Lathrop, MD
1951	Duncan McPherson, MD	1976	John Bordley, MD
1952	D.C. Jarvis, MD	1977	Max Soni, MD
1953	Charles A. Thigpan, MD		W.E.N. Harrison, MD
1954	J. Parsons Schaeffer, MD	1978	Moses Lurie, MD
1955	Edward P. Fowler, MD	1979	Shirley Baron, MD
1956	Harold L. Lillie, MD	1980	Frank Lathrop, MD
1957	Not Available		Harry Rosen-Wasser, MD
1958	Arnold S. Diehl, MD	1981	Ben Senturia, MD
1959	Frederick T. Hill, MD	1982	Harold Schuknecht, MD
1960	Terence Cawthorne, MD		Ugo Fisch, MD
1961	Milton J. Robb, MD	1983	Walter Work, MD
1962	Thomas C. Galloway, MD		Roy B. Cohn, MD
1963	Robert C. Martin, MD	1984	Beverly Armstong, MD
1964	C. Stewart Nash, MD	1985	G.O. Proud, MD
1965	Georges Portmann, MD	1986	Daniel Miller, MD
1966	Gordon D. Hoople, MD	1987	Paul Ebert, MD
1967	Albery C. Furstenberg, MD	1988	Robert W. Brown, MD
1968	Francis E. LeJeune, MD	1989	Hallowell Davis, MD
1969	Lawrence R. Boies, MD	1990	George Reed, MD
1970	Victor Alfaro, MD	1991	Victor Goodhill, MD
1971	Vern O. Knudsen, PhD	1992	Roger Boles, MD

Guests of Honor cont'd

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
2012. Paul A. Levine, MD
2013. Robert H. Mathog, MD
2014. Michael M.E. Johns, MD
2015. Gerald S. Berke, MD FACS
2016. William H. Owens
2017. H. Bryan Neel, III, MD PhD FACS
2018. Dana M. Thompson, MD FACS
2019. Harold C. Pillsbury, MD FACS

Joseph H. Ogura, MD 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.)
2012. James L. Netterville, MD
2013. Randal S. Weber, MD
2014. David E. Eibling, MD FACS
2015. Uttam K. Sinha, MD FACS
2016. Jonas T. Johnson, MD FACS
2017. Eric J. Moore, MD FACS
2018. Dana M. Thompson, MD FACS
2019. James P. Bagian, MD PE

Fifty Year Club

1949

Ernest R.V. Anderson, MD Camarillo, CA
Julio Quevedo, MD Guatemala City

1950

Arthur L. Juers, MD Ivins, UT

1951

Howard C. High, Jr., MD Milwaukee, WI

1953

Bert A. De Bord, Jr., MD Temple, TX

1955

G. Dekle Taylor, MD Jacksonville, FL

1956

J.H. Thomas Rambo, MD New York, NY

1957

William Skokan, MD Fort Worth, TX

1958

Hershel H. Burston, MD Studio City, CA
James F. Gardner, MD Pittsford, NY

1959

Seymour J. Brockman, MD Pacific Palisades, CA
Peter A. Wallenborn Jr., MD Huntsville, AL
Warren E. Wiesinger, MD Oakland, CA

1960

John T. Bickmore, MD Bonita Springs, FL
James M. Cole, MD Danville, PA
James M. Timmons, MD Lexington, SC

1961

Richard T. Farrior, MD FACS Tampa, FL
Irwin Harris, MD FACS Los Angeles, CA
Fred H. Linthicum Jr., MD Malibu, CA
Ludwig A. Michael, MD FACS Dallas, TX
William F. Robbett, MD Manhasset, NY

1962

Irving M. Blatt, MD FACS Schriever, LA
M. Stuart Strong, MD Bedford, MA
John H. Webb Jr., MD Orlando, FL

Fifty Year Club cont'd

1963

H.A. Ted Bailey, Jr., MD Little Rock, AR
 Arthur J. Gorney, MD Sarasota, FL
 William C. Livingood, MD Orlando, FL
 George T. Nager, MD Baltimore, MD
 Michael M. Paparella, MD Minneapolis, MN

1964

Ned I. Chalut, MD FACS St. Clair Shores, MI
 Daniel J. Fahey, MD FACS Williamsville, NY
 Merrill Goodman, MD FACS Port Washington, NY
 John C. Lillie, MD Rochester, MN

1965

Sidney N. Busis, MD FACS Pittsburgh, PA
 George D. Lyons Jr., MD New Orleans, LA
 Francis L. McNelis, MD FACS Warren, RI
 Richard C. Parsons, MD Hartwell, GA

1966

William J. Follette, MD FACS North Palm Beach, FL
 Arthur J. Kuhn, MD Naples, FL
 Harry W. McCurdy, MD FACS Bethesda, MD

1967

William P. Beatrous, MD New Orleans, LA
 Gordon R. Freeman, MD FACS Dyersburg, TN
 George T. Singleton, MD Gainesville, FL
 Ted N. Steffen, MD Louisville, KY
 White M. Wallenborn, MD Charlottesville, VA
 Harold H. Wanamaker, MD Syracuse, NY

1968

Leslie Bernstein, MD El Macero, CA
 Arndt J. Duvall, III, MD White Bear Lake, MN
 Edward L. Hendershot, MD Lodi, OH
 I. Sidney Jaffee, MD FACS Gainesville, FL
 Robert J. Richardson, MD FACS Minneapolis, MN
 John J. Shea Jr., MD Memphis, TN
 Roger A. Simpson, MD Iowa City, IA
 Howard W. Smith, MD DMD FACS New York, NY
 James Byron Snow Jr., MD FACS West Grove, PA

1969

James H. Brandenburg, MD Madison, WI
 Jack E. Brooks, MD FACS Phoenix, AZ
 James F. Hora, MD Kingston, PA
 Lindsay L. Pratt, MD St. Louis, MO
 Harold J. Quinn, MD Shreveport, LA
 Edward W. Stevenson, MD FACS Birmingham, AL
 John S. Turner Jr., MD Stone Mountain, GA
 Robert J. Wolfson, MD Gladwyne, PA

Please report discrepancies to the Triological
 Administrative Office (beth@triological.org)

In Memoriam

The following deaths have been reported to the Administrative Office since the publication of the 2018 Annual Program.

	Elected	Died
Warren Y. Adkins Jr., MD Mount Pleasant, SC	1982	2018
James D. Baxter, MD Burlington, ON Canada	1976	2017
Noel L. Cohen, MD FACS New York, NY	1974	2019
Sidney S. Feuerstein, MD FACS Palm Beach, FL	1964	2017
Minoru Hirano, MD Kurume, Japan	1997	2018
James C. Hutchinson, Jr., MD FACS Melrose Park, IL	1982	2018
C. Gary Jackson, MD Brentwood, TN	1988	2018
Robert I. Kohut, MD Woodleaf, NC	1974	2019
Joseph H. Leek, MD St. Simons Island, GA	1973	2017
Gregory J. Matz, MD FACS Maywood, IL	1975	2017
Arnold M. Noyek, MD FACS Toronto, ON Canada	1979	2018
Stanley E. Thawley, MD FACS St. Louis, MO	1981	2019
David F. Wilson, MD Portland, OR	1985	2018

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James Toomey, MD
Lawrence W. Travis, MD FACS
Richard J. Trevino, MD FACS
Harvey M. Tucker, MD
John S. Turner Jr., MD
Wayne A. Viers, MD

Senior Fellows cont'd

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Donald P. Vrabec, MD
Richard W. Waguespack, MD FACS
Joseph W. Walike, MD
Peter A. Wallenborn Jr., MD
White M. Wallenborn, MD
Harold H. Wanamaker, MD
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Anthony J. Yonkers, MD FACS
John W. Youngblood, MD
Joan T. Zajtchuk, MD FACS
Dean H. Zobell, MD
Harry Zoller, MD FACS

Inactive Fellows

Eugenio A. Aguilar III, MD FACS
Dan Joshua Castro, MD FACS
Newton J. Coker, MD
Richard D. Fantozzi, MD FACS
Russell Allen Faust, MD PhD

A. Julianna Gulya, MD FACS
Kevin T. Kavanagh, MD FACS
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Randall L. Plant, MD FACS

Nestor R. Rigual, MD FACS
Nancy Sculerati, MD
Robert C. Sprecher, MD FACS
Robert F. Yellon, MD FACS

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Bruce Benjamin, OBE FRACS
Ettore Bocca, MD
Patrick J. Bradley, MD FACS
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George Choa, MD FACS
Harvey L.C. Coates, FRACS
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Bahman Emami, MD
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Juan Manuel Garcia Gomez, MD

Tu Guy-Yi, MD
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Alessandra Rinaldo, MD FACS
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Isamu Sando, MD
Kiminori Sato, MD PhD
Gordon B. Snow, MD
Jack Snyder, MD
Juan M. Tato, MD
Mirko Tos, MD
Paul Van Den Broek, MD PhD
William H. Wachter
John C. Watkinson, MSC MS DLO
Sabina Wullstein, MD
Thomas Wustrow, MD FACS
Eiji Yumoto, MD

Candidates Preparing Theses

Eelam A. Adil, MD MBA
Nishant Agrawal, MD FACS
Samantha Anne, MD FACS
Ellis M. Arjmand, MD PhD FACS
Karthik Balakrishnan, MD MPH FACS
Ben J. Balough, MD
Naveen D. Bhandarkar, MD
Benjamin Saul Skorr Bleier, MD FACS
Maurits S. Boon, MD
Sarah N. Bowe, MD FACS
Michael J. Brenner, MD FACS
Matthew Thomas Brigger, MD MPH
Matthew Alexander Bromwich, MD
FRCSC BSc
Valerie Julie Brousseau, MDCM FRCSC
Kevin David Brown, MD PhD
Farrel Joel Buchinsky, MBChB BSc FACS
Eugene Hanyoung Chang, MD FACS
Jolie L. Chang, MD FACS

Douglas B. Chepeha, MD MScPH FACS
J. Jared Christophel, MD MPH FACS
Matthew S. Clary, MD
David B. Conley, MD FACS
Marion Everett Couch, MD PhD MBA
FACS
James Vincent Crawford, MD BS
Robert D. Cullen, MD
Sharon L. Cushing, MD BScH MSc
Mark D. Delacure, MD FACS
Megan L. Durr, MD FACS
Umamaheswar Duvvuri, MD PhD FACS
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Ivan El-Sayed, MD FACS
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Michael Seth Goldrich, MD FACS
Quinton S. Gopen, MD
Satish Govindaraj, MD FACS

Scott M. Graham, MD
Trevor G. Hackman, MD
James A. Hadley, MD FACS
Catherine K. Hart, MD
Ryan N. Heffelfinger, MD BS
Ronna Hertzano, MD PhD
Barry E. Hirsch, MD
Paul Theodore Hoff, MD FACS
F. Christopher Holsinger, MD FACS
Melton J. Horwitz, MD FACS
Kevin Chung-Kai Huoh, MD
Kris R. Jatana, MD FACS
Paul Elvin Johnson, MD FACS
Arjun Shankar Joshi, MD FACS
Elina F. Kari, MD
Seungwon Kim, MD
Young Jun Kim, MD PhD FACS
Philip Daniel Knott, MD
Jeffrey A. Koempel, MD MBA

Candidates Preparing Theses cont'd

Devyani Lal, MD MBBS MS
Amy Anne Donatelli Lassig, MD FACS
Marcie Marie Lesperance, MD MS FACS
Charles J. Limb, MD
Derrick Telun Lin, MD FACS
David Gary Lott, MD
Stephen Charles Matuso, MD
Andrew Alexander McCall, MD FACS
Kevin Christopher McMains, MD
Jeremy D. Meier, MD
Frank R. Miller, MD FACS
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Rick F. Nelson, MD PhD
Daniel W. Nuss, MD FACS
Margaret A. Ogden, MD FACS
Thomas J. Ow, MD FACS
James N. Palmer, MD
Samip N. Patel, MD FACS

Yash J. Patil, MD FACS
Spencer Cranston Payne, MD
Michael Peter Platt, MD BS
Gregory N. Postma, MD
Douglas D. Reh, MD
Vicente A. Resto, MD PhD FACS
Jason T. Rich, MD FACS
Gresham T. Richter, MD FACS
Scott Michael Rickert, MD FACS
Pamela C. Roehm, MD PhD
Marc Robert Rosen, MD FACS
Paul Thomas Russell, MD
Michael J. Rutter, BHB MBChB FRACS
Babak Sadoughi, MD FACS
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Gavin Setzen, MD FACS
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Ameet S. Singh, MD

Davud Bardaran Sirjani, MD FACS
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Edward M. Weaver, MD MPH FACS
Alisha Nicole West, MD
Troy D. Woodard, MD FACS
Nancy M. Young, MD FACS
Carlton Jude Zdanski, MD FAAP FACS

PostGraduate Members

Geoffrey P. Aaron, MD
Ksenia A. Aaron, MD
Jason M. Abramowitz, MD
Omar H. Ahmed, MD
Aurash S. Alemi, MD
Kristan P. Alfonso, MD
Kristen V.H. Angster, MD
Christopher Eric Bailey, MD
Brandon Jackson Baird, MD
Sanjeer Balamohan, MD
Keith J. Basler, MD
Shethal Bearely, MD
Angelique M. Berens, MD
Mathieu Bergeron, MD
Regan W. Bergmark, MD
Daniel M. Beswick, MD
Jay M. Bhatt, MD
Amit N. Bhojwani, MD
Brian N. Boone, MD
Ryan C. Borek, MD
Christopher John Britt, MD
Christopher D. Brook, MD
Andrew M. Bur, MD
Rachel B. Cain, MD
Zachary J. Cappello, MD
Daniel A. Carlton, MD
Matthew L. Carmichael, MD
Daniel J. Carroll, MD
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John D. Cramer, MD
Ryan Crane, MD

Matthew Gordon Crowson, MD
Deepa Danan, MD
Andrew T. Day, MD
Kristine Elizabeth Day, MD
Nicholas L. Deep, MD
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Nicholas A. Dewyer, MD
Sandeep Dhaliwal, MD
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Felicity M.B. Lenex-Voit, MD
Joshua M. Levy, MD
Rui Jun Lin, MD
Tzyy-Nong Liou, MD
Christopher V. Lisi, MD

PostGraduate Members cont'd

Alexander K. Malone, MD
Amy Manning, MD
Sonya Marcus, MD
Alexander P. Marston, MD
Sean T. Massa, MD
Patrick O. McGarey, MD
Conor W. McLaughlin, MD
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Aykut A. Unsal, DO MS
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Yona Vaisbuch, MD
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Mary Lauren Worthen, MD
Shiayin F. Yang, MD
Yin Yiu, MD
Frederick Yoo, MD
Jason L. Yu, MD
Soroush Zaghi, MD

Resident Members

Anish Abrol, MD
Nicholas B. Abt, MD
Joseph R. Acevedo, MD
Annie K. Ahn, MD
Suhyla Alam, MD
Anthony P. Alessi, MD
David K. Alexander, MD
Syed A. Ali, MD
Mohamedkazim M. Alwani, MD
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Luke N. Andera, MD
Danielle C. Anderson, MD
Yvette R. Anderson, MD
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Karam W. Badran, MD

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Michael H. Berger, MD
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Colin T. Bohr, DO
Craig A. Bollig, MD
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Bryan M. Brandon, MD
Amishav Y. Bresler, MD
Sabrina A. Brody-Camp, MD
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Jason R. Brown, MD
Jens C. Brown, DO
William Colby Brown, MD
Jacob P. Brunner, MD
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Ciersten A. Burks, MD
Kent L. Burton, MD
Philip Ryan M. Camilon, MD
David A. Campbell, MD
Michael William Canfarotta, MD
Garrett G. Casale, MD
Lauren M. Cass, MD

Resident Members cont'd

Janice E. Chang, MD
Joseph Chang, MD
Divya A. Chari, MD
D. Wenhua Chen, MD
David S. Chen, MD
Jenny X. Chen, MD
Michelle M. Chen, MD
Esther A. Cheng, MD
Janet S. Choi, MD
David W. Chou, MD
Sei Y. Chung, MD
Kate L. Clancy, MD
Bhavishya S. Clark, MD
C. Alessandra Colaianni, MD
Arron M. Cole, MD
Nicole J. Colgrove, MD
Rebecca A. Compton, MD
Joseph H. Conduff III, MD
Andrew J. Coniglio, MD
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Justin E. Cottrell, MD
John A. Crenshaw, MD
Steven A. Curti, MD
Macaela J. Dagucon, MD
Benjamin J. Damazo, MD
Opeoluwa O. Daniyan, MD
Pedram Daraei, MD
Richard O. Davila, MD
Andrew B. Davis, MD
Ruth J. Davis, MD
Wesley L. Davison, MD
Joseph A. de Gruy, MD
Kelly Marie Dean, MD
Carolyn A. DeBiase, MD
Tyler K. DeBlieux, MD
Jaron M. Densky, MD
Adeeb Derakhshan, MD
Anita Deshpande, MD
Jacob K. Dey, MD
Amanda E. Dilger, MD
Corina Din-Lovinescu, MD
Karl William Doerfer, MD
Eric Michael Dowling, MD
Madeleine Drusin, MD
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Luke W. Edelmayer, MD
Colin Edwards, MD
Abhinav R. ETTYREDDY, MD
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Danielle F. Eytan, MD
Jeffrey J. Falco, MD
Farhoud Faraji, MD
Soroush Farnoosh, MD
Douglas R. Farquhar, MD
Zainab Farzal, MD
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Mathieu Forgues, MD
Joel Franco, MD
Anna Frants, MD
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Monika E. Freiser, MD
Hudson M. Frey, MD
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Sara C. Gallant, MD
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Trevor W. Getz, MD
Saied Ghadersohi, MD
Shabnam Ghazizadeh, MD
Saba Ghorab, MD
Marian W. Ghraib, MD
Victoria B. Givens, MD
Stefania Goncalves, MD
Enrique G. Gorbea, MD
Scott W. Gorthey, MD
Susannah C. Gould, MD
Mingyang L. Gray, MD
Tedeon K. Green, MD
Matthew C. Gropler, MD
Abhijit R. Gundale, MD
Scott R. Hall, MD
Tyler R. Halle, MD
Chelsea S. Hamill, MD
Thomas K. Hamilton, MD
Andrea L. Hanick, MD
John E. Hanks, MD
Frances Mei Hardin, MD
Jeffrey Harmon, MD
Jonathan A. Harounian, MD
Vandra C. Harris, MD
Erin K. Haser, MD
Casey Y. Hay, MD
Cameron M. Heilbronn, MD
Samuel N. Helman, MD
Sandra H. Ho, MD
Elizabeth A. Hobbs, MD
Sarah E. Hodge, MD
Sean P. Holmes, MD
Thomas W. Holmes, MD
Justin W. Holt, MD
Kathryn R. Hoppe, MD
Laura K. House, MD
Jessica B. Howell, MD
Shirley Hu, MD
Benjamin N. Hunter, MD
Kevin Hur, MD
Rachel T. Irizarry, MD
Mohamad R. Issa, MD
Ayaka J. Iwata, MD
Lia K. Jacobson, MD
Danny B. Jandali, MD
Sebastian M. Jara, MD
Pawina Jiramongkolchai, MD
Christopher Z. Johnson, MD
Jeffrey D. Johnson, MD
Jaxon W. Jordan, MD
Natalie S. Justicz, MD
Jacob Kahane, MD
Joanna Kam, MD
Rebecca J. Kamil, MD
Ankit Kansal, MD
Vivek Kanumuri, MD
Richard Kao, MD
Anatoli F. Karas, MD
David A. Kasle, MD
Christopher R. Kaufmann, MD
Vivian F. Kaul, MD
Aasif A. Kazi, MD
Suraj Kedarisetty, MD
Naushad M. Khakoo, MD
Sarah Khayat, MD
Sarah M. Kidwai, MD
Christine S. Kim, MD
Grace S. Kim, MD
Jeehong Kim, MD
Matthew H. Kim, MD
Natalie A. Kim-Orden, MD
Ashley E. Kita, MD
Jaclyn A. Klimczak, MD
Armine Kocharyan, MD
Nadeem R. Kolia, MD
Rachel A. Kominsky, MD
Yann-Fuu Kou, MD
Kevin J. Kovatch, MD
Yoseph A. Kram, MD
Scott T. Kramer, MD
Natalie A. Krane, MD
Rijul S. Kshirsagar, MD
Kathryn M. Kudlaty, MD
Anisha R. Kumar, MD
Susan Kurian, MD
Alex B. Labby, MD
Paul A. Lambert, MD
Evie C. Landry, MD
Dustin M. Lang, MD
Alexander Eric Lanigan, MD
Richard H. Law, MD
Phong T. Le, MD
Brittany Leader, MD
Nicole L. Lebo, MD
Andrew H. Lee, MD
David R. Lee, MD
Eric Q. Lee, MD
Jake J. Lee, MD
Ashton E. Lehmann, MD
Heidi E. L'Esperance, MD
Christopher J. Leto, MD
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Chen Lin, MD
Jiahui Lin, MD
Jonathan K. Lin, MD
Ioan A. Lina, MD
Sara W. Liu, MD
Devon M. Livingstone, MD
Garrett D. Locketz, MD
Sarah A. Lookabaugh, MD
Erin Mamuyac Lopez, MD
Benjamin D. Lovin, MD
Alexander L. Luryi, MD
Marlon M. Maducdoc, MD

Resident Members cont'd

Leila J. Mady, MD
Hossein Mahboubi, MD
Ahmad F. Mahmoud, MD
Matthew T. Maksimoski, MD
Jonathan R. Mallen, MD
Mohammed Mamdani, MD
Brian F. Manzi, MD
Nauman F. Manzoor, MD
Kastley M. Marvin, MD
Eric C. Mason, MD
Frank H. Masters III, MD
Adam C. McCann, MD
Kathleen E. McClain, DO
Joseph H. McClellan, MD
Hilary C. McCrary, MD
Christopher I. McHugh, MD
Brian S. McManus, MD
Casey Means, MD
Lindsey C. Megow, MD
Joseph Benjamin Meleca, MD
Catherine M. Merna, MD
Annika M. Meyer, MD
Steven B. Micucci, MD
Ashley L. Miller, MD
Craig Miller, MD
Justin D. Miller, MD
Lauren E. Miller, MD
Matthew Q. Miller, MD
Mark M. Mims, MD
Roxana Moayer, MD
Suresh Mohan, MD
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Nicole L. Molin, MD
Kevin A. Moore II, MD
Cindy M. Moore, MD
Lindsay S. Moore, MD
William G. Morrel IV, MD
Lindsey E. Moses, MD
Omid Moshtaghi, MD
Kelly F. Moyer, MD
Rula Mualla, MD
Alexander W. Murphey, MD
Calvin W. Myint, MD
Celeste Z. Nagy, MD
Ashley M. Nassiri, MD
Jason C. Nellis, MD
Rebecca Chota Nelson, MD
Miles R. Neumann, MD
Christopher W. Noel, MD
Leah J. Novinger
Brian A. Nuyen, MD
Adetokunbo A. Obayemi, MD
Daniel C. O'Brien, MD
Ashley P. O'Connell Ferster, MD
Cristen E. Olds, MD
Susannah C. Orzell, MD
Andrew Keith Pappa, MD
Harman S. Parhar, MD
Anuraag S. Parikh, MD
Sean M. Parsel, MD
Matthew D. Partain, MD
Krupa Patel, MD
Pratik B. Patel, MD
Prayag S. Patel, MD

Ronica R. Patel, MD
Tapan D. Patel, MD
Vijay A. Patel, MD
Prasanth Pattisapu, MD
Tiffany Peng, MD
Philip L. Perez, MD
Elizabeth L. Perkins, MD
Katie M. Phillips, MD
Kristen D. Pitts, MD
Marc A. Polacco, MD
Christopher D. Pool, MD
Andrew C. Prince, MD
Matthew R. Purkey, MD
Nicholas A. Quinn, MD
Cyrus C. Rabbani, MD
Apoorva T. Ramaswamy, MD
Cong Ran, MD
Viran J. Ranasinghe, MD
Vinay K. Rathi, MD
Jordan W. Rawl, MD
Amrita Ray, MD
Mallory J. Raymond, MD
Christopher R. Razavi, MD
Lauren K. Reckley, MD
Lara K. Reichert, MD
Yin Ren, MD
William J. Reschly, MD
John P. Richards, MD
Caroline C. Rieger, MD
Ryan A. Rimmer, MD
Christopher A. Roberts, MD
Zachary N. Robinett, MD
Alexander N. Rock, MD
Matthew L. Rohlfing, MD
Stephen J. Romeo, DO
Scott Allan Roof, MD
Janine M. Rotsides, MD
Jason R. Rudman, MD
Shannon F. Rudy, MD
Lindsey E. Ryan, MD
Robert A. Saadi, MD
Chetan Y. Safi, MD
Parsa P. Salehi, MD
Mohamad Z. Saltagi, MD
Daniel Schaerer, MD
Sam D. Schild, MD
Isaac L. Schmale, MD
Stephen S. Schoeff, MD
Adam T. Schwalje, MD
Zachary G. Schwam, MD
Marissa A. Schwartz, MD
Anne M. Selleck, MD
Rosh K.V. Sethi, MD
Rishabh Sethia, MD
Janki Shah, MD
Parth Vinit Shah, MD
Ravi R. Shah, MD
Scott B. Shapiro, MD
Daniel D. Sharbel, MD
Giriraj K. Sharma, MD
Brandon A. Shepherd, MD
Dustin A. Silverman, MD
Jonathan C. Simmonds, MD
Parul Sinha, MD

Pedrom C. Sioshansi, MD
Jennifer M. Siu, MD
Shanmugappiriya Sivarajah, MD
Blaine D. Smith, MD
Erin J. Smith, MD
Liuba Soldatova, MD
Yohan Song, MD
Satyan B. Sreenath, MD
James K. Stanford, MD
Gaelen B. Stanford-Moore, MD
Katelyn Stepan, MD
Ryan M. Stephenson, MD
Kristin L. Stevens, MD
William A. Stokes, MD
Jeffrey M. Straub, MD
Madeleine P. Strohl, MD
Vanessa C. Stubbs, MD
Rahul S. Subbarayan, MD
Daniel C. Sukato, MD
Christopher B. Sullivan, MD
Brian P. Swendseid, MD
Tyler Paul Swiss, MD
John T. Symms, MD
Blake R. Szelestey, MD
Ryan D. Tabtabai, MD
Rehab Talat, MD
Akina Tamaki, MD
Alex J.F. Tampo, MD
Grace X. Tan, MD
Liyang Tang, MD
April M. Tanner, MD
Zahrah M. Taufique, MD
Taylor B. Teplitzky, MD
Nicholas James Thompson, MD
William S. Tierney, MD
Alisa Timashpolsky, MD
Kiranya E. Tipirneni
Sarah M. Tittman, MD
Michael C. Topf, MD
Vanessa F. Torrecillas, MD
Prem Bharat Tripathi, MD
Andrew G. Tritter, MD
Chelsea A. Troiano, MD
Michal Trope, MD
Kristy H. Truong, MD
Nathan C. Tu, MD
Olivia Twu, MD
Reza Vaezeafshar, MD
Dianne G. Valenzuela, MD
Adam J. Van Horn, MD
Varun V. Varadarajan, MD
Jonathon W. Vargo, MD
Adam P. Vasconcellos, MD
Varun Vendra, MD
Avanti Verma, MD
Peter M. Vila, MD
Douglas Von Allmen, MD
Brian A. Walker, MD
Scott K. Walton, MD
Cynthia S. Wang, MD
James C. Wang, MD
Tammy J. Wang, MD
Tiffany Wang, MD
Weitao Wang, MD

Resident Members cont'd

Tyler S. Weaver, MD
Michael H. Weber, MD
Justin M. Wei, MD
Jennifer R. White, MD
Elizabeth H. Wick, MD
Nathan Wiebracht, MD
Melina J. Windon, MD
Stephanie J. Wong, MD
Alan D. Workman, MD
Douglas M. Worrall, MD
Derek B. Wu, MD

Grace T. Wu, MD
Jacqueline A. Wulu, MD
Christopher C. Xiao, MD
Mary Jue Xu, MD
Alisa Yamasaki, MD
Jennifer Yan, MD
Kristen L. Yancey, MD
Zao Yang, MD
Linda X. Yin, MD
Candice B. Yip, MD
Peng You, MD

Phoebe K. Yu, MD
Sonia N. Yuen, MD
Habib G. Zalzal, MD
Kevin Y. Zhan, MD
Zhipeng Paul Zhang, MD
Kevin Y. Zhao, MD
Nina W. Zhao, MD
Melissa Zheng, MD
Alisa Zhukhovitskaya, MD
Zachary A. Zimmerman, MD
Steven A. Zuniga, MD