

**TRIOLOGICAL SOCIETY
113TH ANNUAL MEETING PROGRAM
APRIL 30 - MAY 1, 2010
LAS VEGAS, NEVADA**

FRIDAY, APRIL 30, 2010

PLATINUM ROOM

- 7:00 - **B**usiness Meeting (Fellows Only)
7:50 New Fellow Induction Ceremonies and Reception
- 8:00 **W**elcome/Opening Remarks
Frank E. Lucente, MD*, Brooklyn, NY
- 8:04 **P**residential Citation Awards
Lanny Garth Close, MD*, New York, NY
Robert H. Miller, MD MBA*, Houston, TX
Myles L. Pensak, MD*, Cincinnati, OH
Richard M. Rosenfeld, MD MPH*, Brooklyn, NY
Nancy L. Snyderman, MD, Philadelphia, PA
- 8:14 **G**uest of Honor Introduction and Presentation
The Role of Individualized Medicine in Management of Early Glottic Cancer
Gady Har-El, MD*, New York, NY
- 8:28 **P**residential Address
Upholding the Noble Legacy: Noblesse Oblige
Frank E. Lucente, MD*, Brooklyn, NY
- 8:40 **P**anel: Ethical Issues in Otolaryngology/Head and Neck Surgery
Moderator: Robert H. Maisel, MD*, Minneapolis, MN
Panelists: Gerald S. Berke, MD*, Los Angeles, CA
Lanny Garth Close, MD*, New York, NY
Anna M. Pou, MD, New Orleans, LA
Harold C. Pillsbury, MD*, Chapel Hill, NC
- 9:30 **O**gura Lecture
Teaching and Learning - Then and Now
Marvin P. Fried, MD*, Bronx, NY

◆ 9:45 - 10:15 Break with Exhibitors - Visit Posters ◆

Concurrent Sessions --- 10:15 - 12:00

Panel Sessions --- Gold Room
Invited Papers ---- Platinum Room
GOLD ROOM
Panel Sessions

10:15 **C**ontemporary Management of Laryngeal Cancer
Moderator: Jonas T. Johnson, MD*, Pittsburgh, PA
Panelists: Christine G. Gourin, MD*, Baltimore, MD
 Randal S. Weber, MD*, Houston, TX
 Gregory T. Wolf, MD, Ann Arbor, MI
 Bruce H. Haughey, MBChB, St. Louis, MO

11:10 **P**earls in the Management of Sinus and Skull Base Tumors
Moderator: David W. Kennedy, MD*, Philadelphia, PA
Panelists: Ricardo Carrau, MD*, Pittsburgh, PA
 Satish Govindaraj, MD, New York, NY
 Peter H. Hwang, MD*, Stanford, CA
 Bert W. O'Malley Jr., MD*, Philadelphia, PA
 Brent A. Senior, MD*, Chapel Hill, NC
 S. James Zinreich, MD, Baltimore, MD

◆ 12:00 - 1:00 Lunch with Exhibitors - Visit Posters ◆

PLATINUM ROOM
Invited Papers

Laryngology

Moderator: Gerald S. Berke, MD*, Los Angeles, CA

10:17 **E**arly Injection Medialization for Unilateral Vocal Cord Paralysis
Aaron D. Friedman, MD, Boston, MA; James A. Burns, MD*, Boston, MA; Steven M. Zeitels, MD*, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential impact of early injection medialization laryngoplasty on reducing the need for open neck reconstructive phonosurgery.

Objectives: To evaluate whether the timing of early (< 4 months from time of nerve injury) vs. late (> 4 months) injection medialization laryngoplasty impacts the need for subsequent open neck reconstruction to restore vocal function in patients with unilateral vocal cord paralysis. **Study Design:** Retrospective chart review from 2005-2009. **Methods:** 102 outpatient or hospitalized adults with dysphonia resulting from postsurgical or idiopathic unilateral vocal cord paralysis were identified. All subjects underwent an awake, transoral, paraglottic injection with absorbable hyaluronic acid gel (Restylane) in the office or at bedside. Patients who recovered vocal cord mobility (18), had active disease directly affecting the recurrent laryngeal nerve (4), had fewer than 3 months of followup after injection (time for Restylane gel to be reabsorbed) (38), or died within 1 year after the onset of paralysis (7), were excluded, leaving a study population of 35 patients (18 male, 17 female). **Results:** 65% (17/26) of patients with early injection medialization developed favorable synkinetic reinnervation, obviating the need for open neck phonosurgical reconstruction; their mean followup was 12.9 months from the onset of paralysis. Only 22% (2/9) of patients undergoing late injection (>4-month post-paralysis) avoided phonosurgical reconstruction (p=0.02, chi-square test). **Conclusions:** Patients who sustain vocal cord paralysis were less likely to require transcervical reconstruction if early injection medialization was done. We believe that early medialization creates a more favorable phonatory vocal cord position that can more likely be maintained by synkinetic reinnervation, as opposed to allowing the final position of a denervated and lateralized vocal cord

to be determined solely by reinnervation.

10:25 **Reinke's Edema Presenting as Stridor: Implications for Otolaryngologists in Difficult Airway**

Atta Mohyuddin, MD, London, UK; Arhi Chapreet, MD, Luton, UK; John Pickles, MD, Luton, UK

Educational Objective: At the conclusion of this presentation, the participants should be able to know that teamwork between otolaryngologist and anesthesiologist in anticipated difficult airway pays off with good outcome as demonstrated in this case.

Objectives: We demonstrate the importance of managing a patient who presented with stridor due to severe Reinke's edema to the otolaryngologist. The concept of managing difficult airway has thus been introduced to the otolaryngologists according to a plan of action as described by the American Society of Anesthesiologist's algorithm. **Study Design:** A case report and review of the literature. **Methods:** A case report of interest. PubMed search with key words difficult airway, stridor, awake intubation and Reinke's edema. **Results:** Management of anticipated difficult airway case with awake fiberoptic intubation with backup strategies of direct laryngoscopies with Eschmann stylet and awake tracheostomy were demonstrated in this case. **Conclusions:** This case report demonstrated a definitive strategy of securing a difficult airway with obstruction at the glottis and highlighted the role of teamwork between otolaryngologist and anesthesiologist to secure airway.

10:33 **Standardized High Level Disinfection of Flexible Laryngoscopes in Pediatric Otolaryngology**

Melissa M. Statham, MD, Cincinnati, OH; J. Paul Willging, MD*, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to understand optimal disinfection practices for flexible laryngoscopes as well as the durability of different endoscopes when subjected to continued use and disinfection.

Objectives: Guidelines issued by the Association of Operating Room Nurses and the Association of Professionals in Infection Control and Epidemiology recommend high level disinfection (HLD) for semi-critical instruments, such as flexible laryngoscopes. We aim to examine the efficacy of automated high level disinfection as well as the durability of endoscopes to continued use and automated HLD. **Study Design:** Retrospective review. **Methods:** Automated endoscope reprocessor logs and repair logs were examined. All endoscopes were systemically cleaned with mechanical cleansing (when indicated) followed by leak testing, enzymatic cleaning, and exposure to Orthophthaldehyde (0.55%) for 5 minutes at a temperature of at least 25 celsius, followed by rinsing for three minutes. **Results:** A total of 4336 patient endoscope exams and subsequent disinfection were performed with 60 flexible laryngoscopes in an outpatient tertiary pediatric otolaryngology practice from 2005-2009. No nosocomial infections were transmitted via the use of flexible laryngoscopes. A total of 77 endoscope repairs were performed, 48 major (average cost \$3815.97) and 29 minor (average cost \$326.85). On average, the 2.2 mm flexible laryngoscopes were utilized for 61.9 examinations before major repair was needed whereas the 3.6 mm endoscopes were utilized for 154.5 exams before needing minor repairs, and no major repairs have been needed to date. **Conclusions:** Automated endoscope reprocessor use for high level disinfection is an effective means to disinfect and process flexible endoscopes. Even when utilizing standardized, automated disinfection techniques, smaller fiberoptic endoscopes demonstrate a shortened longevity for use prior to needing major repairs when compared with larger fiberoptic endoscopes.

10:41 **EMG and Histologic Evolution of the Recurrent Laryngeal Nerve from Transection and Anastomosis to Complete Reinnervation—A Rat Model**

Michael J. Pitman, MD, New York, NY; Philip A. Weissbrod, MD, New York, NY; Rick M. Roark, PhD, Valhalla, NY; Sansar C. Sharma, PhD, Valhalla, NY; Steven D. Schaefer, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should know the time course of recurrent laryngeal nerve reinnervation from transection and anastomosis to complete reinnervation in a rat model. They should be aware of the evolution of laryngeal electromyographic signals and histologic observations as reinnervation takes place. They should understand the importance of identifying the time point of complete reinnervation as it pertains to studying the effect of neurotrophic factors on recurrent laryngeal nerve reinnervation.

Objectives: To test the hypothesis that consistent laryngeal electromyographic (LEMG) and histologic changes occur at specific time periods during recurrent laryngeal nerve (RLN) reinnervation after transection and anastomosis in a rat model. To identify the time point when reinnervation is complete. **Study Design:** 20 Sprague Dawley rats underwent unilateral RLN transection and anastomosis. They were sacrificed at 4, 8, 12, 16 and 20 weeks. Prior to sacrifice each rat underwent LEMG and visual grading of vocal fold motion. Bilateral RLNs were harvested and evaluated histologically. **Methods:** Transoral LEMG was performed. An endoscope and recording equipment were used to visualize and grade vocal fold motion as well as remotely compare motion with the LEMG. After sacrifice, the RLN proximal and distal to the transaction was harvested for histologic evaluation. **Results:** LEMG revealed denervation followed by synkinetic reinnervation with consistent findings at each time period. LEMG evolution appears to plateau at 16 weeks. Vocal fold motion was slight in 3 rats at 4 weeks but was otherwise absent. Histologically, regenerative changes of the axons and their myelin sheaths were consistent at each time period. At 16 weeks histologic changes appear to plateau. **Conclusions:** Consistent LEMG and histologic changes occur at specific time periods during RLN reinnervation after transection and anastomosis in a rat model. At 16 weeks, rein-

nervation is either complete or near complete. When using a rat model to investigate the effect of neurotrophic factors on RLN reinnervation a minimum of 16 weeks between transection and harvest is necessary to allow for complete reinnervation.

10:49 **The Efficacy of Transforming Growth Factor Beta-3 for the Prevention of Buccal Mucosa Scarring**

Satoshi Ohno, MD, Kyoto, Japan; Shigeru Hirano, MD PhD, Kyoto, Japan; Shin-Ichi Kanemaru, MD PhD, Kyoto, Japan; Ichiro Tateya, MD PhD, Kyoto, Japan; Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the efficacy of transforming growth factor beta-3 for the prevention of buccal mucosa scarring.

Objectives: In the treatment of tumorous diseases, scars are often formed after resection or irradiation. Scars of buccal mucosa cause difficulty in opening of the mouth, worsening quality of life. Transforming growth factor beta-3 (TGFb-3) is an isoform of TGFb-1 that is known to accelerate scarring, though it has a different effect on wound healing. TGFb-3 administration into wounds has been associated with improvement in the quality of the healing skin wound in vivo. TGFb3 is considered to be an important anti-scarring factor also in buccal mucosa. However buccal mucosa is different from skin in some points such as proportion of extracellular matrix proteins in the submucosal layer. Thus, it should be examined whether TGFb-3 is effective for buccal mucosa scarring. In this study we investigate the efficacy of TGFb-3 for the prevention of buccal mucosa scarring. **Study Design:** Prospective animal experiment with control. **Methods:** Eight Sprague-Dawley rats were involved in this study. After 15 minutes from an injection of 0.5 ml TGF-b3 (0.05 ug/ml, 0.5 ug/ml, 5 ug/ml) or saline into buccal submucosa, buccal mucosa was removed down to masseter muscle or orbicularis oris muscle layer using a 6-mm biopsy punch. Six weeks after the operation, the buccal mucosae were harvested after euthanasia. Histological examinations were performed. **Results:** In the submucosal layer, well organized collagen formation was seen in the TGFb3 treated groups comparing to sham treated group, in a dose dependent manner. **Conclusions:** TGF-b3 is considered to be effective for the prevention of buccal mucosa scarring.

10:57 - **Discussion/Q&A** 11:05

Pediatric Otolaryngology Moderator: Scott C. Manning, MD*, Seattle, WA

11:12 **Pediatric Acute Sinusitis: Predictors of Increased Resource Utilization**

Deepak R. Dugar, BA, Washington, DC; Rishi Vashishta, BSc, Washington, DC; Lina Lander, ScD, Omaha, NE; Rahul K. Shah, MD*, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) demonstrate national variances of care in pediatric acute sinusitis; 2) identify predictors of increased resource utilization for pediatric acute sinusitis; and 3) identify common comorbidities of patients with pediatric acute sinusitis.

Objectives: To determine national variations in resource utilization in the management of pediatric sinusitis. **Study Design:** Analysis of national publicly available dataset. **Methods:** The Kids' Inpatient Database 2006 was analyzed using ICD-9 codes for acute sinusitis. **Results:** 8381 patients (55% male, mean age 8.5 years (SE=0.2)) were admitted with acute sinusitis. Mean total charges were \$20,062 (SE 1159.1). Mean length of stay was 4.2 days (SE=0.12), with 4.8 diagnoses (SE=0.06) and 0.85 procedures (SE=0.06). 38% had concomitant respiratory diseases, 10% orbital symptoms, and 11% otitis media. 628 patients underwent operations on the upper aerodigestive tract (489 were nasal sinusectomies); 583 patients underwent lumbar puncture and 162 underwent orbital surgery. The primary payer was private insurance in 50% and Medicaid in 41%. Predictors of increased total charges were gender (male) ($p=0.028$), hospital teaching status ($p<0.0001$), patient location ($p<0.0001$), hospital region ($p<0.0001$), source of admission ($p<0.0001$), and discharge status ($p<0.0001$). Large geographic variation in resource utilization was found, ranging from \$5,837 (Arkansas) to \$48,327 (California). Race, primary payer, admission type and urgency were not significant predictors of increased resource utilization. **Conclusions:** There exists large national variation in the management of acute pediatric sinusitis. The majority of patients had additional diagnoses. Predictors of increased resource utilization included gender, teaching status of the hospital, patient location, hospital region, source of admission, and discharge status. Knowledge of these predictors may allow interventions to reduce the economic burden of this entity while preserving outcomes.

11:20 **The Increased Risk of Community Acquired Methicillin Resistant Staphylococcus Aureus (MRSA) Deep Space Neck Infections Requiring Surgical Intervention in Young Children**

Praveen Duggal, MD, Atlanta, GA; Iman Naseri, MD, Jacksonville, FL; Steven E. Sobol, MD, Atlanta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss and compare the signifi-

cant increased risk of MRSA deep neck space infections requiring surgical drainage in the younger pediatric population.

Objectives: To analyze the microbiological origins of deep neck space infections requiring surgical intervention in a pediatric population. **Study Design:** Retrospective cohort study. **Methods:** The study population (N=145) included all pediatric patients surgically treated for deep neck space infections in a metropolitan tertiary care children's hospital over the course of 5 years (9/2004-8/2009) that did not resolve with medical management. Areas of infection included deep cervical neck, parapharyngeal, and retropharyngeal abscesses. The abscesses were managed with intraoperative incision and drainage. Gram stain and microbiological cultures with sensitivities were sent from all specimens. Demographic and clinical information was compared with the microbiological data. **Results:** Microbiological analysis of cultures resulted in 53 (36.6%) MRSA, 36 (24.8%) methicillin sensitive staphylococcus aureus (MSSA), and 56 (38.6%) representing other non-staphylococcal pathogens or no-growth. The mean age was 2.9 years (range : < 1-14) and 63% of patients were less than 2 years old. Patients < 2 years of age were 6.7 times more likely to have MRSA ($p < 0.0001$) versus all other infections. African American pediatric patients accounted for 67% of all deep neck space infections and 85% of all MRSA infections. The risk of MRSA infection was significantly higher for African American children $OR = 2.84$ ($p = 0.029$). **Conclusions:** Over 60% of all deep neck space infections requiring surgical intervention were caused by staphylococcus aureus. Approximately 37% of these were MRSA in origin. Children younger than 2 years are at a significantly increased risk of developing MRSA deep space neck infections requiring surgical intervention and warrant further study.

11:28 Bony Mandibular Abnormalities Associated with Cervicofacial Lymphatic Malformations
Teresa M. O, MD, New York, NY; Roy Kwak, MD, New York, NY; Joanna d'Elia, MD, New York, NY;
Milton Waner, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize and describe the bony mandibular abnormalities associated with cervicofacial lymphatic malformations.

Objectives: To quantitatively and qualitatively evaluate the bony mandibular abnormalities associated with cervicofacial lymphatic malformations. **Study Design:** Retrospective chart and imaging review. **Methods:** The records and imaging of all patients presenting to a tertiary care vascular anomalies center with craniofacial lymphatic malformations over a 2 year period were reviewed. A control population was found on the PACS database. 3D reconstructions were performed from CT and MRI data. A novel method was devised to measure the mandibular-ramal angle. Qualitative measurements were taken: mandibular-ramal angle, mandibular symphyseal height, anterior condylar displacement. **Results:** 96 patients presented with lymphatic malformations of the head and neck over a 2 year period. 27 of 96 patients had beard malformations and 21 of these 27 patients had adequate imaging for analysis. 10 had unilateral and 11 had bilateral disease. There were 23 controls. Qualitatively, a few patterns emerged: outward flaring of the mandibular ramus, the mandible was displaced anteriorly, there was relative ipsilateral facial hypertrophy and anterior position of the maxilla and orbit. The majority of the lesions showed micro- and macrocystic components. Quantitatively, the mandibular-ramal angle was evaluated between nondiseased and diseased mandibles. Of 67 nondiseased sides, the average angle was 131 degrees ($SD = 6.8$). A total of 32 diseased sides had an average angle of 152 degrees ($SD = 14.0$). (p -value < $3.8E-09$). With half beard malformations, diseased side averaged 153.9 and nondiseased 140.8 ($p = 0.008$). **Conclusions:** Cervicofacial lymphatic malformations in the beard distribution are associated with significant bony abnormalities leading to both functional and cosmetic sequelae.

11:36 Current Treatment of Parotid Hemangiomas
Inanna P. Weiss, MD, New York, NY; Teresa M. O, MD, New York, NY; Brian A. Lipari, MD, New York, NY;
Milton Waner, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to report on the current treatment of parotid hemangiomas and propose an algorithm for treatment.

Objectives: Parotid hemangiomas are the most common salivary gland tumors in children. Their treatment has posed a challenge due to several factors: the lesions' expansive growth, resistance to treatment and relationship to the facial nerve. Various treatment modalities have been attempted, and promising results have been achieved with surgical resection alone or in conjunction with endovascular sclerotherapy. Recently, bleomycin and oral propranolol have been used with promising results. We wish to elucidate the treatment options and propose a treatment algorithm for parotid hemangiomas. **Study Design:** Retrospective review. **Methods:** This study was performed by examining the records and reviewing relevant data of 56 patients with hemangiomas of the parotid gland treated by our group from 2004 to 2009. **Results:** Of 56 patients, 70% were female, female/male ratio was 2.29/1. 39% had unilateral parotid hemangiomas, 12.5% had associated cutaneous segmental hemangiomas. All 22 patients who underwent systemic steroid therapy responded initially, 68% of these rebounded after cessation of therapy. 16 patients (29%) underwent surgery with excellent results (facial symmetry, restoration of contour, preserved facial nerve function). 7 (44%) patients received preoperative sclerotherapy 24-48 hours prior to surgery, while 5 (8%) patients had endovascular sclerotherapy alone. 10 patients were treated medically with oral propranolol. 8 of 10 had significant shrinkage of the lesion within the first month of treatment. There were no reported side effects. **Conclusions:** Multiple treatment regimens have been used to successfully treat parotid hemangiomas. Although propranolol is a recent addition, it seems the most promising. Further evaluation is warranted.

11:44 Long Term Followup for Intracapsular Tonsillectomy Techniques
Yushan Lisa Wilson, MD, New York, NY; Sudeep Roy, BS, Valhalla, NY; Guopei Yu, MD PhD, New York,

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss tonsillar regrowth as a complication of intracapsular tonsillectomy techniques compared with traditional extracapsular electrocautery tonsillectomy for obstructive sleep breathing related problems.

Objectives: We previously demonstrated that postoperative recovery in children with obstructive sleep apnea is significantly earlier with use of intracapsular coblation or microdebrider versus traditional extracapsular electrocautery tonsillectomy. The purpose of this study is to compare tonsillar regrowth and long term complications of patients receiving intracapsular tonsillectomy with those undergoing traditional extracapsular electrocautery tonsillectomy for obstructive sleep breathing-related problems. **Study Design:** One hundred and fifty-six patients who underwent tonsillectomy via intracapsular microdebrider, intracapsular coblation or extracapsular electrocautery dissection between February 2004 and July 2006, were available for enrollment. Follow-up history and/or physical examination were obtained in 113 children. **Methods:** Followup history and/or physical examination were obtained in seventy-six children. **Results:** At mean follow-up of 47.7 + 10.87 months (range 28.2-70.8), there were no statistical differences between all three groups in recurrence of obstructive breathing problems, recurrent throat infections, or need for additional intervention. Residual tonsil size was significantly larger in both intracapsular groups, but there was no difference between coblation and microdebrider. Only 6 patients required additional surgery. Of these, only 1 patient underwent a second tonsillectomy for obstructive symptoms. The indications for the remainder of the surgeries were for recurrent infections. **Conclusions:** These techniques did not differ significantly with respect to recurrence of sleep disordered breathing problems, recurrent throat infections, need for additional medical or surgical intervention. Although patients in the intracapsular tonsillectomy group required additional surgery, the main indication for these procedures was not due to pharyngeal obstructive symptoms. Intracapsular tonsillectomy with either the coblator or microdebrider is efficacious in the long term treatment of pediatric obstructive sleep disordered breathing.

11:52 - Discussion/Q&A
12:00

◆ 12:00 - 1:00 Lunch with Exhibitors - Visit Posters ◆

PLATINUM ROOM

Head and Neck

Moderator: Lanny Garth Close, MD*, New York, NY

1:02 **Minimally Invasive Surgery for Thyroid Gland**
Hiroya Kitano, MD PhD, Yonago, Tottori Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand merits and demerits among the minimally invasive surgical procedures.

Objectives: I would like to present the merits and demerits among three minimally invasive surgical procedures, total video endoscopic surgery for thyroid, video assisted endoscopic surgery for thyroid and direct mini-incision for thyroidectomy. **Study Design:** For over 100 patients, total video endoscopic surgery for thyroid, video assisted endoscopic surgery for thyroid and direct mini-incision for thyroidectomy were performed. I would like to discuss about merits and demerits among these surgical procedures. **Methods:** Total video endoscopic surgery is a technique using laparoscopic instruments approach from three small holes in the anterior chest. Video assisted endoscopic surgery is basically conventional thyroid surgery but incision was made lateral side in the neck. Direct mini-incision for thyroidectomy is a technique of conventional thyroidectomy from mini-incision in the anterior neck. **Results:** About cosmetic results, total video endoscopic surgery for thyroid was the best, however difficulty of procedures and surgical time was worst. Direct mini-incision method was easiest one among these three procedures but cosmetic results were worst among these three procedures. **Conclusions:** There are merits and demerits among these three procedures respectively. Which procedure will be the best one for the patients is different depending on the condition of each patient.

1:10 **Novel Endoscopic Approach to the Paranasal Sinuses and Lateral Skull Base: A Clinical and Radioanatomic Study of Endoscopic Anterior Maxillotomy**
Ivan H. El-Sayed, MD, San Francisco, CA; Matthew S. Russell, MD, San Francisco, CA (Presenter);
Steven J. Pletcher, MD, San Francisco, CA; Michael W. McDermott, MD, San Francisco, CA; Andrew T. Parsa, MD PhD, San Francisco, CA

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

extend the endoscopic access to the lateral and anterior skull base.

Objectives: To evaluate our initial experience with a novel technique, endoscopic anterior maxillotomy (EAM), for improved access to the anterior-lateral skull base. Clinical and radioanatomic data are presented to describe and define this novel technique. **Study Design:** Case series. **Methods:** Surgical patients with lesions of the pterygopalatine fossa, infratemporal fossa, and anterior-lateral maxilla treated between 2006-2008 are reviewed. Demographic data and surgical technique are presented. A mathematical model was developed from radioanatomic data pre- and post-EAM to describe technical improvements. Matched paired analysis was performed for statistical evaluation. **Results:** Thirty-two patients had surgical treatment of anterior-lateral skull base lesions. EAM was utilized in 16 cases. 56% extended lateral to V2 and 56% extended posterior to the maxillary sinus. Complete resection was achieved in 11 patients. There was one unplanned subtotal resection. The internal maxillary artery was effectively controlled endoscopically, including in 2 cases of rapid bleed without need for open conversion. Sensation and aesthetic concerns were minimal. Radioanatomic measurements demonstrated a 150% increase in lateral endoscope excursion with EAM compared to the standard technique. Angle of reach increased from 41% to 62%, with a p-value of 0.0001. Additionally, in the principal surgeon's experience, maneuverability of multiple endoscopic instruments was greatly improved allowing for a 2 surgeon technique with greater dexterity and safety. **Conclusions:** Endoscopic anterior maxillotomy is a novel technical addition to the skull base surgeon's armamentarium. Radioanatomic analysis demonstrates a statistically significant improvement in access to the anterior-lateral skull base.

1:18 **Diagnostic and Interventional Sialendoscopy: A Preliminary Experience**

Rohan R. Walvekar, MD, New Orleans, LA; Celeste Gary, BS, New Orleans, LA; David D. Beahm, MD, New Orleans, LA; Daniel W. Nuss, MD, New Orleans, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to anticipate the issues with starting a new sialoendoscopy practice. The presentation is also directed at preparing the participants as to what would be feasible indications, possible complications, issues with learning curve related to a new salivary endoscopy practice.

Objectives: To present a preliminary experience with sialoendoscopy for diagnostic and interventional indications. **Study Design:** Retrospective. **Methods:** Patients who underwent a sialoendoscopy at a tertiary care medical center from July 2008 to date were identified. A 1.3mm Marchal sialendoscope, 1.1 and 1.6 mm Erlangen sialendoscope were used for diagnostic and interventional procedures. All procedures were conducted under general anesthesia. Clinical, demographic, procedure related data was recorded. **Results:** 15 patients with age ranging from 8 to 74 years are reported. 12 patients were adults while 3 patients were in the pediatric age group. Six were male and 9 female. The most common indication for treatment was sialolithiasis followed by idiopathic glandular swelling. We treated 2 patients with recurrent parotitis of childhood that are reported separately. The stones ranged from 3mm stones to 15mm and were most common in the submandibular gland. Larger stones required a combined approach technique. Minor complications were inability to dilate the duct papilla, non-retrieval of the stone, and failure of complete endoscopy due to an acute masseteric bend preventing navigation. Major complications included salivary fistula (1/15) and minor ductal tear with floor of mouth edema (1/15). **Conclusions:** Sialoendoscopy is feasible for management of nonneoplastic salivary gland disorders. Based on a preliminary experience we make recommendations to navigate technical challenges and ensure successful outcomes.

1:26 **Outcomes of Static and Dynamic Facial Nerve Repair in Head and Neck Cancer**

Tim A. Iseli, MBBS, Parkville, Victoria Australia; Nichole R. Dean, DO, Birmingham, AL (Presenter); Gregory E. Harris, BS, Birmingham, AL; Claire E. Iseli, MBBS, Parkville, Victoria Australia; Eben L. Rosenthal, MD*, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss outcomes related to static or dynamic facial nerve repair in head and neck cancer patients.

Objectives: Determine outcomes associated with nerve grafting versus static repair following facial nerve resection. **Study Design:** Retrospective chart review. **Methods:** Charts from 105 patients who underwent facial nerve reconstruction between January 1999 and January 2009 were reviewed. The majority had parotid malignancy (78.1%) most commonly squamous cell carcinoma (50.5%). Patients underwent static (n = 72) or dynamic (n = 33) reconstruction with nerve grafting. Facial nerve function was measured using the House-Brackmann scale. **Results:** Patients receiving static reconstruction were on average 10.3 years older (P = 0.002). Mean overall survival for tumor cases was 61.9 months; parotid squamous cell carcinoma was associated with worse prognosis (P = 0.10). Median followup was 16.1 months (range 4 to 96.1 months). Most (97%) patients receiving a nerve graft had some return of function at a median of 6.2 months postoperatively (range 4-9 months) and the majority (63.6%) had good function (House-Brackmann score ≤ 4). Patients having static reconstruction (29.2%) were more likely to have symptomatic facial palsy than those having a nerve graft (15.2%, P = 0.12). **Conclusions:** Where possible, nerve grafting is the preferred method of facial nerve reconstruction. Although elderly patients with parotid malignancy have traditionally been considered poor candidates for nerve grafting, we demonstrate good results within 9 months of facial nerve repair even with radiotherapy, the use of long grafts (>6cm) and prolonged preoperative dysfunction.

1:34 **Outcomes of Vascularized Bone Graft Reconstruction of the Mandible in Bisphosphonate Related Osteonecrosis of the Jaws**

Rahul Seth, MD, Cleveland, OH; Neal D. Futran, MD DMD, Seattle, WA; Daniel S. Alam, MD, Cleveland,

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) appreciate the current therapeutic challenges in bisphosphonate related osteonecrosis of the jaws (BRONJ); and 2) describe utility of vascularized bone graft reconstruction with the fibula free flap in cases of extensive BRONJ.

Objectives: 1) Describe the clinic entity of bisphosphonate related osteonecrosis of the jaws (BRONJ); 2) identify the current therapeutic challenges in BRONJ; and 3) describe the use of vascularized bone grafts for reconstruction of the mandible in extensive BRONJ.

Study Design: Multi-institutional retrospective review. **Methods:** Patients (n=11) undergoing mandible reconstruction with vascularized bone grafts after segmental mandible resection for BRONJ were evaluated. Mandible reconstruction was only performed on patients with intractable pain, fistulae, or pathologic fracture, and after failure of comprehensive conservative therapy. No patients had a history of head and neck malignancy or had received radiation therapy to the head or neck. Union was established with followup radiography and clinical evaluation. **Results:** Average patient age was 61.3 years. Median followup was 13.9 months. All patients had undergone therapy with bisphosphonates and had no other identifiable cause of mandible osteonecrosis. Eight patients (73%) received intravenous bisphosphonate therapy. Pathologic mandible fractures were present in 73% of patients, and 36% had orocutaneous fistulae. Fibula osteocutaneous flaps were used in all cases with no failures. All patients came to bony union as demonstrated clinically and radiographically. Wound complications occurred in 36% of patients but were all treated successfully with conservative therapy. **Conclusions:** BRONJ is a significant complication of bisphosphonate therapy and current literature only supports conservative therapy. We demonstrate that vascularized bone graft reconstruction with the fibula free flap offers a high success rate of bony union and fistula closure and should be offered to selected patients with advanced cases of BRONJ.

1:42 - **D**iscussion/Q&A
1:50

Head and Neck

Moderator: Christine G. Gourin, MD*, Baltimore, MD

1:57 **P**redictors of Total Laryngectomy Survival

Isaac A. Bohannon, MD, Birmingham, AL; Renee A. Desmond, PhD DVM, Birmingham, AL; William R. Carroll, MD, Birmingham, AL; J. Scott Magnuson, MD*, Birmingham, AL; Eben L. Rosenthal, MD*, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to identify specific predictors of disease free survival in patients undergoing total laryngectomy for laryngeal squamous cell carcinoma.

Objectives: The objective of this study was to characterize factors predictive of survival in patients undergoing total laryngectomy.

Study Design: Retrospective cohort. **Methods:** Between 2001 and 2007, 223 patients were treated at a university hospital with total laryngectomy. Of these patients, 101 (45.3%) underwent laryngectomy with postoperative radiotherapy (SRT) and 122 patients (54.7%) had organ sparing treatment (CRT), including concomitant chemoradiotherapy or radiotherapy alone, before undergoing salvage laryngectomy. Overall survival was compared by Kaplan-Meier method and significant predictors were identified by univariate and multivariate analysis using Cox regression. **Results:** The median overall survival was 52 months. In multivariate analysis age greater than 65 years and older was a significant predictor of poorer survival compared to age less than 65 years ($p=0.01$). Both higher N stage and positive pathology at neck dissection were indicators of poorer survival in univariate analysis ($p<0.0001$). Analysis of gender, T stage, positive margins, and complications did not yield statistically significant survival differences. Disease specific five year survival between treatment groups was not significantly different (47.6% vs. 51.2% for SRT vs. CRT, respectively). Complications were not affected by type of treatment or TNM stage. **Conclusions:** Survival after total laryngectomy is significantly worse among patients greater than 65 years. N stage and positive neck pathology also worsen long term survival. Overall survival was not affected by treatment modality in this investigation.

2:05 **G**astroneopharyngeal Reflux in Patients with Laryngectomy, Do All Patients Need Antireflux Therapy?

Ramez George Nassif, MBBCh, Toronto, ON Canada; Lesley G. Irvine, BSc, Dundee, Scotland UK; Rodney E. Mountain, MBCh, Dundee, Scotland UK

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the pathophysiological changes that occur to the upper esophageal sphincter after laryngectomy that would make this subgroup of patients more vulnerable to the hazards of gastroesophageal reflux.

Objectives: We aim to demonstrate and measure the pathophysiological changes that occur to the upper esophageal sphincter fol-

lowing laryngectomy and surgical voice restoration. **Study Design:** Prospective, investigational clinical trial of patients who had laryngectomy. **Methods:** 11 laryngectomy patients with speech valves inserted through surgical TE fistula were recruited. Nine patients had cricopharyngeal myotomy part of their procedure, while the other 2 didn't have formal myotomy. We used oesophageal manometry to examine the upper oesophageal pressure and 24 hour double probe PH monitoring. **Results:** Six patients had symptoms of reflux, 5 had no reflux symptoms. Also, 2 patients had recurrent problems with their valves including infection or fitting problems. All 11 patients showed suboptimal pressure at their new upper oesophageal sphincter (mean <10mmHg - N=30-120mmHg), while 8 patients recorded significant gastroesophageal reflux into the neopharynx using the dual 24 hour PH probe. Management with proton pump inhibitors improved both their reflux symptoms and the efficiency of their speaking valves. **Conclusions:** In this cohort of laryngectomy patients we showed universal iatrogenic hypotonic upper oesophageal sphincter resulting in significant reflux into the neopharynx. We recommend that new laryngectomy patients undergoing surgical voice restoration get investigated postoperatively to exclude significant gastroesophageal reflux and treated accordingly.

2:13 **Analysis of Swallowing Function following Transoral Laser Microsurgery (TLM) ± Adjuvant Therapy for Advanced Oropharyngeal Cancer**

Jason T. Rich, MD, St. Louis, MO; Bruce H. Haughey, MBChB, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the impact of TLM on swallowing function following resection of advanced stage oropharyngeal cancer.

Objectives: Evaluate swallowing function following treatment of advanced stage oropharyngeal cancer and analyze factors affecting G-tube dependence. **Study Design:** Analysis of prospectively assembled data. **Methods:** A cohort of all patients treated with TLM ± adjuvant therapy for advanced stage (AJCC III or IV) oropharyngeal cancer between 1996 and 2006 was assembled. Swallowing function (using the Functional Outcome Swallowing Scale or FOSS) and gastrostomy tube (G-tube) dependence at last followup were analyzed. **Results:** Eighty-four patients met criteria for inclusion in the study. All had a minimum followup of at least 2 years and a median followup of 48.5 months. Eighty-three percent of patients advanced through the postoperative recovery period without requiring G-tubes. Thirty-nine (46%) patients had G-tube placement at some point during treatment, with the median time of placement being 69 days. At last followup, 81% of patients had FOSS scores of 0 to 2 (representing acceptable swallowing,) and 15% were G-tube dependent. Of those patients requiring G-tubes, 68% were placed following initiation of radiotherapy. Univariate analysis revealed that T-stage (T3-4 vs. T1-2) and tumor site (base of tongue vs. tonsil) were significantly associated with G-tube dependence. Administration of radiotherapy and/or chemotherapy was not significant. **Conclusions:** The majority of patients treated with TLM for advanced stage oropharyngeal cancer had acceptable swallowing function and did not require G-tube placement. Of those patients requiring G-tubes, most had placement of feeding tubes following initiation of adjuvant radiotherapy and not immediately after surgery. Advanced T-stage (T3-4) and base of tongue tumors were associated with G-tube dependency.

2:21 **Cost Effective Community Based Screening for Oral Cancer in High Risk Males in the United States: A Decision Analysis Approach**

Raj C. Dedhia, MD, Pittsburgh, PA; Mark S. Roberts, MD, Pittsburgh, PA; Jonas T. Johnson, MD*, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the evidence for the cost effectiveness of a community based oral cancer screening program for high risk males in the United States.

Objectives: The 2004 US Preventative Services Task Force (USPSTF) guidelines do not recommend routinely screening adults for oral cancer given no proven mortality reduction. A large cluster randomized controlled screening trial in Kerala, India in 2005, however, reported a significant reduction in mortality for screened male tobacco and/or alcohol users. In the United States, office based screening efforts targeting males of high risk (regular use of tobacco and/or alcohol) have been unsuccessful due to poor attendance. Given the newfound screening mortality benefit to this high risk subpopulation, we sought to ascertain the cost effectiveness threshold of a community outreach screening program for males >45 years regularly using tobacco and/or alcohol. **Study Design:** Decision analysis model using data from peer reviewed trials and Medicare reimbursement rates. **Methods:** Taking a societal perspective, costs in US\$2009 and outcomes in quality adjusted life years (QALYs) were analyzed in a decision tree model. Each hypothetical screened and unscreened cohort consisted of one million high risk males with an annual incidence of disease of 25/100,000. The value difference between cohorts represented the cost effectiveness threshold of a screening program. One way sensitivity analysis was performed for \$/QALY and cancer incidence. **Results:** The screened cohort consumed fewer medical resources of \$2,729,898 and gained an additional 321 QALYs. Using the \$75,000/QALY metric, the screened cohort's value to society bested the unscreened cohort by \$26,782,156 (\$27/person). Sensitivity analysis demonstrated a range from \$12,598,434 to \$50,421,692 (\$13-\$50/person). **Conclusions:** Given the significant health benefits via early detection and financial savings in the screened cohort, a community based screening program targeting high risk males costing \$27/person demonstrates cost effectiveness from a US societal perspective.

2:29 **Histopathologic Findings of HPV and p16 Positive Head and Neck squamous Cell Carcinomas**

Abie H. Mendelsohn, MD, Los Angeles, CA; Chi K. Lai, MD, Los Angeles, CA; Peter Shinkatu, MD, Los Angeles, CA; Maie St. John, MD PhD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify histopathologic changes seen with widely used tumor markers (HPV, p16) in head and neck squamous cell carcinomas.

Objectives: Human papilloma virus (HPV) and p16INKa positivity in head and neck squamous cell carcinomas is currently thought to be an encouraging prognostic indicator. However the histopathologic changes responsible for this behavior are completely unknown. It is our objective to elucidate these histopathologic characteristics. **Study Design:** Retrospective cohort study within a large scale academic center. **Methods:** Clinical data, histopathology, and immunohistochemistry were reexamined from 71 HNSCC resections between 7/1/2008—8/30/2009. Specified histopathologic features included: lymphovascular invasion, perineural invasion, grade of squamous differentiation, basaloid classification, EGFR, HPV-HR/LR, p16. **Results:** HPV and p16 had no direct impact on perineural or lymphovascular invasion. However, HPV and p16 were strongly predictive of poorly differentiated tumors, as well as basaloid SCC ($p < 0.001$). Subsequently, poorly differentiated tumors ($p = 0.02$) predicted presence of lymphovascular invasion. Additionally HPV (+), p16(+), lymphovascular invasion, poorly differentiated, and basaloid tumors were all significantly associated with positive nodal disease upon presentation ($p = < 0.001, 0.003, 0.013, 0.002, 0.001$ respectively). Through multivariate logistical regression only HPV positivity (OR=20.7, $p = 0.45$, 95% CI= 401.3 — 1.7) and lymphovascular invasion (OR=5.6, $p = 0.02$, 95% CI= 23.7 — 1.3) remained as independent predictive factors for nodal disease. None of the pathologic factors correlated with EGFR. **Conclusions:** HPV and p16 positivity is predictive for poorly differentiated tumors and basaloid classification, which in turn predicts higher incidence of lymphovascular invasion as well as nodal involvement. Additionally, HPV positive tumors are shown to be an independent risk factor for nodal metastasis. Further study is required to evaluate whether a robust immune response to nodal disease is responsible for improved clinical outcomes.

2:37 - Discussion/Q&A

2:45

◆ 2:45 - 3:15 Break with Exhibitors - Visit Posters ◆

Otology

Moderator: Daniel I. Choo, MD*, Cincinnati, OH

3:17 **MOSHER AWARD PRESENTATION FOR TRIOLOGICAL SOCIETY THESIS**
The Assessment of Olivocochlear Function in Neonates with Real Time Distortion Product Otoacoustic Emissions
Adrian L. James, MD*, Toronto, ON, Canada

Educational Objective: At the conclusion of this presentation the participants should be able to describe how olivocochlear function can be detected with otoacoustic emissions and used in the assessment of newborn hearing.

Objectives: Otoacoustic emissions (OAE) can be suppressed with activation of the medial olivocochlear neural pathway by stimulation of the contralateral ear. The primary objective of this study is to assess the feasibility of using the olivocochlear mediated OAE suppression to test neonatal hearing with a novel device that detects changes in distortion product (DP)OAE level with high temporal resolution. The secondary objective is to investigate whether temporal parameters of the response can be determined with this technique and used in the assessment of neonates at risk of auditory neuropathy spectrum disorder (ANSD). **Study Design:** Prospective translational study of novel hearing assessment technique. **Methods:** 46 neonates were tested in clinic or neonatal intensive care (NICU). DPOAE were recorded in real time with narrow band pass digital filtering (1ms temporal resolution) during presentation of an intermittent contralateral broadband noise stimulus. Magnitude and latency of the contralateral suppression response were compared with hearing outcome (auditory brainstem response screen and clinical followup) and risk factors for hearing loss, particularly hyperbilirubinemia as a risk factor for ANSD. **Results:** Contralateral suppression was identified in all of 38 neonates with detectable DPOAE and normal hearing, most reliably at $f_2 = 4.4\text{kHz}$ (average values = 1dB suppression from DP level of 14dB SPL using 0.55s contralateral stimulus at 50dB SPL). Sensorineural hearing loss was identified in three cases (6.5%) and ANSD in five cases (11% of all neonates tested). Contralateral suppression was absent in two of the ANSD cases (one associated with cochlear nerve aplasia, the other with hyperbilirubinemia) and present in three. The median latency for onset of contralateral suppression was 60ms and offset latency 83ms. The latency for offset of suppression was longer in neonates that required treatment for hyperbilirubinemia at 123ms ($p = 0.02$; Mann-Whitney rank sum test). Latency measurements were determined with high intra-observer reliability (Pearson Product Moment Correlation coefficient > 0.96). **Conclusions:** Contralateral suppression of real time DPOAE can be identified in neonates reliably. This is likely a manifestation of olivocochlear activity, though middle ear muscle reflexes may contribute to suppression in some circumstances. The technique provides a feasible objective test of hearing in neonates that can be applied in the NICU setting without sedation. The presence of a response indicates detection of sound by the contralateral ear and effective brainstem transmission of neural signals, so providing a more sensitive test of hearing than OAE alone. The high temporal resolution of the technique allows measurement of latency of the response. These benefits help to identify neonates at risk of ANSD and have the potential to provide prognostic information that will assist in the management of this unpredictable disorder. Further development of the technique is indicated with regard to determination of hearing

threshold, frequency specific testing and automation of response detection.

3:25 **R**egenerative Treatment for the Soft Tissue Defect of External Auditory Tube

Shin-ichi Kanemaru, MD PhD, Osaka, Japan; Hiroo Umeda, MD PhD, Shizuoka, Japan; Tatsuo Nakamura, MD PhD, Kyoto, Japan; Shigeru Hirano, MD PhD, Kyoto, Japan; Juichi Ito, MD PhD, Kyoto, Japan

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

Objectives: To establish the new treatment for regeneration of the soft tissue defect of external auditory tube (ET) without conventional surgical therapy. **Study Design:** Clinical pilot study. **Methods:** The patients with ET defect without active inflammation were randomly selected from 20 patients. Their ages ranged from 12 to 79, with the average age of 58. Materials for ET defect repair were a gelatin sponge with basic fibroblast growth factor (b-FGF) and an arginate acid film (n=17)/a fibrin glue (n=3). The effectiveness of this therapy for the ET defect repair was estimated 3 weeks after the treatments. After creating a mechanical disruption of the ET defect edge under the microscope, a gelatin sponge immersed in b-FGF was placed over the defect in contact with the residual soft tissue of ET. It was covered by an arginate acid film for flat defect or a fibrin glue for complicated defect. In case complete closure of the ET defect was not achieved, the above same treatment was performed repeatedly. The final estimation was performed 3 months after the treatment. **Results:** Complete closure of the ET defect was achieved in all patients within 3 time treatments. No inflammation/infection and sequela were observed in all patients. **Conclusions:** The study demonstrated that the combination of a gelatin sponge, a bFGF and an arginate acid film/a fibrin glue was effective for regeneration of the ET defect. This is the innovative regenerative therapy: easy, simple, cost effective and noninvasive method for outpatients.

3:33 **L**aser Tissue Welding Tympanoplasty of Rabbit Tympanic Membrane Perforations

Luv R. Javia, MD, Philadelphia, PA; Benjamin S. Bleier, MD, Charleston, SC; James N. Palmer, MD, Philadelphia, PA; Noam Cohen, MD PhD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand and discuss the principles and methods of laser tissue welding and its potential application in otology, specifically for tympanoplasty.

Objectives: Laser tissue welding (LTW) involves the instantaneous fusing of tissue edges through protein denaturation by using a wavelength specific laser and biologic solder containing a targeted chromophore. LTW is a potential novel therapeutic modality with many otologic applications, including the repair of tympanic membrane (TM) perforations. This study tests the feasibility of using LTW in repairing TM perforations and measures the strength of the welded repairs. **Study Design:** Ex vivo animal study. **Methods:** Middle ear clefts of rabbit temporal bones were intubated such that a measurable pressure could be applied to the visualized TM. Tympanic membrane perforations were repaired employing an 808nm diode laser and a polysaccharide albumin solder. Tympanoplasty with both temporalis fascia and solder or with solder alone was performed. Burst pressures were measured for native TM and immediately after LTW of perforations, and then compared using a paired Student's t-test. **Results:** Laser tissue welding was easily performed on rabbit TM perforations both with and without fascia. The mean burst pressure for welded perforations with fascia and solder was 53.83 mmHg (N=7) and was significantly stronger than native TM (p=0.006). On average, the laser welded TM was 3.8 times stronger than the native TM. The mean burst pressure for welds using solder alone was 44.98 mmHg (N=6), which was equivalent to the burst pressure of native TM. **Conclusions:** Laser tissue welding of TM perforation is technically feasible. Additionally, laser welded TM is equal in strength if not stronger than native TM, depending upon the technique of LTW repair.

3:41 **O**steoblasts Cultured from Stapes: An In Vitro Model for Otosclerosis

Kouros Parham, MD PhD, Farmington, CT; Yvonne L. Richardson, MD, Farmington, CT (Presenter); Jonathan J. Romak, BA, Farmington, CT; Craig M. Rodner, MD, Farmington, CT; Gerry Leonard, MD, Farmington, CT; Gloria A. Gronowicz, MD, Farmington, CT

Educational Objective: At the conclusion of this presentation, the participants should be able to explain use of osteoblasts cultured from stapes bones harvested during stapedectomy as an in vitro model for otosclerosis.

Objectives: Otosclerosis is a disease of bone remodeling and turnover in which osteoblasts play a central role. At present, an ideal experimental model for investigating otosclerosis is not available. In this study we developed in vitro osteoblast cultures grown from stapes removed during stapedectomies and describe the characteristics of these osteoblasts. **Study Design:** Laboratory study involving cell cultures and clinical tissue specimens. **Methods:** Cell cultures were grown from stapes removed from four patients with otosclerosis and compared to cell cultures from healthy human peripheral bone fragments harvested during four orthopedic procedures of patients matched for age and sex. Specimens were cultured in DMEM-F-12 with 15% FBS and antibiotics. Staining for alkaline phosphatase, a marker for osteoblast differentiation, verified the osteoblast-like identity of the cells. Once cells reached confluence, 10,000 cells/cm² were replated, and adhesion and proliferation assays were performed. **Results:** For adhesion studies, cells were trypsinized and replated at the same density. Cells were assayed after 4 hours of culture. Attachment of stapes osteoblasts was significantly higher

than for normal human osteoblasts (NHO) (mean±SEM 22616±2455 vs. 12651±908 cells; $p < 0.005$). For proliferation, at 72 hours of culture, tritiated thymidine uptake for the stapes osteoblasts was significantly lower than NHOs (2884±391 vs. 3935±513 dpm; $p < 0.05$).
Conclusions: Osteoblasts cultured from stapes represent a good in vitro model for otosclerosis. The otosclerotic osteoblasts have characteristics that distinguish them from normal osteoblasts. The higher adhesion and lower proliferation rate of otosclerotic osteoblasts may implicate the involvement of integrins and cyclins, respectively, in the pathogenesis of otosclerosis.

3:49 **P**Primary Anastomosis of Transected Facial Nerve Using Novel Nerve Probe in Rodent Model

Amy P. Wu, MD, La Jolla, CA; Quyen T. Nguyen, MD PhD, La Jolla, CA (Presenter); Michael A. Whitney, PhD, La Jolla, CA; Jessica L. Crisp, BA, La Jolla, CA; Linda T. Nguyen, BA, La Jolla, CA; Roger Y. Tsien, PhD, La Jolla, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand 1) current limitations of peripheral facial nerve repair; and 2) utility of novel nerve probe for intraoperative visualization of facial nerves.

Objectives: Surgical identification of traumatically/iatrogenically transected peripheral facial nerve can be challenging due to degeneration of distal branches. Primary anastomosis, which offers the highest likelihood of functional restoration, is usually limited to several days of injury in patients due to difficulty in identification of distal branches beyond this time window. However, studies have shown that following repair, nerves are able to regenerate up to one year from initial injury. We show that use of a novel fluorescent nerve probe improves the intraoperative visualization of proximal and distal ends of transected nerves for weeks post-transection in rodents, resulting in improved functional outcome of primary repair and decreased operative time. **Study Design:** Facial nerves were transected in adult wild type mice. Primary repair was attempted by a separate surgeon with and without the aid of fluorescently labeled nerve probe. **Methods:** The main trunk of the right facial nerve was identified and transected at the pes anserinus. Complete transection was verified by the lack of ipsilateral whisker, lid or alar movement. Anastomoses were performed in standard white light illumination in the control group whereas fluorescently labeled nerve probe was used to visualize nerves in the experimental group. Mice were observed for functional recovery. **Results:** The use of the fluorescently labeled nerve probe resulted in improved facial nerve function and decreased operative time. **Conclusions:** The use of our novel nerve probe may enable surgeons to primarily repair extracranial facial nerve transections beyond the first 3 days after injury. This will improve functional recovery and decrease operative time.

3:57 **P**henotypic Comparison of Hearing Impaired Patients between Those with Homozygous Mutations of GJB2/Del (GJB6-D13S1830) and Heterozygous Mutation Carriers

Michael J. Lipan, MD, Miami, FL; Xiao M. Ouyang, MD, Miami, FL; Simon I. Angeli, MD*, Miami, FL; Denise Yan, PhD, Miami, FL; Xiu Z. Liu, MD PhD, Miami, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss and compare the clinical presentations for hearing impaired patients in two groups. The first group consists of homozygous mutations of GJB2/del(GJB6-D13S1830) and the second group consists of heterozygous mutation carriers.

Objectives: The aim of the study is to assess clinical characteristics of individuals with nonsyndromic sensorineural hearing loss (NSSNHL) with genetic mutations in GJB2 and/or del(GJB6-D13S1830). We describe and compare one group with homozygous mutations against a group of heterozygous mutation carriers. **Study Design:** Prospective cohort study. **Methods:** 350 patients between the ages of 3 months and 80 years referred to a tertiary care outpatient otology practice for NSSNHL were screened for genetic mutations. Direct sequencing of GJB2 and PCR analysis of del(GJB6-D13S1830) was performed and clinical data from history and physical, audiologic testing and radiographic studies were reviewed. **Results:** Twenty types of mutations in GJB2 were detected. Twenty-eight probands were found to have bi-allelic mutations (mutated GJB2 or the del(GJB6-D13S1830) and digenic GJB2/delGJB6-D13S1830 (incidence of 8.0% in our screened population [28/350]). Twenty-six probands were found to have only one GJB2 mutation (incidence of 7.4% [26/350]). Severe to profound hearing loss occurred in 78% of the homozygote group and 50% of the heterozygote group. Both groups tend to demonstrate bilateral, symmetric, nonprogressive hearing loss with heterogeneous audiogram patterns, lack of vestibular complaints and rare inner ear malformations on radiologic imaging. **Conclusions:** These two patient populations have similar incidences in a cohort of patients evaluated for NSSNHL. Heterozygous carriers had less hearing loss. The frequency of carriers in this cohort is higher than expected for the general population suggesting the contribution of a yet unidentified genetic factor affecting expression of the wild type allele. Therefore, counseling should consider the complexity of their genetic factors and the limitations of current screening.

4:05 - **D**iscussion/Q&A 4:15

Otology

Moderator: Jose N. Fayad, MD*, Los Angeles, CA

4:21 **D**etermining First Line Treatment for Migraine Related Dizziness

Adam M. Cassis, MD, Morgantown, WV; Stephen J. Wetmore, MD*, Morgantown, WV

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the effectiveness of medications used for migraine related dizziness and apply the information presented to their clinical practice in regards to treatment of this entity.

Objectives: Determine first line therapy for migraine related dizziness (MRD). **Study Design:** Retrospective chart review and telephone interviews. **Methods:** Forty-four patients with the diagnosis of MRD were included in the study (38 female, 6 male). These patients were treated with medications (b-blockers, calcium channel blocker, neuroleptics, and antidepressants) that can be used for migraine prophylaxis. Symptoms of MRD were recorded at each visit with a data form or patients were contacted by phone. Response of symptoms to medications was compiled as well as adverse reactions to those medications. **Results:** Patients treated with b-blockers, calcium channel blocker (CCB), neuroleptics, and antidepressants experienced an overall improvement of their symptoms in 86%, 85%, 67%, and 80% respectively. All patients treated with antidepressants had a decrease in the frequency of their dizziness, CCBs had 70% decrease in frequency, while b-blockers and neuroleptics each had 75% decrease. The duration of dizziness was decreased 50-67% for all groups, while at least half of each group had a decrease in severity of their dizziness. Incidence of side effects was highest in the CCB group (35%) and b-blocker group (29%) and lowest for antidepressants and neuroleptics (17%). **Conclusions:** Results for each group had similar results for the relief of migraine related dizziness. Side effects were slightly higher in patients taking b-blockers and CCBs but were otherwise well tolerated. There is no clear evidence for support for a certain class of medications as first line to treat MRD but may be directed to treat comorbid conditions.

4:29 **P**resence of Cytomegalovirus in the Perilymphatic Fluid of Patients with Profound Sensorineural Hearing Loss Caused by Congenital Cytomegalovirus Infection

Hiroshi Ogawa, MD, Fukushima, Japan; Takamichi Matsui, MD, Fukushima, Japan; Yoko Baba, MD, Fukushima, Japan; Naoko Yamada, PhD, Fukushima, Japan; Tatsuo Suzutani, MD, Fukushima, Japan; Koichi Omori, MD, Fukushima, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the relationships between the presences of CMV-DNA to CMV related sensorineural hearing loss.

Objectives: Sensorineural hearing loss (SNHL) is one of the most frequent manifestations in patients with congenital cytomegalovirus (CMV) infection at birth. Using dried umbilical cord, we recently developed a PCR based assay for the retrospective detection of congenital CMV infection. In the cases for which CMV was detected we performed cochlea implantation and evaluated the CMV-DNA in the perilymphatic fluid using a PCR based assay. **Study Design:** Focus group study. **Methods:** Five cases were found to be CMV positive from the dried umbilical cord assay. Perilymphatic fluid was collected from each patient at the time of cochlear implantation and analyzed for the presence of CMV using a PCR method. Perilymphatic fluid was also collected and analyzed for the presence of CMV in 17 cases those were found to be CMV negative from dried umbilical cord assay. **Results:** The perilymphatic fluid in 2 of the 5 CMV-DNA positive and in 1 of the 17 CMV-DNA negative patients was found to be positive for CMV. In the 5 cases caused by congenital CMV infection, speech perception and acquisition, and language development were improved postoperatively. However, there were no differences in criteria between the CMV positive group in which the perilymphatic fluid was CMV positive and the CMV negative group. **Conclusions:** Not all patients diagnosed with congenital infection using umbilical cord were found to be positive for CMV-DNA in perilymphatic fluid. In addition, a CMV-DNA positive result was observed in one patient who had not been diagnosed with congenital infection. Sampling of perilymphatic fluid from a large population of patients with congenital SNHL caused by congenital CMV infection or of unknown etiology can determine the prevalence of CMV related profound HL.

4:37 **C**orrelation of Imaging Characteristics and Clinical Markers in Children with Enlarged Vestibular Aqueducts

Adam P. Campbell, BA, Chapel Hill, NC; Oliver F. Adunka, MD, Chapel Hill, NC; Carlton J. Zdanski, MD, Chapel Hill, NC; Craig A. Buchman, MD*, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the possible prognostic value of MR imaging findings in children with enlarged vestibular aqueduct syndrome.

Objectives: To correlate clinical markers and imaging findings in children with at least unilateral enlarged vestibular aqueduct syndrome. **Study Design:** Thirty-three pediatric patients diagnosed with at least unilateral enlarged vestibular aqueducts were included. Each child had appropriate clinical and audiometric data available, as well as a high resolution MRI from the study institution. **Methods:** All images were reviewed by two neurotologists and evaluated for size of endolymphatic sac and duct, as well as incomplete cochlear partitioning. Imaging data was then correlated to known demographic and audiologic data including age of diagnosis, residual hearing, stability of hearing, and evidence of an air bone gap. **Results:** Sixteen male and 17 female children were included. Thirteen children were diagnosed before age 1 and 10 had a positive family history. Twenty-four ears demonstrated profound hearing loss without residual hearing. On MRI, 54 ears had an enlarged endolymphatic sac and 23 also had a markedly enlarged endolymphatic duct. Twenty ears

showed clear imaging evidence of incomplete cochlear partitioning. Most ears with an enlarged endolymphatic duct also had an air bone gap and greater chance of progressive hearing loss. Other findings associated with progressive loss were a small endolymphatic sac and an enlarged endolymphatic duct. Several other correlations were observed. **Conclusions:** Several imaging findings seem to correlate with clinical and audiometric patterns in patients with enlarged vestibular aqueducts. For example, an enlarged endolymphatic duct, a normal sized endolymphatic sac and incomplete partitioning all correlate with an increased risk of progressive hearing loss.

4:45 **Anatomic Verification of a Novel, Non-Rigid Registration Method for Precise Intrascalar Localization of Cochlear Implant Electrodes in Adult Human Temporal Bones Using Clinically Available Computerized Tomography**

Theodore A. Schuman, MD, Nashville, TN; Jack H. Noble, BS, Nashville, TN; Charles G. Wright, PhD, Dallas, TX; George B. Wanna, MD, Nashville, TN; Benoit M. Dawant, PhD, Nashville, TN; Robert F. Labadie, MD PhD*, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the clinical relevance of preferential scala tympani cochlear implant electrode insertion, compare rigid versus non-rigid image registration techniques, and evaluate this novel method for localizing electrode arrays based on clinically available computerized tomography.

Objectives: We have previously described a novel, automated, non-rigid, atlas based registration method for determining the intrascalar position of cochlear implant (CI) electrode arrays within human temporal bones using clinically available, flat panel volume computerized tomography (fpVCT). We sought to validate this method by correlating results with anatomic microdissection of CI arrays in cadaveric bones. Previous reports have associated preferential scala tympani electrode insertion with improved audiological outcomes in CI recipients. These labor intensive studies used rigid registration to identify intracochlear electrode position, which may be less precise than non-rigid algorithms. **Study Design:** Basic and translational research. **Methods:** Seven adult cadaveric temporal bones were imaged using fpVCT before and after electrode insertion. The array midline was identified on the post-intervention scan and superimposed on the pre-intervention images using rigid registration. Using an intracochlear atlas, non-rigid registration was then used to graphically depict the scala tympani and vestibuli on the pre-intervention fpVCT. Specimens were then microdissected to demonstrate the actual array position. **Results:** Using microdissection as the standard for ascertaining electrode position, non-rigid registration of basilar membrane coupled with post-intervention fpVCT of electrode location accurately depicted the array location in all seven bones. In four specimens, the array remained within the scala tympani; in three the basilar membrane was breached. **Conclusions:** We have anatomically validated this automated, non-rigid registration method for predicting the intrascalar location of CI arrays using fpVCT. Using this algorithm and pre- and post-intervention fpVCT, rapid feedback regarding implant location and expected audiological outcomes could be obtained in clinical settings.

4:53 **FOWLER AWARD PRESENTATION FOR TRIOLOGICAL SOCIETY THESIS Laser Stimulation of Single Auditory Nerve Fibers**

Philip D. Littlefield, MD*, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the relationships between optical impulses and evoked auditory neuron action potentials.

Objectives: One limitation with cochlear implants is the difficulty stimulating spatially discrete spiral ganglion cell groups because of electrode interactions. Multipolar electrodes have improved on this, but also at the cost of much higher device power consumption. Recently, it has been shown that spatially selective stimulation of the auditory nerve is possible with an infrared laser aimed at the spiral ganglion through the round window. However, these neurons must be stimulated at high pulse repetition rates for optical radiation to be useful in cochlear implants. We herein use single fiber recordings to characterize the responses of auditory neurons to optical radiation. **Study Design:** In vivo study using normal hearing adult gerbils. **Methods:** Two diode lasers (Lockheed Martin Aculight, Bothell, WA) were used for stimulation of the auditory nerve. They operated between 1.844 and 1.873 μm , with pulse durations of 35 - 1000 μs , and at repetition rates between 1 and 1000 Hz. The laser outputs were coupled to a 200- μm diameter optical fiber placed against the round window membrane and oriented toward the spiral ganglion. The auditory nerve was exposed through a craniotomy and recordings were taken from single fibers during acoustic and laser stimulation. **Results:** Action potentials occurred 2.5 - 4.0 ms after the laser pulse. Maximum rates of discharge were up to 250 Hz. The action potentials did not respond strictly after the light pulse with high stimulation rates, i.e. >300 pulses per second. **Conclusions:** Auditory neurons can be stimulated through the round window membrane with a laser at repetition rates adequate to convey useful auditory information. Optical stimulation and electrical stimulation have different characteristics, which could be selectively exploited in future cochlear implants.

5:01 **Discussion/Q&A**

5:08 **Adjourn**

5:30 - **Poster Reception (TRIO & ASPO) - Exhibit Hall** 7:00

7:00 - **W**ine Reception - Skyview 2 (Bally's 26th floor)
8:50

SATURDAY, MAY 1, 2010

7:00 - **B**usiness Meeting (Fellows Only) - Platinum Room
7:50

PLATINUM ROOM

8:00 **A**nnouncements
Recognition of Poster Awardees

General

Moderator: Andrew H. Murr, MD*, San Francisco, CA

8:07 **L**earning Curve for Competency in Flexible Laryngoscopy
Kulsoom Laeeq, MD, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD (Presenter); Charles M. Stewart, MD PhD, Baltimore, MD; Hamid B. Masood, MD, Baltimore, MD; Robert A. Weatherly, MD, Kansas City, KS; Charles W. Cummings, MD*, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to have an understanding of teaching and assessing flexible laryngoscopy to the residents. We will explain the learning curves obtained for the attainment of competency in flexible laryngoscopy. This has implications for the otolaryngology program interns improving program outcomes.

Objectives: The purpose of our study was 1) to identify the number of flexible laryngoscopies required to attain competency in performing the procedure; and 2) to generate learning curves for the mean number of attempts and time taken by medical students and untrained residents to achieve competency for flexible laryngoscopy. **Study Design:** Cross-sectional educational study. **Methods:** Eight medical students and five residents with no previous experience of flexible laryngoscopy performed 12 attempts at the procedure on a virtual reality simulator. Two evaluators used an assessment tool to score performance on each step of the procedure. Time required to do the procedure was also recorded. Learning objective was to achieve competency on each step described and to perform the procedure in 2 minutes or less. A learning curve was generated using logarithmic analysis of the mean number of attempts to become competent for all the residents. Similar curves were obtained for total time taken and for each step of the procedure. **Results:** It took an average of 6 attempts (range= 3-8) at flexible laryngoscopy to achieve competency in the procedure. Time taken to do the procedure decreased with the number of attempts. A plateau in the performance score was achieved after 8 (± 1.9) attempts. **Conclusions:** Our results suggest that residents can perform flexible laryngoscopy safely after eight attempts at the procedure. This finding has implications for residency programs since this learning curve in the performance can be shortened by practicing in the laboratory rather than on patients.

8:15 **U**tility of Imaging Studies in Idiopathic Vocal Cord Paralysis
Brad W. deSilva, MD, Columbus, OH; Bradley R. Lawson, BS, Columbus, OH; Lowell A. Forrest, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to determine 1) the incidence of idiopathic etiology in patients presenting with vocal cord paralysis; 2) the likelihood patients with idiopathic vocal cord paralysis will require surgery for glottic incompetence; and 3) utility of brain, neck, and chest imaging studies in ruling out pathology in the setting of idiopathic vocal cord paralysis.

Objectives: To determine the utility of brain, neck, and chest imaging studies in ruling out pathology in patients with idiopathic vocal cord paralysis. **Study Design:** Retrospective chart review. **Methods:** 10 year database of 471 patients diagnosed with vocal cord paralysis was reviewed to determine etiology. Imaging studies ordered for patients with idiopathic etiology were reviewed to determine incidence of significant pathologic findings and develop recommendations for complete workup. **Results:** The incidence of idiopathic etiology for vocal cord paralysis was 22.1% (104/471). Other common etiologies included iatrogenic 62.4% (294/471), neoplastic 8.1% (38/471), traumatic 4.5% (21/471), and neurologic 3.0% (14/471). Those patients with idiopathic etiology requiring surgery (injection laryngoplasty and/or medialization thyroplasty) for glottal incompetence amounted to 37.5% (39/104). The incidence of significant pathologic findings on brain, neck, and chest imaging for idiopathic etiology was 9.6%, most commonly found on CT neck and chest. The most common abnormality identified was mediastinal mass or lymphadenopathy leading to a new neoplastic or inflammatory diagnosis. MRI brain was more likely to identify central pathology than screening CT head. **Conclusions:** CT imaging of neck and chest has signifi-

cant clinical benefit for patients with idiopathic vocal cord paralysis. Brain imaging can be reserved for patients with global neurologic and high vagus nerve deficits. A large portion of patients (37.5%) may require surgery for glottic incompetence after lack of recovery of vocal fold motion in the setting of idiopathic vocal cord paralysis.

8:23 **Development and Pilot Testing of an Objective Structured Clinical Examination (OSCE) on Hoarseness**

Charles M. Stewart, MD PhD, Baltimore, MD; Hamid Masood, MD, Baltimore, MD; Kulsoom Laeeq, MD, Baltimore, MD; Amit Kochhar, MD, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to have an understanding of the six competencies and evaluations of residents in those competencies through development of objective structured clinical examination (OSCE). The results of the pilot testing of the OSCE will be discussed for reliability, validity and feasibility.

Objectives: 1) To develop a valid and reliable tool for an objective structured clinical examination (OSCE) on hoarseness; and 2) to pilot test the feasibility of this tool by assessing residents' clinical skills in various core competencies while assessing hoarseness on a standardized patient (SP). **Study Design:** Cross-sectional validation study. **Methods:** The OSCE checklists were developed using modified Delphi technique after obtaining input from faculty involved in providing care to patients with hoarseness. Both SP based and rest stations were created to assess residents' clinical skills. Twelve otolaryngology-head and neck surgery residents participated in the study. Live assessments, video recordings and written documentation were objectively rated by faculty members. Formative feedback was provided in the end for remediation purposes. **Results:** OSCE that we have developed is a feasible and valid method of assessing residents' clinical skills for evaluating hoarseness. Senior residents performed better in most of the tasks especially ability to perform direct flexible laryngoscopy. Senior residents were more focused while juniors were more thorough in their approach. Faculty found OSCE to be helpful in providing feedback to residents. **Conclusions:** This OSCE can be effectively used for the objective assessment of clinical competency in hoarseness. It has the potential to evaluate multiple competencies on a single occasion including procedures such as flexible laryngoscopy. It provides opportunity of targeted assessment of learning in order to provide constructive formative feedback.

8:31 **Site Involvement as a Predictor of Airway Intervention in Angioedema**

Michael E. McCormick, MD, Detroit, MI; Adam J. Folbe, MD, Detroit, MI; John H. Krouse, MD PhD*, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be better able to understand how the extent of involvement in angioedema can predict the need for airway intervention.

Objectives: To look for a relationship between which sites are involved in angioedema and the need for airway intervention (intubation, tracheotomy). **Study Design:** Retrospective chart review. **Methods:** 140 patients were admitted to two hospitals at an academic medical center between July 1, 2006 and June 30, 2008 with the diagnosis of angioedema. 9 patients were excluded for misdiagnosis and insufficient data. 131 patients were included in the study. Charts were reviewed for pertinent data, including demographics, sites of involvement along the upper airway, medical therapy, and airway intervention. Subsites included lips, anterior tongue, floor of mouth, soft palate, base of tongue, and larynx. **Results:** The BOT was involved in 18 patients and the larynx was involved in 28 patients. Airway intervention was required in 19 patients (15%). Patients with laryngeal and/or BOT involvement required intervention in 36% of cases (vs. 6% in patients without involvement of larynx/BOT). Patients with more than 3 sites involved had a 37% rate of intervention, compared with only 11% in patients with only 1 or 2 sites involved. In the subgroup of patients with laryngeal/BOT involvement, 56% with 3 or more sites involved required intervention, as compared to 30% of patients with 1-2 sites involved. **Conclusions:** Involvement of the BOT and/or larynx has a six-fold increase in the rate of airway intervention in angioedema patients. In addition, the number of sites involved further predicts airway intervention in those patients with laryngeal/BOT involvement. In select situations, patients with angioedema limited to the lips only may be considered for discharge with medical therapy.

8:39 **Angioedema: Assessment, Risk Factors, Treatment, and Patient Demographics in an Urban Tertiary Care Center**

Danny M. Mesleman, MD, Detroit, MI; Natalie N. Rizk, PhD, Detroit, MI; Michael D. Seidman, MD*, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the populations at risk for developing severe angioedema of the head and neck, patient medication use prior to angioedema episode, medical and radiographical treatments in emergency room, and patients requiring an otolaryngology consultation.

Objectives: Multiple factors place patients at risk for developing angioedema of the head and neck. The current study reviews the evaluation and treatment of patients in the emergency room, medications patients use that may perpetuate the diagnosis, and those requiring an otolaryngology consultation. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review from January 2, 1999, to December 28, 2001, was performed in all patients with a diagnosis of angioedema of the head and neck only (ICD-9 995.1). Each patient's demographic information and current medications were documented. Emergency room course was analyzed for medication usage, radiographs, hospital admission, and otolaryngology consultation. **Results:** The inclusion criteria of angioedema were met

by a total of 642 patients. African Americans were the largest percentage of patients to be diagnosed with angioedema. This population was compared with the remaining subjects amongst the following variables ACEI, ARB, ASA, admission, allergy outpatient referral, medications given in the emergency room (Benadryl, epinephrine, H2 blockers), intubation, otolaryngology consultation, NSAIDs, OCP, and opioids. A statistically significant difference was established between African Americans and all other subjects for increased use of ACE inhibitors ($p<0.0001$), hospital admission ($p<0.001$), H2 blockers ($p=0.0012$), epinephrine ($p=0.0463$) and more otolaryngology consults ($p<0.0001$). **Conclusions:** This case series reveals interesting information about the demographics and management of the disorder in the emergency room. The data aids in the identification and treatment of certain populations at risk for severe cases of angioedema and those patients that need further airway evaluation and management.

8:47 **Efficacy of Preoperative Neck Ultrasound in the Detection of Cervical Lymph Node Metastasis from Thyroid Cancer**

Harry S. Hwang, MD, San Francisco, CA; Lisa A. Orloff, MD, San Francisco, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the diagnostic utility of preoperative neck ultrasound in the detection of cervical lymph node metastasis in patients with thyroid cancer. Participants should also be able to compare the efficacy of preoperative neck ultrasound between the lateral neck versus the central neck compartments. Lastly, the efficacy of preoperative neck ultrasound in the setting of revision neck dissection for patients with thyroid cancer will be discussed.

Objectives: Our objective is to assess the diagnostic accuracy of surgeon performed preoperative neck US in the detection of both central and lateral cervical lymph node metastasis from thyroid cancer. **Study Design:** Case series. **Methods:** All patients with thyroid cancers and follicular thyroid lesions who were evaluated by preoperative neck US were reviewed. The cervical lymph nodes were assessed for suspicion of metastasis based on US characteristics. The diagnostic accuracy of US was determined according to whether histologically confirmed cancer was present in surgical cervical lymph node specimens. **Results:** From October 2004 to December 2007, 637 patients with thyroid nodularity underwent neck US by the senior author. Of those patients, 63 had a preoperative neck US performed for papillary thyroid carcinoma (PTC). The sensitivity and specificity of US in predicting metastasis in the central neck was 30.0% and 86.8%, respectively. The sensitivity and specificity of US in predicting metastasis in the lateral neck was 93.8% and 80.0%, respectively. A subset of 17 patients underwent ultrasonography followed by revision neck dissection for PTC, and the sensitivity and specificity of US in predicting metastasis in the lateral neck was 100% and 100%, respectively. **Conclusions:** Surgeon performed preoperative neck US is a valuable tool in assessing patients with thyroid cancers. The highly sensitive and specific nature of US in predicting cervical lymph node metastasis in the lateral neck, especially in the setting of recurrent disease, can provide reliable information to assist in the surgical management of patients with thyroid cancer. Although US for central compartment lymphadenopathy in the presence of the thyroid gland is less sensitive and specific than US for the lateral neck, it still provides useful information that can be obtained at the same time as the primary thyroid pathology is assessed.

8:55 **The Successes and Pitfalls of Using Sialoendoscopy for the Diagnosis and Management of Salivary Gland Obstruction**

Alison M. Maresh, MD, New York, NY; David I. Kutler, MD, New York, NY; Ashutosh S. Kacker, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the potential barriers of initiating a sialoendoscopy program, compare the results of sialoendoscopy with more invasive procedures used to manage salivary gland obstruction, and discuss potential techniques for improving sialoendoscopy outcomes.

Objectives: Sialoendoscopy is a new technology being used at a limited number of institutions for the diagnosis and management of salivary gland pathologies. This technique is promising for its superior diagnostic potential as well as its decreased morbidity as compared to traditional more invasive techniques for managing obstruction. Our objective is to review the sialoendoscopy experience at our institution to identify successes, areas of improvement, and to provide guidance to other programs that may be interested in sialoendoscopy. **Study Design:** We did a retrospective review of all diagnostic and interventional sialoendoscopy cases performed at this institution from 2008 to date. **Methods:** Charts were reviewed for epidemiological and clinical data, as well as procedural techniques, findings, and outcomes. **Results:** We have attempted 37 parotid and submandibular sialoendoscopies, with successful endoscopic canalization of the duct in 36 of these cases. 18/21 stones were removed from 19 patients. Stones that were $>5\text{mm}$ were more difficult to dislodge and remove without fragmentation. Other abnormal findings included strictures, scars, and fibrotic debris. There were no intraoperative complications, and 2 patients had postoperative purulent sialadenitis that resolved after antibiotics. **Conclusions:** As an institution that recently began performing sialoendoscopies, we show similar success rates compared to other programs that use this technique. Obstacles included the initial cost of acquiring equipment and the associated learning curve of using a new technique. Similar to other programs, successful extraction of sialoliths was limited with larger stones. In the future, we hope to use laser lithotripsy for fragmentation, a technique already being trialed at some institutions.

9:03 - **Discussion/Q&A** 9:10

General

Moderator: Michael G. Stewart, MD*, New York, NY

9:12 Awake Pulse Dye Laser (PDL) treatment of Hereditary Hemorrhagic Telangiectasia Epistaxis

Chih-Kwang Sung, MD MS, Boston, MA; Ramon A. Franco Jr., MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the indications for treatment and utilize the technique of office based, awake pulse dye laser treatment of recurrent epistaxis secondary to hereditary hemorrhagic telangiectasia.

Objectives: Hereditary hemorrhagic telangiectasia (HHT) is an autosomal dominant genetic abnormality affecting the subepithelial vasculature resulting in fragile, dilated blood vessels. The dominant clinical feature of HHT is chronic, recurrent epistaxis. Various treatments including cauterization, embolization, septodermoplasty and systemic and topical estrogen therapy have been employed for HHT with no definitive cure. The purpose of this study was to develop a simple and effective treatment to limit the symptoms of HHT epistaxis.

Study Design: Retrospective review. **Methods:** The records of five patients who underwent PDL treatment of HHT epistaxis from July 2004 to September 2009 were reviewed. **Results:** Five patients with HHT (3 male, 2 female), average age 63 (range 47-80) were treated with in-office PDL under local anesthesia. Patients received an average of 2.8 treatments with 409 pulses and 288.4 joules of energy delivered. All patients reported a decrease in frequency and severity of bleeding episodes. No major complications were reported.

Conclusions: Improvements in epistaxis symptoms of HHT were reported by all five patients after PDL laser treatments. Multiple treatments are required for continued control due to the recurrent nature of HHT. Preliminary indications show PDL treatment is a viable, simple and safe technique for controlling the nasal manifestations of HHT.

9:20 Tongue Base Coblation as an Adjunct to Uvulopalatopharyngoplasty in the Surgical Treatment of Sleep Apnea: Experience with 100 Patients

Nora W. Perkins, MD, Albany, NY; Steven M. Parnes, MD*, Albany, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the role of a multilevel approach to surgical treatment of sleep apnea, which may include reduction of the tongue base using coblation.

Objectives: Assess the improvement in sleep apnea, based on polysomnographic data, with the use of tongue base coblation in addition to uvulopalatopharyngoplasty (UPPP). **Study Design:** Prospective cohort involving one hundred patients with sleep apnea who underwent UPPP and tongue base coblation. **Methods:** Chart review was performed and demographic, preoperative polysomnographic data and postoperative polysomnographic data were evaluated. **Results:** Eighty men and twenty women with sleep apnea were treated with tongue base coblation and uvulopalatopharyngoplasty. The average preoperative respiratory disturbance index (RDI) was 34.2. Fifty-six patients completed the study and underwent postoperative polysomnograms, revealing an average postoperative RDI of 22.1. Of the fifty-six patients, thirty-nine had an improvement in their RDI (mean decrease in RDI 23.4), and seventeen had worsening of their RDI (mean increase of 15.6). The difference in RDI, from preoperative to postoperative, was statistically significant, $P < 0.0004$.

Conclusions: Procedures to address the tongue base are often used in conjunction with uvulopalatopharyngoplasty for the surgical treatment of sleep apnea. Coblation allows the surgeon to remove bulky tissue in the tongue base under endoscopic visualization. Approximately two-thirds of patients had an improvement in their RDI, however some patients had worsened RDI.

9:28 Open Bedside Tracheotomy: Impact on Patient Care and Patient Safety

Donald B. Yoo, MD, Bronx, NY; Bradley A. Schiff, MD, Bronx, NY; Richard V. Smith, MD, Bronx, NY; Marvin P. Fried, MD*, Bronx, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to compare and discuss the impact of open bedside tracheotomy versus tracheotomy performed in the operating room in terms of the effects on patient care, patient safety, and utilization of resources.

Objectives: Objectives were 1) to evaluate the impact of open bedside tracheotomy (OBT) on patient care; and 2) to determine whether OBT in the intensive care unit (ICU) is a safe, cost effective procedure. **Study Design:** Retrospective chart based review.

Methods: 163 consecutive patients in the medical or surgical ICU who underwent OBT by the otorhinolaryngology service from July 2007 to July 2009, in addition to the 163 consecutive adult patients who had undergone open tracheotomy in the operating room immediately prior to July 2007, were included in the study. Data examined included time intervals between initial consultation and performance of tracheotomy, complication rates, ICU length of stay, and cost considerations. **Results:** In the group of patients examined prior to OBT, time to surgery averaged 3.24 days in comparison to an average of 1.48 days for patients who received OBT ($p < 0.05$). Review of complications revealed no significant difference in the two study groups (OR, 1.42, 95% CI, 0.44-4.56, $p = 0.56$). The length of ICU stay decreased by 0.6 days on average in the OBT group versus the OR group, approaching statistical significance ($p = 0.072$). Cost analysis suggests a potential savings of \$4,700 per case, resulting in approximately \$766,100 saved in the OBT group. **Conclusions:** Review of our experience demonstrates comparable safety for tracheotomy performed bedside versus in the operating room, while offer-

ing shorter time to surgery, decreased costs, and perhaps a decrease in the length of ICU stay. These findings suggest that open bedside tracheotomy is the procedure of choice for patients in the ICU setting requiring tracheotomy.

9:36 **T**emperature Variations of Nasal Endoscopes and Other Otolaryngic Lighting

Jeffrey J. Nelson, MD, Syracuse, NY; Parul Goyal, MD, Syracuse, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand patient safety concerns involving high powered otolaryngic lighting, thus having increased awareness of equipment and procedures which may pose risks to patients and staff.

Objectives: Advances in light sources and endoscopes have improved illumination during endoscopic sinus surgery. However, these advances have also increased the temperatures the equipment reaches during the course of procedures. Limited data exists on temperature variations of nasal endoscopes and the potential risks of burns to drapes and patients. We attempt to quantify temperature variations of nasal endoscopes, light cords and light boxes. **Study Design:** Various endoscopes, light cords and xenon light sources were used to measure temperature increases over time. Noncontact infrared thermometers were used to measure the temperature of the endoscopes and light cords. **Methods:** Temperatures were measured using different combinations of endoscopes, light cords, and light sources at multiple intervals up to 30 minutes for a total of 24 trials. Variables assessed included endoscope age, light cord age, light source type, and light source age. Also, extended time trials were repeated up to 180 minutes. **Results:** The maximum temperature of endoscopes for all trialed combinations was 34.5 degrees celsius. The age of light cord or scope do not statistically change heat production. An additional study performed of light cord and light source alone reached a temperature of 132 degrees within one minute to a maximum over 150 degrees celsius. **Conclusions:** Patient safety is a preeminent concern for all procedures. Although the endoscope temperatures appear low risk for patient injury, the light cord itself creates extreme temperatures. It is important to monitor the endoscope and light cords for extreme temperatures to avoid patient injury.

9:44 **A** New Tool for Measuring Therapeutic Outcome for Oral Malodor

Yosef P. Krespi, MD*, New York, NY; Victor Kizhner, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the proper use of a new QOL tool for analysis oral malodor therapy.

Objectives: Oral malodor (OM) is a common yet debilitating condition. Its diagnosis and management can be empirical with dissatisfying treatment outcomes mainly due to lack of uniform grading methodology. Objective evaluation methods include organoleptic judges and cumbersome, unreliable breath analysis tools. Therefore there is a great need for quality of life questionnaire. **Study Design:** A simple tool, Halitosis Associated Life-Quality Test (HALT), collecting self-reported subjective symptoms was developed and tested. **Methods:** We devised HALT based upon 20 questions covering psychological, social, dental, pharyngeal, nasal, symptoms and handicap with functional disability on a 5 point scale. HALT was measured among patients with OM and controls. When medical or surgical intervention was utilized, in addition to organoleptic assessment, HALT was measured before and 2-4 weeks after. Interventions included: FESS, tonsil cryptolysis or complete tonsillectomy. The efficacy of various xerostomia agents (i.e. Caphosol) were also tested for OM and results measured by HALT. **Results:** HALT scores were significantly higher among OM patients ranging from 2-4.5 with a mean of 2.5 compared to controls. Most of the patients demonstrated improvement on HALT scores following therapy. Tonsil cryptolysis for tonsilloliths was the most common intervention. Improvement was statistically significant in over 90% of the patients. **Conclusions:** A thorough search for a source for OM can lead to encouraging treatment results. When tonsilloliths are present cryptolysis can achieve significant control. HALT was validated as a tool for grading individual progress unique to OM. We believe that HALT should be used in conjunction to other objective OM tools.

9:52 - **D**iscussion/Q&A

9:58

◆ 9:58 - 10:25 Break with Exhibitors - Visit Posters ◆

Facial Plastic/Reconstructive Surgery

Moderator: Soly Baredes, MD*, Newark, NJ

10:27 **I**nterposition Vein Grafts in Microvascular Head and Neck Reconstruction

Maxwell C. Furr, MD, Portland, OR; Steven B. Cannady, MD, Rochester, NY; Mark K. Wax, MD, Portland, OR

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

vein grafting may be needed in head and neck reconstruction; and 2) become familiar with the factors associated with use of interposition grafts and the morbidity of their use.

Objectives: In the reconstruction of complex defects of the head and neck, free tissue transfer has become an invaluable and widely utilized technique. In cases in which donor vessels in the neck have become compromised, particularly due to prior surgery, trauma, or radiotherapy, interposition vein grafts are necessary for the creation of tension free anastomoses. Due to concerns with the addition of extra anastomoses, the potential for damage to the vein graft during harvest, and patient factors, interposition grafting has been anecdotally associated with decreased survival of the free flap. However, this has not been fully investigated in a large series. **Study Design:** Descriptive case series design in a tertiary referral center. **Methods:** Charts of patients undergoing interposition vein grafts for microvascular reconstruction of head and neck defects between August 1998 and February 2009 were reviewed. **Results:** Over a ten year period, 29 interposition vein grafts were used in 20 free tissue transfers, representing 1.7% of all microvascular reconstruction cases. 70% of vein grafts were used in cases of secondary reconstruction or prior radiotherapy. Free flap survival in the interposition vein graft group was 95%, compared with 96% overall flap survival. **Conclusions:** Interposition vein grafts are utilized most often in cases of secondary or post-radiation reconstruction, and survival in free flaps using interposition vein grafting is not associated with decreased flap survival.

10:35 **Orthodromic Transfer of the Temporalis Tendon and Coronoid Process of the Mandible to Reanimate the Paralyzed Face**

Douglas M. Sidle, MD, Chicago, IL; Andrew J. Fishman, MD, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to describe a new minimally invasive technique for reanimation of the paralyzed face. Participants will be able to compare this newer technique with traditional temporalis muscle transfers and discuss its advantages.

Objectives: To report a modification of the temporalis tendon transfer technique for use in facial paralysis patients in whom dynamic adjacent muscle transfer is determined to be the best treatment option. **Study Design:** Retrospective review of 6 consecutive patients who underwent orthodromic transfer of the temporalis tendon and the attached coronoid process of the mandible for the treatment of longstanding and permanent facial paralysis. **Methods:** Outcomes measured included patient satisfaction, objective measurements of oral commissure elevation with smiling, and physician grading of preoperative and postoperative patient photographs. Medical records were reviewed for complications. **Results:** Patient satisfaction was high, with a mean score of 8.0 (possible score of 10). 3 patients were physician graded as excellent to superb. The other 3 patients were rated as having good postoperative results. Movement was identified in every patient and ranged from 2.5 to 9.5 mm, with mean movement of the oral commissure of 5.3 mm. One patient developed a seroma at the site of harvest of the fascia lata that was drained without further complication. **Conclusions:** This facial reanimation procedure is a novel modification of the temporalis tendon transfer technique where the coronoid process is transferred in conjunction with the tendon. This technique is minimally invasive and safe and may result in less variability of the postoperative aesthetic result. The procedure allows orthodromic action of the temporalis muscle, is relatively easy to perform, and eliminates the facial asymmetry typically produced by transfer of the origin of the temporalis muscle.

10:43 **The Final Dermal Closure of the Cleft Lip Deformity**

Daniel Luke Crozier, MD, Syracuse, NY; Joshua A. Demke, MD, Lubbock, TX; Sherard A. Tatum, MD, Syracuse, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the variety of techniques used by surgeons to close the dermis in cleft lip deformities. To identify the training backgrounds of those who do cleft lip repair. Finally, to discuss the relative advantages of different closure techniques, according to the surgeons who use them.

Objectives: To identify and discuss the variety of techniques used to close the skin in repair of cleft lip deformity. **Study Design:** More than 1100 surveys were sent out to the members of the American Cleft Palate-Craniofacial Association. The option to submit an electronic survey online or to return a paper survey was given. **Methods:** A total of 208 surveys were submitted electronically and by mail. The paper surveys were entered into the electronic survey website Zoomerang, and the results were evaluated using the website's tools. **Results:** The use of transcutaneous permanent sutures alone was the most common technique (31%), followed by tissue glue with or without subcutaneous sutures (20%), transcutaneous absorbable sutures alone (14%), and transcutaneous permanent and subcutaneous absorbable (10%). The most common transcutaneous sutures were nylon, fast absorbing gut, and Prolene, in that order. 72% of respondents reported that transcutaneous sutures were rarely associated with persistent track marks, 0-5% of the time. **Conclusions:** The survey revealed that a wide variety of skin closure techniques are being used to repair cleft lip deformity. Future studies comparing the results of these different techniques may help cleft lip surgeons to achieve optimal results.

10:51 **Withdrawn--Effectiveness of CO2 Fraxel Laser Therapy in the Management and Treatment of Facial Scars**

Brian A. Lipari, MD, New York, NY; Teresa M. O, MD, New York, NY; Inanna P. Weiss, MD, New York, NY; Milton Waner, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should clearly understand scar formation, degrees

and therapeutic efficacy of CO2 Fraxel laser therapy for the treatment of facial scars.

Objectives: To quantitatively and qualitatively evaluate the effectiveness of CO2 Fraxel laser therapy in the management and treatment of facial scars after surgical excision of various vascular anomalies. **Study Design:** Retrospective review of all patients presenting to a tertiary care vascular anomalies practice with facial scars secondary to surgical excision of a vascular lesion. **Methods:** The medical records and laser logs of all patients with facial scars secondary to surgical excision of a vascular lesion (hemangioma, arteriovenous malformation, venous malformation, lymphatic malformation, etc.) between 2007 and 2009 were reviewed. Of 200 patients, 125 with facial scars were included for evaluation in this study and 75 with well healed scars were excluded. The selection criteria of scars were based on a combination of clinical and imprinting parameters. Scar improvement was graded using patient questionnaires and clinical evaluation by two physicians. **Results:** Of the 125 patients studied, both patients and clinicians noted the following: 115 (92%) showed significant improvement in the texture and visual appearance of the scar, whereas, 5 (4%) showed moderate improvement and 5 (4%) demonstrated minimal improvement. **Conclusions:** There was good correlation between patient satisfaction and clinical evaluation. It is evident that early implementation of CO2 Fraxel laser therapy is beneficial in the reduction and appearance of facial scars secondary to surgical excision of a vascular lesion.

10:59 - Discussion/Q&A

11:05

Sinus and Nasal

Moderator: Ralph B. Metson, MD*, Boston, MA

11:07 Outcomes after Middle Turbinate Resection: Revisiting a Controversial Topic

Zachary M. Soler, MD, Portland, OR; Peter H. Hwang, MD*, Stanford, CA; Jess C. Mace, MPH, Portland, OR; Timothy L. Smith, MD MPH*, Portland, OR

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss quality of life outcomes after middle turbinate resection.

Objectives: To evaluate differences in endoscopy exam, olfactory function, and quality of life (QOL) status after endoscopic sinus surgery (ESS) for patients with and without bilateral middle turbinate (BMT) resection. **Study Design:** Open, prospective, multi-institutional cohort. **Methods:** Subjects completing enrollment interviews, computed tomography, and endoscopy exam were asked to provide pre- and postoperative responses to the Smell Identification Test (SIT), Rhinosinusitis Disability Index (RSDI), Chronic Sinusitis Survey (CSS), and Medical Outcomes Study Short Form-36 Health Survey (SF-36). Bivariate and multivariate analyses were performed at the 0.05 alpha level. **Results:** 47 subjects with BMT resection were compared to 195 subjects without BMT resection with a mean followup of 17.4 months postoperatively. Patients with BMT resection were more likely to have asthma ($p=0.001$), aspirin intolerance (0.022), nasal polyposis (0.025), and prior sinus surgery ($p=0.002$). Patients with BMT resection had significantly higher baseline disease burden measured by endoscopy, CT, and SIT scores (all $p<0.001$). No significant differences in improvement were found in RSDI, CSS, or SF-36 scores between patients with BMT resection and those with BMT preservation (all $p>0.220$). Patients undergoing BMT resection were more likely to show improvements in mean endoscopy (-4.5 ± 5.2 vs. -1.9 ± 4.3 ; $p=0.005$) and olfaction (5.3 ± 10.8 vs. 1.3 ± 7.6 , $p=0.045$) compared to those with BMT preservation. **Conclusions:** This investigation found no difference in QOL improvement after ESS between patients with and without BMT resection. Patients undergoing BMT resection did, however, show greater improvements in endoscopy and SIT scores which persisted after controlling for confounding factors.

11:15 Correlations between Symptoms, Nasal Endoscopy, and In-Office Computed Tomography in Postoperative Chronic Rhinosinusitis Patients

William R. Ryan, MD, Palo Alto, CA; Tara T. Ramachandra, MD, Nashville, TN; Peter H. Hwang, MD*, Stanford, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to compare correlative relationships between symptoms, nasal endoscopy signs, and sinus computed tomography findings in postoperative chronic rhinosinusitis patients.

Objectives: In presurgical CRS patients, there is known to be poor correlation between symptoms, nasal endoscopy, and sinus CT scans. No studies exist evaluating the presence of such correlations in postsurgical CRS patients. **Study Design:** Cross-sectional study. **Methods:** 51 CRS patients who had undergone ESS within the past 3 years completed symptom questionnaires, nasal endoscopy, and an in-office sinus CT scan during one clinic visit. Metrics used were SNOT-22, visual analog symptom scale, Lund-Kennedy endoscopy scale, and Lund-McKay CT scale. We determined Pearson correlation coefficients, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) between scores for symptoms, endoscopy, and CT. **Results:** Collectively, symptom scores correlated poorly with both endoscopy and CT scores (coefficient range: 0.3-0.24). Individual symptoms also correlated poorly, except when symptoms were severe (PPV 77-91% for a positive endoscopy; PPV 77-100% for a positive CT scan). Endoscopy

and CT scan scores had a strong correlation (coefficient: 0.76 ($p < 0.05$)). Endoscopy scores had high PPV (93%) but low NPV (46%) for predicting a positive CT scan. **Conclusions:** Symptoms, when analyzed collectively, do not correlate with endoscopic and CT findings in CRS patients after ESS. Individual symptoms may be predictive when severe. Positive findings on nasal endoscopy correlate closely with positive CT scan findings, thus validating the importance of endoscopy in clinical decision making. However, negative nasal endoscopy cannot rule out occult radiologic evidence of disease. Thus symptoms, endoscopy, and CT provide complementary information in the evaluation of the post-ESS patient with CRS.

11:23 **The Early Postoperative Course of Surgical Sleep Apnea Patients**

Brian W. Rotenberg, MD FRCPC, London, ON Canada; Amanda C. Hu, MD, London, ON Canada (Presenter); John Fuller, MD FRCPC, London, ON Canada; Yves Bureau, PhD, London, ON Canada; Ian Arra, MD, London, ON Canada; Mithu Sen, MD FRCPC, London, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the early postoperative course of surgical sleep apnea patients and discuss the appropriate level of postoperative monitoring for these patients.

Objectives: Recent guidelines from the American Society of Anesthesiologists recommended postoperative monitoring for almost all patients with obstructive sleep apnea (OSA). These guidelines are largely based on retrospective literature and expert opinion. The appropriate level of postoperative monitoring remains controversial. Our objective was to prospectively document the early postoperative course of patients undergoing OSA surgery. **Study Design:** Prospective observational study. **Methods:** One hundred and twenty-one patients (age 43.92 ± 13.46 years, 79.8% male) with sleep study proven OSA (AHI 31.85 ± 22.66) who were undergoing surgery for OSA at our tertiary care center were recruited from 2007 to 2009. The following outcome measures were recorded: 1) incidence of respiratory complications requiring nursing intervention; and 2) level of postoperative blood oxygen saturation, divided into three groups: a) mean oxygen saturation in recovery room (SpO₂ recovery); b) mean oxygen saturation in step-up unit (SpO₂ step-up); and c) lowest oxygen saturation over the 24 hour period (SpO₂ minimum). These results were then compared to the benchmark literature. **Results:** Overall incidence of nursing intervention in response to a respiratory complication (3.4%) was significantly less than expected ($p < 0.001-0.002$). SpO₂ recovery was $92.85 \pm 3.21\%$, SpO₂ step-up was $95.94 \pm 1.56\%$, and SpO₂ minimum was $92.77 \pm 3.07\%$. No variables were identified as being associated with any of the outcomes measures. **Conclusions:** Incidence of respiratory events requiring intervention in the early postoperative course of OSA patients was far lower than expected by the benchmark literature. This data suggests that routine postoperative inpatient monitoring is not required in most cases.

11:31 **In-Training Assessment and Attainment of Competency in Endoscopic Sinus Surgery**

Kulsoom Laeeq, MD, Baltimore, MD; Andrew P. Lane, MD*, Baltimore, MD; Sandra Y. Lin, MD, Baltimore, MD; Masaru Ishii, MD PhD, Baltimore, MD; Douglas Reh, MD, Baltimore, MD; Nasir I. Bhatti, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to have an understanding of teaching and assessing endoscopic sinus surgery (ESS) to the residents. The assessment tool for ESS will be introduced. We will explain the implementation of the tool in our program and discuss the results for reliability, validity and feasibility of the assessment tool for use in the operating room. This has implications for the otolaryngology programs in terms of improving program outcomes.

Objectives: 1) To generate learning curves for residents' attainment of competency for each step of endoscopic sinus surgery (ESS); and 2) to assess the feasibility and validity of the assessment tool for endoscopic sinus surgery when used in the operating room for in-training assessment of operative competency. **Study Design:** Cross-sectional validation study. **Methods:** We implemented the use of global and checklists parts of ESS assessment tool to evaluate the surgical skills of 15 otolaryngology-head and neck surgery residents (PGY 1-5) in the operating room over a period of 18 months. Rhinology faculty scored residents' performance of every step of ESS at the end of each procedure using a previously validated tool. Construct validity was calculated by comparing scores across training levels and also by progression of scores for individual resident over time (ANOVA). Logistic regression analysis was used to generate the learning curves for attainment of competency. For all statistical purposes $p < 0.05$ was considered significant. **Results:** Construct validity was demonstrated with senior residents performing better than junior residents. Scores of individual residents progressed with the increasing number of ESS cases performed over time. Compliance rate for the faculty to complete the evaluation was 92%. Learning curves were generated for the number of surgeries required to perform more than 90% of the procedure competently. Competency was achieved last in performing "frontal sinusotomy". **Conclusions:** Our results indicate that the tool we have developed is a feasible and valid instrument for the assessment of competency. It can be used for the in-training assessment and for documentation of operative competency in ESS.

11:39 **Evaluation of a Novel Polysaccharide Based Gel for Use in Laser Assisted Skull Base Repair: A Rabbit Model**

Benjamin S. Bleier, MD, Philadelphia, PA; James N. Palmer, MD, Philadelphia, PA; Alexander G. Chiu, MD, Philadelphia, PA; Noam A. Cohen, MD PhD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain what laser tissue welding (LTW) entails, discuss the limitations of previously described biologic soldering materials, and explain the advantages of using a polysaccharide based gel for laser assisted skull base and cerebrospinal fluid leak repairs.

Objectives: To define the thermal and inflammatory profile of a novel polysaccharide based soldering gel in rabbit sinonasal mucosa, to assess the prospective burst strength of the laser assisted repair, and to determine the time required for complete solder resorption. **Study Design:** Prospective, IACUC approved study in a previously described rabbit dorsal sinusotomy model. **Methods:** Ten dorsal maxillary sinusotomies were performed in a New Zealand white rabbit model. Five wounds were laser welded using a novel polysaccharide based soldering gel with an 810nm diode laser while five were left to heal by secondary intention. Burst pressure thresholds of 2 laser and 2 control wounds were measured on postoperative days 0 and 5 and were compared using a Student's t-test. All welds were examined histologically on postoperative day 0, 5, and 45 for thermal injury, inflammation, and degree of solder resorption. **Results:** The burst pressures of the LTW group were significantly higher than control on postoperative day 0 (135.03mmHg, N=4, SD=5.76 vs. 7.98mmHg, N=4, SD=0.51), and day 5 (155.38mmHg, N=4, SD=2.88 vs. 41.70mmHg, N=4, SD=7.26)(p<0.05). No significant thermal or inflammatory effect was found on postoperative day 0 and 5. Complete solder resorption was noted by postoperative day 45. **Conclusions:** Laser tissue welding using a polysaccharide based soldering gel is capable of creating sinonasal mucosal wound repairs capable of withstanding over four times normal human intracranial pressure without any additional grafting materials. These repairs increase in strength over time, are not associated with any thermal or inflammatory injury, and demonstrate complete solder resorption within 45 days.

11:47 - **D**iscussion/Q&A

11:55

11:55 **I**ntroduction of President-Elect

Gerald S. Berke, MD*, Los Angeles, CA

12:00 **A**djourn

◆ 12:00 - 1:00 Lunch with Exhibitors/View Posters ◆

Scientific Poster Program

General A1 - A24
Head & Neck A25 - A56
Laryngology-Bronchoesophagology A57 - A66
Otology A67 - A98
Pediatrics A99 - A106
Plastics-Aesthetics A107 - A116
Sinus-Rhinology A117 - A130

General

A1. **R**oller Coaster Induced Ear Barotrauma

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

Educational Objective: At the conclusion of this presentation, the participants should be able to mechanism of ear barotrauma and proposed mechanism for roller coaster induced barotrauma.

Objectives: To present a unique case of roller coaster induced barotraumas and discuss the possible mechanism of injury. **Study Design:** Case report and literature review. **Methods:** Literature review of ear barotrauma and roller coaster induced injury relevant to otolaryngology, with discussion of a recent representative case within our health system. **Results:** We present a case of a 24 year old male who presented for evaluation of otalgia after riding a roller coaster that reaches speeds of 120 mph within 4 seconds with concurrent lateral head rotation. Physical exam findings included external ear canal edema and tympanic membrane injection. Audiological examination was within normal limits. Images of the findings are provided. The patient was managed with observation and symptoms resolved within 72 hours. **Conclusions:** To our knowledge this is the first reported case of roller coaster induced barotrauma. As roller coaster engineering advances, otolaryngologists need to be aware of a new etiology of barotrauma.

A2. **U**nder the Microscope: Assessing Surgical Aptitude of Otolaryngology Residency Applicants

David J. Archibald, MD, Rochester, MN; Matthew L. Carlson, MD, Rochester, MN; Eric J. Moore, MD*, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand a new assessment of surgical aptitude amongst applicants applying for otolaryngology residency training using microsurgery.

Objectives: With a limited number of positions among otolaryngology residency training programs, further metrics are desirable in identifying the best candidates amongst a very competitive applicant pool. While academic performance in medical school is readily available, a convenient and rapid assessment of an applicant's capacity for surgical performance is lacking. We describe a direct assessment of an applicant's ability for rapid surgical skill acquisition, manual dexterity, visual-spatial abilities, and response to stress that can be performed during the interview process. **Study Design:** A retrospective review of 97 otolaryngology residency applicants over three years. **Methods:** After a brief orientation applicants were seated at a microsurgical training station and allotted 20 minutes to suture an incision using 10-0 nylon suture on a polyurethane practice card. Their performance was assessed by an otolaryngologist and included scores ranging between 1 and 5 for the following categories: microscope use, respect for tissue, instrument handling, knot tying and suture control, skills acquisition, and attitude towards the exercise. **Results:** The average overall score was 22.4 out of a total of 30 points (standard deviation = 3.7; range = 13-28). Top performers (scores greater than 26) and low performers (scores less than 20) each made up 17% of the study group. **Conclusions:** The value of applicant screening tests in predicting surgical competency is controversial. Previous assessments of surgical aptitude often involve dexterity tests unrelated to actual surgical procedures. We describe a direct assessment tool that may prove useful in identifying outliers, both high and low, to aid in final applicant ranking.

A3. **P**atent Pyriform Sinus Fistula in a Third Branchial Cleft Cyst

Deidra A. Blanks, MD, Chapel Hill, NC; Carol G. Shores, MD PhD, Chapel Hill, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand a potential treatment for branchial clefts.

Objectives: To determine if a patent branchial cleft fistula is identifiable and treatable via direct laryngoscopy. **Study Design:** We present a case of a child with previous resection of a third branchial cleft cyst who presented over the course of 13 years with recurrent ipsilateral neck abscesses. **Methods:** A fistulous opening in the ipsilateral pyriform sinus was identified on modified barium swallow and

direct laryngoscopy despite multiple previous direct laryngoscopies. **Results:** The fistula was treated with endoscopic direct cautery. **Conclusions:** Modified barium swallow was effective in identifying the fistula and should be considered in patients presenting with recurrent branchial cleft cysts.

A4. **Acquired Nasopharyngeal Stenosis in a Patient with Sarcoidosis**

Jacob R. Brodsky, MD, Syracuse, NY; Richard T. Kelley, MD, Syracuse, NY; Sherard A. Tatum, MD, Syracuse, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the typical head and neck findings of sarcoidosis and be familiar with the diagnosis and management of acquired nasopharyngeal stenosis as a potential cause of nasal obstruction in sarcoidosis.

Objectives: Acquired nasopharyngeal stenosis is a well documented and frequently difficult to manage phenomenon that is primarily associated with nasopharyngeal radiation therapy, adenotonsillectomy, or uvulopalatopharyngoplasty. Sarcoidosis is a rheumatologic disorder that affects multiple systems, including numerous facets of the head and neck. **Study Design:** Case report. **Methods:** We report a case of a patient with sarcoidosis that demonstrated severe nasopharyngeal stenosis in addition to laryngeal and sinus involvement. After medical management was instituted, the nasopharyngeal stenosis was successfully managed with balloon pharyngoplasty followed by subsequent surgical pharyngoplasty and uvuloplasty with local pharyngeal flap reconstruction. **Results:** The patient has maintained good nasopharyngeal patency postoperatively and has had significant improvement in his nasal obstruction. **Conclusions:** A literature review has revealed no previously reported cases of acquired nasopharyngeal stenosis associated with sarcoidosis. This report is intended to prompt the consideration of nasopharyngeal stenosis as a potential cause of nasal obstruction in patients with sarcoidosis presenting to the otolaryngologist, as well as to draw attention to the need to consider sarcoidosis in the differential diagnosis of patients with nasopharyngeal stenosis. We also demonstrate the viability of pharyngoplasty in the management of nasopharyngeal stenosis in the setting of sarcoidosis.

A5. **Simple Technique: External Light Guidance for Percutaneous Dilatational Tracheotomy**

Ivan H. El-Sayed, MD, San Francisco, CA; James E. Ho, PhD, San Francisco, CA; David W. Eisele, MD*, San Francisco, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss how an external light can be used to perform a percutaneous tracheotomy and compare this technique to the traditional method.

Objectives: Percutaneous dilatational tracheotomy (PDT) is a commonly used technique considered as safe as open tracheotomy, however there is still room for improvement. Bronchoscopic visualization aids safe performance of the procedure, however exact needle placement is still not optimal. As a result, we developed a simple modification of the PDT technique using an external white light guide (ELG) to facilitate identification of the needle entrance point. We aim to present our initial experience with the ELG PDT in an otolaryngology training program. **Study Design:** Retrospective descriptive study. **Methods:** A review of a case series of 15 consecutive patients undergoing ELG PDT. ELG is performed by placing a white light source to the anterior trachea wall externally and identifying the transmitted light inside the trachea with a bronchoscopic to predict the exact needle entrance point. **Results:** The transmitted light was rapidly identified in all 15 patients, and the endotracheal tube tip withdrawn to appropriate position in the subglottis in approximately 10 seconds in 13/15 patients. The needle entered within 1-2mm of the external light in all patients. **Conclusions:** External light guidance is a simple modification of PDT that facilitates rapid placement of endotracheal tube in the subglottis, aids needle placement in the anterior wall and reduces surgeon anxiety.

A6. **The Monetary Value of Physician Services in America: A Survey of the General Population**

Paul C. Frake, MD, Washington, DC; Mark C. Domanski, MD, Washington, DC; Rebecca J. Howell, MD, Washington, DC; Thomas Troost, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) describe the perceived value of the physician services presented in this study; 2) evaluate recent health expenditure data and projections published by the Centers for Medicare & Medicaid Services (CMS); and 3) participate in the discussion about the implications of these opinions on otolaryngology practices and future healthcare reform.

Objectives: To evaluate the perceived monetary value of physician services within the general population and to foster academic discussion about the finances of clinical practice in the setting of upcoming healthcare reform. **Study Design:** Internet based survey and review of CMS data. **Methods:** Web based prospective survey of 409 healthy volunteers between the ages of 18 and 75. **Results:** Based on our survey the perceived monetary values of office visits were comparable to the actual physician payments. However, the average value associated with surgical treatments was significantly higher than the true Medicare reimbursement amount. For example, survey participants said that a reasonable price for a doctor to be paid for performing a tonsillectomy is \$955.58, whereas the Medicare reimbursement is \$271.37. Furthermore, 59% of respondents also believe that insurers, Medicare, and Medicaid pay doctors more than what they had input into the survey. **Conclusions:** The current patterns of CMS reimbursement reveal an unsustainable trend of declining payments for physician services. When the general population was surveyed, the results revealed that most people believe their doctors are paid far more than they actually are. It is vital for otolaryngologists to understand and discuss the economic

forces that continue to shape our practices, and that we all play an active role in the discussions surrounding the upcoming legislation of healthcare reform.

A7. Upper Airway Radiofrequency Ablation with Nasal Surgery: An Effective and Cost Effective Strategy for Socially Disruptive Snoring

M. Boyd Gillespie, MD, Charleston, SC; Jared M. Intaphan, MD, Charleston, SC; Shaun A. Nguyen, MD, Charleston, SC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the technique of combining nasal surgery with upper airway radiofrequency ablation in the treatment of socially disruptive snoring.

Objectives: Review techniques and outcomes of upper airway radiofrequency ablation (RFA) combined with nasal surgery when used for snoring with sleep disordered breathing. **Study Design:** Retrospective review. **Methods:** A prospectively acquired sleep quality assurance database was reviewed to determine demographics, complications, and outcomes of patients with socially disruptive snoring treated with upper airway RFA and nasal surgery. **Results:** Seventy-two patients (32 females; 40 males) with a mean age of 52 years (range, 24 to 83 years) underwent upper airway RFA with nasal surgery for the treatment of chronic nasal blockage and socially disruptive snoring. All patients underwent septoplasty with inferior turbinate reduction with radiofrequency to the soft palate. Twenty-seven patients (38%) also received RFA to the tongue base. Patients received a mean of 2.2 (range, 1 to 4) applications of upper airway RFA in the office 6 weeks or more after surgery using the same RF applicator tips used at the time of surgery. Three patients (4%) had infections related to the nasal surgery which resolved with antibiotics and local wound care. No infections or complications were observed at RFA treated sites. Epworth sleepiness scale improved from a preoperative mean of 11.4 to a postoperative mean of 7.8 ($p=0.01$). Fifty-four of 72 (75%) of bed partners were satisfied with the level of snoring reduction after surgery. **Conclusions:** Upper airway RFA combined with nasal surgery is both a safe and effective treatment for patients with anatomic nasal obstruction with socially disruptive snoring. Reuse of RFA applicator tips in followup treatments improves outcomes and reduces cost without increasing the risk of upper airway infection.

A8. Otolaryngology Resident Perspective of Proposed Duty Hour Restrictions

Rebecca J. Howell, MD, Washington, DC; Amy Caggiula, BS, Washington, DC; Mark C. Domanski, MD, Washington, DC; Philip E. Zapanta, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the proposed guidelines by the Institute of Medicine on resident duty hour restrictions, explain the implications on residency training and patient care from an otolaryngology resident perspective.

Objectives: In 2008, the Institute of Medicine (IOM) published a report detailing recommendations for modifying the existing standards for resident duty hour restrictions. This study identifies the current opinion of otolaryngology residents regarding implementation of the IOM recommendations and how this may affect surgical training and patient care. **Study Design:** We conducted a national online survey of otolaryngology residents. **Methods:** An online survey was distributed to otolaryngology residents via e-mail. Residents were asked about their familiarity with the IOM recommendations, how the new guidelines would affect their training, and whether any changes would have to be made to become compliant to possible new guidelines. **Results:** A total of 175 otolaryngology residents nationwide completed the survey. Most residents were satisfied with their current level of training and felt that increased work hour restrictions would be a challenge to education (79%). Residents expressed concern about the level of care they could provide their patients. Fifty-six percent strongly agreed that they would not be able to provide the same level of call coverage for their patients given the new restrictions. **Conclusions:** The majority of otolaryngology residents are not in favor of the IOM proposed work hour restrictions. Most residents surveyed had reservations on the impact of the new restrictions on both their education and patient care. Any application of new work hour guidelines should address the specific needs of individual specialties. The institution of new blanket policies should be cautioned.

A9. Anesthesia Induced Methemoglobinemia in a Patient with Hansen's Disease: A Case Report

David Hu, MD, Los Angeles, CA; Trac Duong, MD, Los Angeles, CA; Maie St. John, MD PhD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the causes, diagnosis, and management of acquired methemoglobinemia resulting from local anesthetic use in head and neck surgery.

Objectives: Local and topical anesthetics are commonly used for managing patients in otolaryngology. Rarely, methemoglobinemia can occur from anesthetic use and its development can be potentially fatal. This article discusses the physiology of methemoglobinemia and reviews its clinical diagnosis and treatment. **Study Design:** Case study and literature review. **Methods:** The patient's clinical records were examined. A literature search was performed in PubMed using a combination of "methemoglobinemia, lidocaine, and/or dapsone". **Results:** A 52 year old woman with recurrent squamous cell cancer of the tongue and airway obstruction underwent urgent tracheostomy. 2% topical viscous lidocaine was used to anesthetize the oral cavity and oropharynx. Transtracheal block was performed with 4% lidocaine. Subsequently, the patient went into laryngospasm. Oxygen saturation dropped precipitously and an emergent tra-

cheostomy was performed. While securing the airway, she developed bradycardia and became pulseless. ACLS protocol was initiated, and she was successfully resuscitated. Despite ventilation with 100% oxygen, pulse oximetry lingered between 88-90%. Blood gas analysis showed pH 7.48, CO₂ 32, PaO₂ 310, HCO₃ 23.9. A review of her records revealed a history of Hansen's disease and treatment with dapson. Methemoglobin was measured at 12.5%. Methylene blue was administered intravenously, restoring methemoglobin to 1.7%. **Conclusions:** Acquired methemoglobinemia caused by anesthetics like benzocaine are well documented in the anesthesia literature. However, the role of lidocaine causing methemoglobinemia is lesser known. This case highlights the increased potential to develop methemoglobinemia while on concomitant oxidizers, like dapson. Otolaryngologists need to be familiar with the causes, diagnosis, and treatment of methemoglobinemia, because early recognition is critical for a good outcome.

A10. **The Feasibility of Telemedicine in Fiberoptic Laryngoscopy**

Lori A. Lemonnier, MD, Detroit, MI; Corey K. Treadway, MD, Traverse City, MI; Adam J. Folbe, MD, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate that digital images captured during a fiberoptic laryngoscopic examination can be considered equal to a second, confirmatory evaluation, and may provide a means of improving time to patient evaluation.

Objectives: To determine if images captured by a portable digital imaging device during fiberoptic laryngoscopic examination can be of high enough quality to replace a second fiberoptic laryngoscopic evaluation in person. Additionally, to determine if those images can be successfully transferred via internet to be reviewed remotely in an effort to improve time to patient evaluation. **Study Design:** A prospective randomized single blinded study. **Methods:** Digital images and video were captured of fiberoptic laryngoscopic examinations performed at an academic otolaryngology clinic. The video images were then reviewed at least two hours later. Comparisons were made across anatomical subsites and measured for erythema, edema, secretions, and presence of mass. Either a two or three point grading scale was used for all data points. **Results:** Twelve patients were enrolled for a total of 21 independent comparisons and a total of over 1100 data points. Statistical analysis revealed no significant differences between intraobserver evaluation of live and digital laryngoscopy with the exception of mucous quality. **Conclusions:** Evaluation of digital images captured during a fiberoptic laryngoscopic examination can be considered equal to a second, confirmatory evaluation. Future studies will use these images to test feasibility of remote laryngoscopic evaluation and its effect on patient evaluation time.

A11. **Effects of Early Ozone Exposure on the Immunologic Response to Infection in Respiratory Mucosal Cells of Rhesus Macaque Monkeys**

Jonathan Liang, MD, Sacramento, CA; Rebecca Fishman, BS, Davis, CA; Justin Fontaine, BS, Davis, CA; Joan Gerriets, PhD, Davis, CA; Edward Postlethwait, PhD, Birmingham, AL; Lisa Miller, PhD, Davis, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the unified airway concept, discuss the effects of early ozone exposure on the immunologic response to infection, and demonstrate the rhesus macaque monkey as a good model for investigating upper airway diseases (sinusitis, rhinitis, laryngitis, tracheitis).

Objectives: The unified airway concept proposes that respiratory mucosa from the nose and sinuses down to the trachea represent a common epithelium that responds similarly to stimuli. Ozone irritation changes the milieu of the mucosa. We aim to understand the effects of early ozone exposure in altering the immunologic response of respiratory mucosal cells to bacterial endotoxin. **Study Design:** Infant rhesus macaque monkeys were exposed to filtered air (control) or episodic ozone. Animals were exposed to 5 or 11 5-day cycles of ozone at 0.5 ppm during the first 6 months of life. All animals were raised in filtered air conditions until 12 months of age, and then exposed to aerosolized lipopolysaccharide (LPS) to simulate gram negative bacterial infection. **Methods:** Sinonasal and tracheobronchial cells were harvested with necropsy. Cell cultures were grown and cells were exposed to LPS in vitro. After RNA extraction, Taqman polymerase chain reaction (PCR) was performed to analyze IL-6 and IL-8 gene expression. We performed enzyme linked immunosorbent assay (ELISA) on cell supernatant to analyze IL-6 and IL-8 protein expression. **Results:** Cell culture response showed 4.47 IL-6 copies and 872.5 IL-8 copies in control animals, versus 3.31 IL-6 copies and 1293.8 IL-8 copies in ozone exposed animals (per 10,000 GAPDH copies). Similar results were seen with IL6 and IL8 protein expression in ELISA analysis. **Conclusions:** Early ozone exposure had little effect on IL-8 response but did blunt IL-6 response in respiratory mucosal cells. Sinonasal and tracheobronchial cells may have adaptive mechanisms that increase thresholds for manifestation of sinusitis and tracheitis, respectively.

A12. **Lateral Dermoid Cyst of the Floor of Mouth: Unusual Radiologic and Pathologic Findings**

Harrison W. Lin, MD, Boston, MA; Amanda L. Silver, MD, Boston, MA; Mary E. Cunnane, MD, Boston, MA; Peter M. Sadow, MD PhD, Boston, MA; David A. Kieff, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the clinical presentation, radiologic and pathologic evaluation and workup, and surgical management of dermoid cysts of the floor of mouth.

Objectives: To review the presentation and management of dermoid cysts of the floor of mouth and to present a case with an unusually late presentation and strikingly xenotypic radiographic and gross pathologic findings. **Study Design:** Case report and a review of the literature. Surgical, radiographic and histopathologic findings are shown and discussed. **Methods:** We describe a case of a 60 year

old gentleman with a two year history of a slowly enlarging, nontender mass in his right submandibular and base of tongue region. Computed tomography demonstrated a 4.4x3.0x3.5cm mass with mixed attenuation and scattered heterogeneous calcifications. Magnetic resonance imaging further revealed a lesion containing multiple uniformly rounded foci measuring up to 3mm in diameter, creating a “sack of marbles” appearance on cross-sectional imaging. **Results:** Fine needle aspirations showed concerning atypical findings, and accordingly, the mass was excised via a transcervical approach. Incision into the mass demonstrated a cyst containing numerous yellow, spheroid fragments with paste-like consistency. Histopathology revealed that the cyst contained a focally attenuated, focally keratinizing stratified squamous epithelial lining with rare underlying apocrine and eccrine glands within the cyst wall, findings diagnostic of a dermoid cyst. **Conclusions:** Although a lateral dermoid cyst is a rare lesion of the floor of mouth, with only 12 prior cases reported in the literature, it should be considered in the differential diagnosis of any oral cavity or cervical cystic lesion. Radiologic imaging may provide essential diagnostic information that may influence surgical planning, as FNA biopsy may be nondiagnostic due to inevitable sampling bias (cyst wall/contents, squamous lining). Definitive therapy consists of surgical excision.

A13. **The Role of Inhalant Allergy in Caring for the Chronic Laryngitis Patient**

Elizabeth J. Mahoney, MD, Boston, MA; Marisa A. Ryan, BA, Boston, MA (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the unified airway concept as it may relate to chronic laryngitis, demonstrate an appreciation for the incidence of inhalant allergy in the chronic laryngitis patient population and recognize that there is a role for including allergy testing in the diagnostic evaluation of chronic laryngitis patients, even in the absence of classic allergic rhinitis symptoms.

Objectives: Chronic laryngitis including dysphonia, cough or globus is a common complaint of patients seeking otolaryngologic evaluation. Assessment for inhalant allergy is frequently recommended in the evaluation of chronic laryngitis, yet the incidence of allergy in this chronic laryngitis patient population is unclear. This study aims to evaluate the incidence of inhalant allergy in a population of chronic laryngitis patients referred for allergy testing and predict whether chronic laryngitis symptoms, in the absence of classic allergic rhinitis, merit an allergy evaluation. **Study Design:** Retrospective study. **Methods:** A review of all patient encounters at our medical center between August 1, 2006 and August 31, 2008 with a diagnosis of chronic laryngitis or dysphonia was performed. Comorbidities, medications, symptoms, allergy test results, treatment and subjective improvement were recorded. **Results:** 66 patients with chronic laryngitis who underwent allergy testing were identified. 28% of those with isolated laryngeal symptoms compared to 38% of those with additional rhinitis symptoms tested positive for inhalant allergens. There was no significant difference in the predictive value of specific laryngitis and rhinitis symptoms for a positive test. 64% with positive allergy testing reported improvement in laryngeal symptoms with treatment. **Conclusions:** The incidence of positive allergy testing in this cohort suggests that patients with chronic laryngitis, even in the absence of rhinitis symptoms, may have unrecognized inhalant allergies. Although causality cannot be demonstrated, the improvement noted with allergy treatment argues that allergy may be an important contributor to chronic laryngitis. As awareness about the unified airway continues to evolve, otolaryngologists should consider allergy testing in patients with isolated laryngeal symptoms.

A14. **Sharps Exposures among Otolaryngology-Head and Neck Surgery Residents**

Patrick G. Maiberger, MD, Richmond, VA; Angela S. Peng, MD, Richmond, VA; Evan R. Reiter, MD, Richmond, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the rate of sharps exposures among otolaryngology-head and neck surgery residents and understand the barriers to reporting these exposures to the hospital. Finally, participants should be able to recognize the need for improved precautions and testing protocols to minimize these potentially harmful incidents.

Objectives: To assess the prevalence and risk factors for sharps exposures among otolaryngology residents, and to assess practices for reporting these exposures. **Study Design:** Retrospective online survey of otolaryngology-head and neck surgery residents. **Methods:** A questionnaire was sent to all national otolaryngology-head and neck surgery program directors during the 2008-9 academic year. Instructions were to forward this to all active departmental residents. The survey assessed the following areas: demographics, number, timing, and setting of sharps exposures, history of reporting exposures, and knowledge of hospital policies regarding sharps exposures. **Results:** Two hundred twenty-two residents completed the survey, with 167 (73%) reporting at least one sharps exposure during residency. One hundred thirty-four exposures (81%) were from solid bore needles, and 147 (90%) occurred in the operating room. Of all exposures, 31 (19%) occurred while working on patients reported to have a communicable disease, though no residents reported seroconversion. Seventy-four participants (44%) did not inform the hospital of the event primarily due to the perceived burden of reporting and testing procedures. Nearly half of respondents attested to witnessing an unreported exposure. Forty-six participants (23%) were unaware of hospital testing protocol. **Conclusions:** The majority of otolaryngology residents experience a sharps exposure during their residency training. A significant proportion either fail to report exposures or lack knowledge of hospital testing policy. This low rate of reporting exposures may compromise post-exposure prophylaxis and possibly increase rates of seroconversion. Less burdensome testing policies and improved education are needed to help decrease these often preventable exposures.

A15. **HTLV Associated T-cell Lymphoma Presenting as a Sinus Mass with Proptosis: A Case Report**

Christopher A. Mascarinas, MD, Brooklyn, NY; Neil L. Pruffer, MD, Brooklyn, NY; Matthew B. Hanson, MD, Brooklyn, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the clinical characteristics of HTLV associated T-cell lymphoma and be familiar with the necessary workup.

Objectives: Describe a case of human T-cell lymphotropic virus (HTLV) associated T-cell lymphoma of the paranasal sinuses presenting with sinus destruction and severe proptosis. **Study Design:** Case report. **Methods:** The patient's clinical course was reviewed, including photographs, radiographic studies, histopathologic slides. The relevant literature was reviewed. **Results:** A 48 year old woman from Guyana presented with bilateral eye swelling and unilateral vision loss progressing over 4 weeks. On examination there was severe bilateral proptosis and chemosis. Imaging studies showed a large mass centered in the ethmoid sinuses with bilateral orbital invasion but no intracranial extension. An orbital biopsy revealed a large T-cell lymphoma. Serologic tests for HTLV were positive. She was treated with chemotherapy and responded well with improvement of vision in both eyes. **Conclusions:** HTLV associated T-cell lymphoma is a rare etiology of a paranasal sinus lesion, but it should be considered in the differential diagnosis.

A16. **I**ncreased Estrogen and the Risk of Papillary Thyroid Cancer

Vikas Mehta, MD, New York, NY; Sarah L. Cooke, BS, Tallahassee, FL; Theodore Scott Nowicki, BS, Valhalla, NY; Theresa Tran, MD, New York, NY; Jan Geliebter, PhD, Valhalla, NY; Mark S. Persky, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to further understand the role of estrogen in thyroid cancer and the increased risk for an undiagnosed thyroid nodule to be a carcinoma in a woman with a history of pregnancy.

Objectives: Papillary thyroid carcinoma (PTC) is more common in women with a female:male incidence ratio of 3:1. Estrogen has been implicated in the development of thyroid cancer. The study investigates the relationship between various estrogen associated risk factors, including benign and malignant uterine and breast disease and pregnancy, in a large group of women with thyroid disease. **Study Design:** Retrospective chart review of all patients with thyroid disease at a single tertiary care center over a 12 year period. **Methods:** 674 female patients diagnosed with thyroid disease between 1997-2009 were included. Charts were reviewed and patients were segregated into benign or malignant disease. Odds ratios were calculated for the following risk factors: history of hysterectomy, uterine fibroids, breast adenoma, menstrual bleeding and pregnancy. Statistical analyses were performed using the Fisher's exact test. **Results:** 259 patients had a history of papillary thyroid carcinoma. 50% of the PTC patients had a history of pregnancy compared to 41.7% of the patients with benign thyroid disease. The odds ratio associated with pregnancy was 1.43 (95% CI 1.00 — 1.89, p = 0.024). Overall, PTC patients were 43% more likely to have a history of pregnancy than those with benign disease. Odds ratios were calculated for all risk factors and subsets of malignancy, but none demonstrated statistical significance. **Conclusions:** A history of pregnancy, a hyperestrogenic state, is associated with an increased risk of papillary thyroid carcinoma. This further supports the role of estrogen in the pathogenesis of thyroid cancer.

A17. **T**echniques to Achieve Minimally Invasive Endoscopic Excision of Second Branchial Cleft Cysts

Benjamin C. Paul, MD, New York City, NY; David J. Myssiorek, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of techniques to achieve minimally invasive branchial cleft cyst excision. The participants should specifically be able to compare and contrast an endoscopic approach to an open approach for second branchial cleft cyst excision.

Objectives: To evaluate the effectiveness of endoscopic technique in the excision of second branchial cleft cysts. **Study Design:** Video documented case report from a tertiary care hospital. **Methods:** A video assisted endoscopic excision of a second branchial cleft cyst was planned after preoperative discussion revealed a strong patient desire for a minimally invasive, skin sparing approach. The operation was recorded both in operative note, photography, and film. A literature review of similar cases was also conducted. **Results:** A 2.3 cm skin sparing incision allowed for an endoscopic aided extracapsular excision of a 2.8x5.1x4.0 cm fluctuant branchial cleft cyst using needle decompression. The endoscope allowed for enhanced visualization of tissue planes, minimal blood loss, and an operative time comparable to similar open operations. The patient was discharged to home on the same day as the operation and had no post-operative complications. **Conclusions:** The role of endoscopy to excise second branchial cleft cysts has not been well elucidated. Our results suggest an advantage to a minimally invasive approach featuring endoscopy. After a thorough literature review, it appears this is the first study in the United States to discuss these techniques.

A18. **O**ccult Metastatic Papillary Thyroid Carcinoma Presenting as an Isolated Lateral Cervical Cyst

Francisco G. Pernas, MD, Galveston, TX; Alejandro Vazquez, BS, Miami, FL; Sandeep P. Dave, MD, Miami, FL; Carlos S. Duque, MD, Miami, FL; Rita Bhatia, MD, Miami, FL; Donald T. Weed, MD*, Miami, FL

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

cytopathologic features of papillary thyroid carcinoma (PTC) presenting as an isolated lateral cervical cyst.

Objectives: To discuss the clinical, radiologic, and cytopathologic features of papillary thyroid carcinoma (PTC) presenting as an isolated lateral cervical cyst. **Study Design:** Retrospective case series of five adult patients presenting with isolated lateral cervical cysts that were eventually found to represent cystic metastases from PTC. **Methods:** Retrospective case series and review of pertinent literature. **Results:** All but one patient were younger than 40 years of age (range 19 - 62). Three of the 5 were asymptomatic at presentation, and 2 presented with complaints of local discomfort or pain. Fine needle aspiration (FNA) of the lesions was grossly abnormal in all patients, findings ranged from greenish black, to dark brown, to scant but hemorrhagic fluid. In three cases attention was directed towards the thyroid gland only after excisional biopsy and intraoperative histopathological examination revealed cystic lymph node metastasis from an occult PTC. In the other two cases permanent histopathological diagnosis revealed PTC and the patients were subsequently treated. **Conclusions:** Although the majority of isolated (occurring in the absence of a localizing primary lesion) lateral cervical cysts are benign, distinguishing these masses from metastatic carcinoma within a lymph node that has undergone cystic degeneration can be difficult. Head and neck surgeons should be mindful of the potential for malignancy in their approach to these lesions, as they often mimic benign cysts. Surgical management for definitive treatment should be dictated by the results of preoperative diagnostic imaging, FNA, and frozen section analysis at the time of excisional biopsy. Appropriate contingency consent should be obtained in cases where preoperative workup suggests the possibility of occult malignancy.

A19. **Massive Enlargement and Complete Ossification of a Stylohyoid Chain with Associated Neck Pain**

Rajanya S. Petersson, MD, Rochester, MN; Kerry D. Olsen, MD*, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to: 1) understand the relevant anatomy of the human stylohyoid chain and discuss anatomic variations; 2) discuss potential symptoms associated with stylohyoid chain anomalies; and 3) discuss approach to management of these anomalies.

Objectives: We report a case of a massive, completely ossified stylohyoid chain in a patient whose primary complaint was neck pain. We also review anatomical variations of the stylohyoid chain and potential associated symptoms. **Study Design:** Case report. **Methods:** Case report and review of the literature. **Results:** A 62 year old woman presented with a two year history of left neck pain, mild dysphagia, and otalgia. The pain localized to an area inferior to her left ear, extending under the left hemimandible. Physical examination revealed a firm enlargement in the area of the left stylohyoid ligament with tenderness to palpation and left hyoid prominence. Computed tomography showed a calcified, significantly enlarged left stylohyoid chain, from the level of the skull base to the lesser cornu of the hyoid bone. This was surgically resected from the skull base and hyoid via a cervico-parotid approach. The specimen measured approximately 5.5 cm in length and 2 cm in greatest diameter, and pathological examination showed a segment of bone with bone marrow elements consistent with ossified ligament. The patient reported some improvement in symptoms on short term followup. **Conclusions:** Though partial ossification is not uncommon, complete ossification of the stylohyoid chain is rare. Ossification of the stylohyoid chain has been associated with nonspecific symptoms, including throat pain, dysphagia, otalgia, foreign body sensation, and pain along the carotid artery distribution. There are several anatomic variations and symptom correlation is not always obvious. Due to the impressive enlargement of this patient's stylohyoid chain, surgical resection was reasonable in an attempt to alleviate the patient's symptoms.

A20. **Improving Methods of Resident Selection**

Jeremy D. Prager, MD, Cincinnati, OH; Charles M. Myer IV, MD, Cincinnati, OH; Kay M. Hayes, MPH, Cincinnati, OH; Charles M. Myer III, MD*, Cincinnati, OH; Myles L. Pensak, MD*, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the application of business analysis tools to help define job objectives and competencies for the junior otolaryngology resident. Participants should also be able to discuss how business tools may aid in the generation of improved interview questions and techniques designed to identify competencies in candidates for residency.

Objectives: Translating the concept of the ACGME core competencies, it is possible to define the essential job objectives and competencies of a junior otolaryngology resident. The objective of this study is to incorporate validated business analysis tools in the identification of competencies specific to the junior otolaryngology resident and develop behavioral based interview techniques designed to identify these attributes in candidates for residency. **Study Design:** Institution of a pilot program involving a focus group within an otolaryngology department, a professional development consultant, commercial business software for occupational analysis and personnel selection, and an interview technique training seminar for faculty and residents. **Methods:** In coordination with a university based professional development consultant, a commercially available, validated occupational analysis system was used to define the job objectives and competencies of a junior otolaryngology resident. These results were used to generate behavioral based interview questions and techniques for use in the resident selection process. All interviewing faculty and residents were trained in behavioral based interviewing. **Results:** Occupational objectives for the junior resident position specific to a particular university department of otolaryngology were identified. Essential skills and areas of knowledge as well as essential competencies were generated. Specific behavioral based questions for resident interviews were created and incorporated into the current resident selection interview. **Conclusions:** Using a business model of personnel selection, a list of job objectives and competencies for the junior otolaryngology resident can be created. Using these results, a structured interview to complement traditional interviews may be implemented with the ultimate goal of

improving candidate selection.

A21. Unusual Presentation of an Idiopathic Deep Lobe Parotid Sialoceles

Rahul Seth, MD, Cleveland, OH; Philip D. Knott, MD, Cleveland, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate this rare presentation of an idiopathic deep lobe parotid sialoceles.

Objectives: 1) Understand the usual etiology and treatment of parotid gland sialoceles; and 2) recognize this unusual presentation of an idiopathic deep lobe parotid sialoceles. **Study Design:** Presentation of a single case of rare pathology. **Methods:** Retrospective case study was performed of a 65 year old female patient who presented with a cystic mass arising within the left parotid gland. The patient had no history of penetrating or blunt facial trauma, sialolithiasis, sialadenitis, parotid neoplasm, or parotid gland or duct surgery. She underwent rhytidectomy fifteen years prior to presentation. Diagnostic methods included CT and MR imaging and fine needle aspiration (FNA) with cytology, biochemical, and microbiology evaluations. **Results:** CT and MR imaging revealed a large cystic mass arising from the deep lobe of the left parotid gland extending to the left neck. FNA was negative for malignant cells, but amylase level of aspirated fluid was >100,000 U/L. The aspirated fluid produced no bacterial growth. Resolution occurred at 4 weeks and treatment included needle aspiration, compression, and injection of 25 units Botox. Followup 6 month CT imaging revealed resolution of sialoceles and no evidence of salivary mass or lesion. **Conclusions:** Parotid gland sialoceles are established early or intermediate complications of parotid surgery, rhytidectomy, and parotid gland or duct trauma. This case demonstrates the unusual presentation of a deep lobe parotid sialoceles without any discernible etiology. Diagnostic methods verified salivary contents without any identifiable lesion. Successful treatment was achieved using conservative therapies.

A22. Post-Tonsillectomy Hemorrhage: A National Perspective

Shankar K. Sridhara, MD, Washington, DC; Rahul K. Shah, MD*, Washington, DC; Lina Lander, ScD, Omaha, NE

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate and explain the characteristics of patients admitted nationwide for control of post-tonsillectomy hemorrhage.

Objectives: To characterize patients nationwide admitted for control of post-tonsillectomy hemorrhage. **Study Design:** Descriptive study of data from a publicly available national database. **Methods:** Patients admitted for control of post-tonsillectomy hemorrhage (International Classification of Diseases 9 procedure code 28.7) were studied from the Nationwide In-patient Sample 2006; weighted data was used for national estimates. Subgroup analysis of patients that received blood transfusion was performed. **Results:** There were 3505 patients admitted for control of post-tonsillectomy hemorrhage in 2006, with mean total charges \$11,833 (SE \$659). Mean age was 18.3 years (SE 0.6), 49.2% of patients were male, mean length of stay was 1.47 days (SE 0.07), and there was 0% mortality. The majority of patients were 19 years old or younger (0-9:31%; 10-19:32.3%), 16.7% were 20-29, and 9.3% were 30-39. Of all patients, 3.5% had tobacco use disorder, 4.5% dehydration, 7.7% asthma, and 14% anemia. Of all patients, 7.4% received transfusion of packed cells, amongst whom total hospital charges were more than double (\$22,445 (SE 3,602) vs. \$10,941 (SE 623) for those not transfused, p=0.002), mean age was 21.9 years (SE 2.5), and mean length of stay was 3.21 days (SE 0.54). **Conclusions:** This study is the first to characterize patients admitted for control of post-tonsillectomy hemorrhage on a national level in the United States. Mortality was 0% from this series, but a surprisingly high proportion (7.4%) required blood transfusion, which was associated with statistically significant increased resource utilization, as represented by total hospital charges, and length of stay.

A23. Thyroglossal Duct Cyst with Intralaryngeal Extension

Chaz L. Stucken, MD, New York, NY; Vivek V. Gurudutt, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the various presentations of a thyroglossal duct cyst, to expand their differential diagnosis of a midline neck mass with dysphagia, acute voice change and shortness of breath, and to understand the acute treatment options for airway distress caused by a thyroglossal duct cyst.

Objectives: To present the unusual case of a patient with dysphagia, voice change, and shortness of breath who was found to have a thyroglossal duct cyst with intralaryngeal extension. The acute and definitive treatment options for the patient are discussed. A review of the literature will discuss the rare reports of this type of lesion. **Study Design:** Case report and literature review. **Methods:** Retrospective review of a case record in a patient at a tertiary care medical center. PubMed search and review of the literature on thyroglossal duct cyst with intralaryngeal extension. **Results:** A 46 year old male presented with a painless midline neck mass enlarging over a one month period with progressive dysphagia, hoarseness, and shortness of breath. A CT scan confirmed suspicion of a thyroglossal duct cyst with intralaryngeal extension. The mass was acutely aspirated with a 19 gauge needle to relieve the patient's symptoms. Later, a Sistrunk procedure with dissection into the larynx was performed to excise the mass and tract to the base of the tongue. Pathology results are pending at the time of abstract submission. **Conclusions:** A thyroglossal duct cyst with intralaryngeal extension is a rare cause of dysphagia, hoarseness, and shortness of breath. The literature review shows only 11 previously reported cases. The acute management of this lesion is to manage airway and swallowing concerns. Definitely surgical intervention can be accomplished through a Sistrunk procedure with complete excision of the cyst and tract.

A24. **N**ovel Suction System Free from Obstruction

Hiroo Umeda, MD PhD, Shizuoka, Japan; Shin-Ichi Kanemaru, MD PhD, Osaka, Japan; Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to inform novel and excellent suction system all over the world. This system will make a drastic change for the treatment of the patients in the clinic.

Objectives: A novel suction tube and suction system are introduced. For otolaryngologists, it is essential to remove viscous discharge to treat inflammatory ear or nose diseases such as otitis media or chronic sinusitis. However, the current suction tubes often cause difficulty to suck viscous discharge. The basic problem is that a system such as this will have to aspirate viscous discharge with a narrow long tube, which induces higher frictional force inside the suction tube finally leading to plugging of the tube. We have developed a new suction system which enables us to easily and effectively aspirate any viscous material without obstruction. **Study Design:** A prospective study for evaluation of the new device and system. **Methods:** The new device has a double lumen structure. The external lumen provides water and the internal lumen is to suction the material. To investigate the effect of this device, we set three experimental groups: 1) new device, 2) conventional device with a diameter larger than that of the external lumen of the new device; 3) only the inner suction of the new device. The time taken to aspirate twenty milliliter 2-4% aqueous sodium alginate was measured and the amount of water required to aspirate the preparation with the new device were estimated. **Results:** The suction time of group 1 was significantly shorter than that of group 2 (1/6 of time in 4%) and 3 (1/22 of time in 3%). Five milliliter water was not needed for aspiration with the new device. **Conclusions:** This novel suction system has the impressive aspirating function without occlusion. This device and system contribute to saving energy, time and water.

Head and Neck

A25. **S**ecuring Feeding Tubes in Head and Neck Surgery Patients: Septal Suture or Bridal Technique

Samer Al-khudari, MD, Detroit, MI; Daniel R. Clayburgh, MD PhD, Portland, OR; Lisa Morris, MD, Portland, OR; Tammara Watts, MD, Portland, OR; Tamer Ghanem, MD PHD, Detroit, MI; Mark Wax, MD, Portland, OR

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss and review methods to secure feeding tubes in head and neck surgery patients.

Objectives: To compare use of the anterior septal suture technique versus the septal bridal technique in securing nasogastric feeding tubes in head and neck surgery patients. **Study Design:** A multicenter prospective nonrandomized controlled study was conducted on patients undergoing head and neck surgery with postoperative need for a nasogastric feeding tube. **Methods:** Patients underwent either a septal suture or a bridal technique to secure the feeding tube intraoperatively. They were assessed by a standard questionnaire and physical exam administered at three time points postoperatively days 1-5 (time-1), 6-9 (time-2), and day 10 or greater (time-3). The following factors were assessed: subjective assessment of overall pain, pain due to securing mechanism, route of pain control, local complications, and tube dislodgement secondary to securing method. To analyze pain at each time point a nonparametric two sample Wilcoxon test was used. To analyze the change in pain from time 1 to time 2 a Wilcoxon matched pairs signed rank test was used. **Results:** Thirty-five patients were enrolled in the study. 16 patients underwent a septal suture technique and 19 underwent the bridal technique. No local complications were reported secondary to either securing method. No tube dislodgments occurred directly as a result of either securing technique. Overall pain did not significantly differ in both cohorts at each time point ($p=0.612$, 0.395 , 0.434). Pain due to the securing method was not significantly different at each time period ($p=0.141$, 0.077 , 0.522). Overall pain and pain due to securing method did not significantly differ in patients primarily controlled on PO or IV medication ($p=.899$, 0.836). When analyzing the change in overall pain from time 1 to time 2 in bridal technique patients was significant ($p=0.016$), but change in overall pain in septal suture patients was not ($p=0.176$). The change in pain due to securing mechanism approached significance in bridal technique patients ($p=0.062$) and was not significant in septal suture patients ($p=0.218$). **Conclusions:** The septal suture and bridal technique are both effective methods in securing feeding tubes postoperatively in head and neck surgery patients. In both cohorts no local complications were directly attributed to securing method and no tube dislodgments were reported directly related to the securing method. The bridal technique may result in less reported pain in patients when compared to the septal suture but further study is needed to further evaluate this.

A26. **E**ar Melanoma: The Sunbelt Melanoma Trial

Adam C. Augenstein, MD, Louisville, KY; Jeffrey M. Bumpous, MD*, Louisville, KY; Kelly M. McMasters, MD PhD, Louisville, KY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the prognostic factors affecting melanoma of the ear.

Objectives: To evaluate the clinicopathologic factors associated with ear melanomas and their prognosis in comparison to non-ear

melanomas of the head and neck (H&N). **Study Design:** Prospective, randomized. **Methods:** 405 eligible patients with melanoma of the H&N >1.0 mm thick. **Results:** Fifty-nine patients enrolled with the diagnosis of melanoma of the ear. Most were male (79.7%) and Caucasian (96.6%) with an average age of 52.2 years. The most common histologic subtypes were nodular (33.9%), superficial spreading (20.3%) and lentigo maligna (8.5%). Average thickness was 2.5 mm (+1.55) and 34.5% were found to be ulcerated. Sentinel lymph node (SLN) positivity was seen in 7.1% of ear melanoma patients biopsied. Relatively rare, the incidence of locoregional and distant recurrence between the ear and non-ear groups were similar. Overall survival for ear melanoma patients was significantly impacted by ulceration status ($p=0.013$), while both ulceration and SLN positivity predicted survival in non-ear melanoma patients ($p < 0.001$ and $p=0.015$, respectively). Thicker melanomas ($> 4.0\text{mm}$) in the non-ear group significantly impacted disease free survival while other factors in both groups lost their predictive value ($p=0.035$). **Conclusions:** Ulceration was the strongest predictor of overall survival in melanoma of the ear. Ulceration and SLN status correlated with overall survival in non-ear melanoma of the H&N, while depth correlated with disease free survival in those same patients. Recurrence and survival were not impacted by anatomic site, but the prognostic significance of ulceration, thickness and SLN status in the H&N may vary with the site of the melanoma.

A27. **F**actors Determining the Need for Thyroidectomy during Laryngectomy for Squamous Cell Carcinoma

Brooke Nicole Bosley, MD, Washington, DC; Ameet K. Grewal, BS, Washington, DC; Lynn F. Huang, MD, Washington, DC; Stanley H. Chia, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to describe subglottic extension and thyroid cartilage invasion as predictors of thyroid gland invasion by laryngeal squamous cell carcinoma (SCCA).

Objectives: To evaluate predictors for thyroid gland invasion in patients undergoing laryngectomy for SCCA of the larynx. **Study Design:** Retrospective chart review of a single tertiary care hospital. **Methods:** One hundred forty-one charts were reviewed. Ninety patients underwent total laryngectomy for laryngeal SCCA between January 1993 and February 2009. Subjects were assessed based on tumor stage, preoperative evaluation (direct laryngoscopy and CT scan), and pathologic analysis. **Results:** Thyroidectomy was performed in 36/90 (40%) patients and thyroid gland invasion by SCCA occurred in 7/36 (19%) cases undergoing thyroidectomy. In those specimens with thyroid gland invasion, 6/7 (86%) demonstrated both subglottic extension and thyroid cartilage invasion. Direct laryngoscopy was an effective means for identifying subglottic extension ($p < 0.0001$, 60% sensitivity, 100% specificity). Computed tomography also proved to be highly sensitive (100% sensitivity) in predicting subglottic extension ($p = 0.01$), thyroid cartilage invasion, and thyroid gland invasion, but was limited by its specificity (34%, 41%, and 36% respectively). **Conclusions:** Routine thyroidectomy in conjunction with laryngeal SCCA is unnecessary. Preoperative assessment by direct laryngoscopy and CT scan can identify subglottic extension, whereas reliable identification of thyroid cartilage invasion is more difficult. Findings of both subglottic extension and thyroid cartilage invasion correlate positively with thyroid gland invasion and suggest the need for thyroidectomy.

A28. **I**nvasive Aspergillus Masquerading as Chronic Otitis Externa: A Case Report and Review of the Literature

Nipun Chhabra, MD, Cleveland, OH; Philip E. Zapanta, MD, Washington, DC; Nader Sadeghi, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the characteristics and clinical features of invasive aspergillus of the head and neck. Participants should also be able to explain the relevant histopathology, treatment, and prognosis of this disease.

Objectives: In select hosts fungal species may become invasive and opportunistic, resulting in severe morbidity and mortality. We report a rare case of invasive aspergillus, diagnosed on initial presentation as chronic fungal otitis externa. **Study Design:** Single case report and review of the literature. **Methods:** An elderly gentleman's clinical course is presented and discussed. We review the pertinent etiology, clinical manifestations, histopathology, diagnosis, and treatment of this aggressive mycosis and its associated complications. **Results:** After invasive mycosis was suspected by radiographic imaging, surgical exploration and biopsy confirmed aspergillus species. The patient's treatment was modified to include amphotericin B lipid complex and the patient symptomatically improved, eventually demonstrating clinical resolution of further fungal disease. **Conclusions:** The occurrence of invasive mycotic infections of the head and neck has been steadily increasing over the past several decades. Aspergillus, a less common but highly destructive species in acute disease, employs a variety of immuno evasive mechanisms to gain advantage over its host. A high level of clinical suspicion along with a prompt multidisciplinary team approach can help improve the outcome of afflicted patients. A combination of medical therapy, early and aggressive surgical intervention, and an understanding of the underlying immunologic competency of the patient is the best regimen to achieve effective treatment.

A29. **C**hondrosarcoma of the Larynx and Trachea: A Report of Two Rare Cases and Review of the Literature

E. Ashlie Darr, MD, New York, NY; Bruce M. Wenig, MD, New York, NY; Mark L. Urken, MD, New York, NY

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

histopathological characteristics, and management of chondrosarcoma of the larynx and trachea, including the rare clear cell variant.

Objectives: To study the presentation, histopathological characteristics, and management of chondrosarcoma of the larynx and trachea, including the rare clear cell variant. **Study Design:** Case report and review of the literature. **Methods:** We report two cases of chondrosarcoma, one arising in the trachea and another of the clear cell variant originating in the thyroid cartilage. In addition, we review the published literature regarding these lesions. **Results:** Case 1 is an 80 year old male who presented with cough and was found to have an exophytic mass that involved the first through fourth tracheal rings. Biopsy revealed grade I-II chondrosarcoma. He underwent composite resection with end to end anastomosis and remained free of disease 30 months after surgery. Case 2 is a 45 year old male who presented with a neck mass and dysphonia and was found to have a large mass arising from the left thyroid ala. Histopathologic analysis revealed the clear cell variant of chondrosarcoma. The patient underwent partial laryngectomy with adjuvant radiation therapy. He developed pulmonary nodules suspicious for metastatic disease at postoperative month 16 and is currently awaiting biopsy. **Conclusions:** Tracheal and clear cell laryngeal chondrosarcomas are rare tumors that may be treated with conservative surgical resection as long as free margins are attainable. The aggressive nature of the clear cell variant warrants consideration of adjuvant radiation.

A30. **Use of the Harmonic Scalpel in Head and Neck Free Flap Harvesting**

Nichole R. Dean, DO, Birmingham, AL; Eben L. Rosenthal, MD*, Birmingham, AL; Bruce A. Morgan, MD, Birmingham, AL; J. Scott Magnuson, MD*, Birmingham, AL; William R. Carroll, MD, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to cite the relative safety and use of the harmonic scalpel in free tissue harvest.

Objectives: To determine the safety and utility of harmonic scalpel assisted free flap harvest as an alternative to combined cautery and hemoclip techniques. **Study Design:** Retrospective chart review. **Methods:** The medical records of patients undergoing radial forearm free flap reconstruction for head and neck surgical defects between 2006 and 2008 were reviewed (n = 103). Use of bipolar cautery and hemoclips for division of small perforating vessels (n = 53) was compared to ultrasonic energy (n = 52) free flap harvesting techniques. **Results:** Flap harvesting time was reduced with the use of the harmonic scalpel when compared to hemoclip harvest (31.4 vs. 36.9 minutes; P = 0.06). Two patients who underwent flap harvest with hemoclips developed postoperative donor site hematomas, whereas no donor site complications were noted in the harmonic scalpel group. Recipient site complications including infection, fistula and hematoma were equal among both harvesting techniques (P = 0.77). Two flap failures occurred in the hemoclip assisted radial forearm free flap harvest group. Median length of hospitalization was significantly reduced for patients who underwent free flap harvest with the harmonic scalpel when compared to hemoclip techniques (7 versus 8 days; P = 0.01). **Conclusions:** The harmonic scalpel is safe and feasible for radial forearm free flap harvest.

A31. **Use of Excimer Laser for Dilation of a Benign Esophageal Stricture**

Nitasha D. Garcia, MD, Temple, TX; Clifford J. Buckley, MD, Temple, TX; Timothy P. Pfanner, MD, Temple, TX; Scott I. Reznik, MD, Temple, TX; Reginald F. Baugh, MD, Toledo, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the quality of life that patients with dysphagia may experience. Further, participants should be able to explain the function and utility of the excimer laser in treatment of benign esophageal strictures.

Objectives: Dysphagia from esophageal strictures is a known side effect of radiation for head and neck cancer. This case report aims to describe post-chemoradiation therapy dysphagia and stenosis, as well as the detrimental effects dysphagia may have on quality of life. This case further demonstrates that, with careful consideration, novel techniques can be used for the treatment of complicated strictures when other options are unsuitable. Additionally, this case will show that collaboration among different specialists can lead to positive and safe patient outcomes. **Study Design:** Case report. **Methods:** An extensive literature search was conducted looking for information related to post-radiation esophageal strictures, the quality of life that patients with dysphagia experience, current esophageal stricture dilation techniques, and the excimer laser's utility in medicine. **Results:** A patient with a benign complete esophageal stricture was successfully treated with an excimer laser and serial dilations after traditional treatments were unsuccessful or considered inappropriate. **Conclusions:** Complete resection was not possible here, as the patient had experienced bouts of mediastinitis and was known to have poor blood supply to the area surrounding the stricture. On repeat endoscopy there was no opening observed, prohibiting serial dilations to be done without first creating a lumen. The lumen created by the excimer laser permitted greater dilation initially with less pressure and potential complications than de novo dilations over a guidewire. Although this technique may not be suitable for initial therapy of most benign esophageal strictures, its success demonstrates its potential to be used in select cases where traditional therapies are unsuccessful.

A32. **The Calcium Challenge Test in Determining Secondary Hyperparathyroidism in Post-Gastric Bypass Patients**

Michelle Soltan Ghostine, MD, Loma Linda, CA; Alfred Anthony Simental, MD, Loma Linda, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the calcium challenge test and how it can be useful in comparing primary from secondary hyperparathyroidism in the subset of patients who have had gastric

bypass surgery.

Objectives: Head and neck surgeons are often referred patients with hyperparathyroidism who have previously undergone gastric bypass surgery. However, one must be careful that the patient does not have secondary hyperparathyroidism because of an inability to absorb calcium from bypass surgery. In this case a parathyroidectomy could be devastating causing the patient to rely on intravenous infusions of calcium to maintain calcium homeostasis. We have devised a simple test to help determine if patients can absorb calcium.

Study Design: Case series of six patients who have had gastric bypass surgery in which the calcium challenge test was used to determine which patients were candidates for parathyroidectomy.

Methods: The calcium challenge involves the patient first having his/her serum calcium drawn, afterwards he/she takes calcium citrate 3000mg and Rocaltrol 0.5mcg, the serum calcium is then redrawn 4 hours later. If the patient's serum calcium increases then it indicates that the patient has some ability to absorb calcium. However, if the calcium remains unchanged then it is a sign that the patient cannot absorb calcium well via his/her gut and hence he/she likely has secondary hyperparathyroidism.

Results: Three of the six patients responded appropriately to the challenge and increased their serum calcium by an average of 0.73. These patients went on to have a parathyroidectomy and did well subsequently. None of them required intravenous calcium to maintain their homeostasis. The three other patients had an average increase in their serum calcium of only 0.2 after the calcium challenge. Since this was not a significant increase they did not have surgery because of the fear that they would not be able to regulate their calcium without these hyperplastic glands. They are continually being followed.

Conclusions: Patients who have previously undergone gastric bypass surgery can have problems with calcium absorption and present with hyperparathyroidism. However, one must distinguish between secondary and primary hyperparathyroidism before performing a parathyroidectomy. The calcium challenge test is a simple way of determining if calcium absorption is the problem.

A33. Volume Based Trends in Surgical Care of Patients with Parotid Cancer

Christine G. Gourin, MD*, Baltimore, MD; James H. Clark, MBBCh, Baltimore, MD (Presenter); Robert E. Bristow, MD, Baltimore, MD; Arlene A. Forastiere, MD, Baltimore, MD; Wayne M. Koch, MD*, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the relationship between case volume and patterns of surgical care for parotid cancer.

Objectives: Positive volume outcome relationships exist for cancers treated with technically complex surgery. Contemporary patterns of primary surgery for parotid cancer are poorly defined.

Study Design: Retrospective review of the Health Service Cost Review Commission database for hospital and surgeon parotid cancer surgical case volumes from 1990-2009.

Methods: Multiple logistic regression analysis was used to identify factors associated with volume and temporal trends.

Results: Overall, 1,048 parotid cancer surgeries were performed by 222 surgeons at 45 hospitals. There was a significant increase in the proportion of cases performed by high volume surgeons from 12% in 1990-1999 to 23% in 2000-2009 (OR=3.26, P<0.001), while cases performed by low volume surgeons decreased from 61% to 38%. The proportion of cases performed at high volume hospitals increased from 30% to 36%, while cases performed at low volume hospitals decreased from 52% to 36% (OR=1.74, P<0.001). High volume surgeons were significantly associated with high volume hospitals (OR 139.20, P<0.001), greater intensive care unit (ICU) utilization (OR 1.39, P=0.021), and decreased length of hospitalization (OR 0.82, P<0.001). High volume hospitals were significantly associated with increased ICU utilization (OR=5.04, P<0.001) and length of hospitalization (OR=1.30, P=0.005). After controlling for other variables, parotid cancer surgery in 2000-2009 was associated with increased access to high volume surgeons (OR=2.02, P=0.005), high volume hospitals (OR=1.86, P=0.012), concurrent neck dissection (OR=1.64, P=0.002), and a decrease in length of hospitalization (OR=0.93, P=0.002), compared to 1990-1999.

Conclusions: The proportion of parotid cancer surgery patients treated by high volume surgeons and high volume hospitals increased significantly from 1990-1999 to 2000-2009. Further investigation is needed to identify causal factors impacting this favorable trend.

A34. Severe Symptomatic Hypocalcemia following Total Thyroidectomy after Roux-en-Y Gastric Bypass

Justin A. Gross, BS, Grand Forks, ND; Steven M. Olsen, MD, Rochester, MN; Cody A. Koch, MD, Rochester, MN; Eric J. Moore, MD*, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand better the complex patient management strategy necessary to care for post-bariatric surgery patients who undergo partial or total thyroidectomy and the potential for severe symptomatic hypocalcemia that may result.

Objectives: To add to the world's data concerning the potential for severe symptomatic hypocalcemia in post-bariatric surgery patients who subsequently undergo partial or total thyroidectomy, and to provide suggestions on how to prevent this problem and treat it should it occur.

Study Design: Case report.

Methods: Chart review.

Results: This post-bariatric surgery patient developed severe symptomatic hypocalcemia following total thyroidectomy. His calcium level reached a nadir of 6.9 mg/dL, and he required aggressive oral and intravenous repletion therapy with calcium, vitamin D, and magnesium for ten days before hospital discharge.

Conclusions: We recommend that patients undergoing thyroid or parathyroid surgery should be screened for a history of bariatric surgery. If found, these patients should be counseled on the risk of developing severe hypocalcemia and presurgical prophylactic treatment with calcium and vitamin D should be strongly considered. In the five case reports (including this report) regarding post-thyroidectomy hypocalcemia, all nine patients required intravenous calcium infusion to stabilize their calcium levels. We conclude that precautionary PICC line placement

should be acquired during surgery. In addition, maximal replacement with oral calcium citrate, ergocalciferol, and calcitriol should be administered. We reserve intravenous calcium for symptomatic patients, in which case calcium gluconate should be considered. Nursing staff should perform evaluations for symptomatic hypocalcemia every two hours, including testing for Chvostek's and Trousseau's signs, and question patients about perioral and limb paresthesias. Finally, although not studied in this population, intramuscular teriparatide (recombinant PTH) injection may prove to be a useful drug in shortening hospital stay and should be studied in the future.

A35. **Skull Base Osteoradionecrosis following Radiotherapy for Acromegaly**

Michael S. Harris, MD, Indianapolis, IN; Louis T. Moore, MD, Indianapolis, IN; Don-John Summerlin, DMD, Indianapolis, IN; Michael B. Pritz, MD, Indianapolis, IN; Michael G. Moore, MD, Indianapolis, IN

Educational Objective: At the conclusion of this presentation, the participants should be able to identify risk factors and key diagnostic features of osteoradionecrosis in the context of treatment for nasopharyngeal carcinoma or symptomatic pituitary adenomas recalcitrant to surgical therapy alone.

Objectives: Principle objective is to identify risk factors and key diagnostic features of osteoradionecrosis (ORN) in the context of treatment for nasopharyngeal carcinoma or symptomatic pituitary adenomas recalcitrant to surgical therapy alone. **Study Design:** A 49 year old male with a history of acromegaly secondary to a pituitary adenoma was referred with concern for tumor recurrence. Four years prior, he underwent subtotal tumor resection via a transseptal approach followed by postoperative radiation therapy, delivering a total of 54 gray (Gy) in 30 fractions over six weeks. **Methods:** Computed tomographic (CT) imaging at the time of representation disclosed a lytic lesion of the clivus predominantly involving the left side, adjacent to the left internal carotid artery. Transsphenoidal clival biopsy was performed. **Results:** No evidence of tumor recurrence or osteomyelitis was found. The absence of these findings and presence of fibrosis and chronic inflammation was consistent with osteoradionecrosis from radiation therapy. Plan was made for followup magnetic resonance image (MRI) in six months with consideration of hyperbaric oxygen therapy if neoplasm progression were observed. **Conclusions:** The result of a pathophysiologic process characterized by radiation induced cellular injury and fibrosis, a hypovascular-hypoxic state, and chronic nonhealing wounds, ORN most commonly affects the mandible; skull base ORN is a rarer finding. To our knowledge, this is the first report of a case of ORN following radiotherapy for acromegaly.

A36. **Alcohol Induces Reactive Oxygen Species and Migration in Keratinocytes**

Alex W. Helkin, BA, Stony Brook, NY; Hoang-Lan T. Nguyen, PhD, Stony Brook, NY; Ghassan J. Samara, MD, Stony Brook, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand a new model of alcohol as an inducer of squamous carcinoma.

Objectives: Ethanol is synergistic with tobacco in HNSCC carcinogenesis. While ethanol or tobacco, alone, increases the risk of HNSCC 2- to 6-fold, this risk increases to 50-fold with both ethanol and tobacco. Reactive oxygen species (ROS) has been implicated in numerous cellular processes associated with malignancy, including enhancement of cell proliferation, DNA damage, and cell migration. To understand how alcohol contributes synergistically, with tobacco consumption, to HNSCC malignancy, we studied the effects of alcohol on ROS induction of and on the migration of HNSCC. **Study Design:** Using normal HaCaT and transformed HaCaT-II4 human keratinocyte cell lines, we determined the effect of alcohol exposure on ROS level and on cell migration. **Methods:** ROS was determined by fluorescence activated cell sorting (FACS) and migration by the Fluoroblok transwell assay. **Results:** The transformed HaCaT-II4 cells had a greater basal level of ROS than the normal HaCaT cells. While both cell lines showed significant increase in ROS when exposed to 8% ethanol, HaCaT-II4 cells displayed a peak of 20% greater increase in ROS, compared to a 15% increase for the HaCaT, relative to their respective baseline. Exposure to 8% ethanol significantly increased the migration of transformed HaCaT-II4 cells, while having little effect on normal HaCaT cell migration. **Conclusions:** The oral mucosa of smokers contains a mixture of normal and transformed keratinocytes, as a result of the mutagenic effects of tobacco. Our results suggest that alcohol preferentially enhances an invasive phenotype in transformed keratinocytes over normal keratinocytes by inducing ROS.

A37. **Lymphomatous Neoplasms within the Carotid Sheath**

Vivian Jolley, BA MBS, Atlanta, GA; Ryan J. Li, MD, Baltimore, MD; Jeremy D. Richmon, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the differential diagnosis for carotid sheath masses, as well as the appropriate diagnostic evaluation.

Objectives: To report two unusual presentations of extranodal Hodgkin's lymphoma of the neck. **Study Design:** Two case reports from institutional experiences as well as a review of the literature. **Methods:** The medical records of two patients at our institution were reviewed after the diagnoses of Hodgkin's lymphoma involving the carotid sheath were made. We reviewed initial presentations, diagnostic evaluations (including surgery), subsequent medical therapies, and status at followup. The available literature on lymphomatous neoplasms of the head and neck region was then reviewed, with attention to extranodal manifestations of Hodgkin's lymphoma. **Results:** In each case, the confirmatory diagnosis of Hodgkin's lymphoma involving the carotid sheath was made. Subsequent staging was performed and the appropriate chemotherapy regimens instituted. Both cases have demonstrated tumor responsiveness to

treatment, and the patients are being followed serially by the medical oncology service. **Conclusions:** Extranodal lymphomas of the head and neck have been well described, particularly of the non-Hodgkin's type. There were no reports of extranodal Hodgkin's lymphoma involving the carotid sheath available in the literature. This diagnosis should be included in the differential of lesions involving the carotid space. Surgery has a role for diagnostic confirmation, while the mainstay of treatment is chemotherapy in this disease.

A38. **The Outcomes of Intraoperative Radiation Therapy Use in the Treatment of Head and Neck Cancers**

Nathan D. Joos, MD, Louisville, KY; Beth N. McNulty, MD, Louisville, KY; Brian B. Coleman, MD, Louisville, KY; Jeffrey M. Bumpous, MD*, Louisville, KY

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the patient population that may benefit from intraoperative radiation therapy as a treatment modality, as well as discuss the potential benefits, overall and disease free survival expectations, and complication profile.

Objectives: This study sought to define the patient population suitable for and expected outcomes of intraoperative radiation therapy as a treatment modality for cancers of the head and neck. This was accomplished through a retrospective match paired analysis of the outcomes of salvage surgery with intraoperative radiation therapy in comparison to salvage surgery alone in the treatment of patients with advanced recurrent head and neck cancers. **Study Design:** Retrospective chart review including thirty (30) treatment subjects and thirty (30) match paired controls to evaluate the outcomes of intraoperative radiation therapy as a treatment modality in advanced head and neck cancers. **Methods:** Patients were identified through their enrollment in the institution's multimodality cancer treatment clinic. Inclusion criteria included intraoperative radiation therapy as a component of treatment for a recurrent stage 3 or 4 cancer of the head or neck, with at least 2 years of followup from the date of treatment. Additionally, a match paired control group of patients with recurrent cancers treated by other modalities was identified for statistical outcomes comparison. Patients were divided into three groups based upon the final surgical resection margins at the time of IORT delivery or surgical salvage: negative margins, microscopic residual disease, and gross residual disease. The disease free and overall survival of the patients were followed and compared across groups through Kaplan Meier survival curves and Cox regression analysis. **Results:** A total of 60 patients were included in this chart review. The population consisted predominantly of patients with a diagnosis of stage 3 squamous cell carcinoma of the upper aerodigestive tract. Patients in the IORT treatment group received on average 1500cGy at 9MeV at the time of salvage resection. Pathologic review found that patients in the control group were more likely to obtain a negative surgical margin at the time of salvage resection than those patients in the IORT group (53% vs 23%). While the control group did surpass the treatment group, no statistically significant differences were identified between groups for disease free and overall survival ($p=0.21$, $p=0.69$ respectively). A significant decrease in disease free and overall survival was identified in control patients with grossly positive margins at the time of resection when compared to those achieving negative margins ($p=0.047$, $p=0.02$ respectively). This factor did not show significance in the intraoperative radiation therapy group ($p=0.083$, $p=0.37$ respectively). **Conclusions:** The disparity in patients able to receive surgical salvage with negative resection margins suggests a selection bias within the groups outlined in this study, with more advanced cases chosen for intraoperative radiation therapy at the time. This factor likely contributes to the decreased disease free and overall survival periods identified within the treatment group. Interestingly, surgical margin status showed significance only within the control group, suggesting that the addition of intraoperative radiation treatment may play a role in additional local control in advanced cases of recurrent head and neck cancers in which obtaining negative surgical margins at the time of salvage resection may prove to be difficult.

A39. **Routine Surveillance Imaging following Chemoradiation for Advanced Stage Oropharyngeal Carcinoma: Better Than Clinical Exam?**

Gerald T. Kangelaris, MD MBA, San Francisco, CA; Sue S. Yom, MD, San Francisco, CA; Kim Huang, MD, San Francisco, CA; Steven J. Wang, MD*, San Francisco, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the limitations of the routine use of imaging studies in identifying recurrent advanced stage oropharyngeal cancer as compared to history and physical exam.

Objectives: To determine the predictive value of patient symptomatology and physical exam findings compared to routine surveillance MRI or PET-CT in detecting locoregional treatment failure following definitive chemoradiation in advanced stage oropharyngeal carcinoma. **Study Design:** Retrospective cohort. **Methods:** We identified patients with stage III-IV oropharyngeal carcinoma who underwent chemoradiation therapy between April 2000 and September 2004 and underwent longitudinal followup care at our institution. Patient charts were retrospectively reviewed for findings on surveillance imaging, patient symptomatology and physical exam findings. Our outcome measurement was recurrent cancer. **Results:** Forty-three patients received a total of 252 advanced radiographic surveillance studies over an average followup of three years, a mean of 5.9 studies per patient. Sixteen patients experienced false-positive surveillance studies that resulted in intervention, a false positive rate of 7.9 percent. Three patients displayed disease progression following treatment conclusion. Four patients experienced recurrent disease, two of whom had new symptoms or physical exam findings that preceded radiographic identification of disease. Surveillance studies identified recurrent disease in two asymptomatic patients who were salvaged, one of whom remains free of disease at followup. The overall sensitivity and specificity of the imaging surveillance program is 50 and 56 percent, respectively. **Conclusions:** In asymptomatic oropharyngeal cancer patients who have been treated with chemoradiation, a routine radiographic surveillance program produces limited opportunity for salvage and contributes to unnecessary morbid procedural investigations into disease recurrence. Patient symptomatology and routine physical examination may provide sufficient prognostic information regarding treatment failure.

A40. The Protective Efficacy of Basic Fibroblast Growth Factor in Radiation Damaged Salivary Glands of Mouse

Tsuyoshi Kojima, MD, Kyoto, Japan; Shinichi Kanemaru, PhD MD, Kyoto, Japan; Shigeru Hirano, PhD MD, Kyoto, Japan; Ichiro Tateya, PhD MD, Kyoto, Japan; Juichi Ito, PhD MD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that basic fibroblast growth factor prevents radiation induced damage in salivary glands.

Objectives: Radiotherapy is one of the most effective treatments for head and neck cancer. However, it is unavoidable to develop dry mouth syndrome as the common side effect because not only the tumor but also the normal salivary glands are included in the irradiation field. In this study, the protective efficacy of basic fibroblast growth factor (bFGF) was investigated in radiation damaged salivary glands. **Study Design:** Prospective animal experiment with control. **Methods:** Ten C57BL/6 mice were divided into two groups. All mice in both groups were irradiated (10Gy) at one time. Mice in group I (n=5) were administered by bFGF for 3 days after neck irradiation. Mice in group II (n=5) were administered by distilled water as control. Submandibular glands morphology and saliva flow rate were assessed at 1 and 2 months after irradiation, and the apoptotic response of irradiated submandibular glands was also evaluated with and without bFGF treatment. **Results:** The decrease of saliva flow rates were severe in group II compared with group I. The submandibular glands in group I contained more acinar cells than in group II in histology. The glands with bFGF treatment examined at 1 and 2 days after irradiation did not almost detect apoptosis in comparison with no treatment. **Conclusions:** Our study indicates that bFGF prevents salivary gland dysfunction after irradiation. This protective effect of bFGF may be caused by the inhibition of radiation induced apoptosis.

A41. The Use of Direct Autofluorescence in Detection of Oral Lesions

Jessica L. Kulak, MD, Miami, FL; Elizabeth J. Franzmann, MD, Miami, FL

Educational Objective: At the conclusion of this presentation, the participants should have an understanding of the use of autofluorescence in detection of oral lesions.

Objectives: To evaluate whether VELscope (a handheld device that allows direct visualization of tissue autofluorescence) enhanced exam is superior to white light exam at discriminating premalignant and malignant disease from normal oral mucosa. To determine whether VELscope is useful in localizing premalignant or malignant lesions when the oral rinse molecular panel is positive, but no visible lesions are seen by white light exam. **Study Design:** Clinical trial. **Methods:** An ongoing clinical trial of high risk patients and patients previously treated for HNSCC. An oral rinse for each subject was collected for salivary marker analysis. The oral cavity of each subject was examined using white light and VELscope. A biopsy was performed on lesions identified either by white light exam or VELscope exam. **Results:** Twenty patients have been accrued to this study. Loss of fluorescence was identified in 76% of patients. Biopsy was recommended in six patients. No premalignant or malignant lesions have been identified at this point in the study. **Conclusions:** Tissue autofluorescence may be a helpful, however, more evidence is needed to determine whether VELscope enhances clinical examination and improves earlier detection of premalignant lesions.

A42. Withdrawn--Institutional Review of All Cause and Cancer Related Mortality in Head and Neck Cancer Patients with Preexisting Diabetes Mellitus

Ryan J. Li, MD, Baltimore, MD; Jeremy D. Richmon, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to describe how diabetes affects diagnostic and treatment decisions in head and neck cancer. They should be able to compare long term survival outcomes between diabetic and nondiabetic head and neck cancer patients. They should be able to discuss the role of this common comorbidity in long term prognosis.

Objectives: Our institution's experience was reviewed to compare characteristics of diagnosis, treatment, overall mortality and cancer specific mortality in diabetic and nondiabetic patients diagnosed with squamous cell carcinoma of the head and neck. **Study Design:** Retrospective, clinic based cohort study of our institution's database of head and neck cancer patients. **Methods:** We reviewed our hospital's computer database between years 1990 to 2009 for patients diagnosed with squamous cell carcinoma of the head and neck. Patients were categorized into those with preexisting diabetes and those without diabetes. Groups were matched for age, sex, cancer stage, and cancer site (glottic, supraglottic, oral cavity, vs. oropharyngeal), and comorbidities. All included patients had followup of greater than six months. We used multivariate models with Cox regression analyses to assess differences between groups in stage at diagnosis, treatment modality (surgery vs. radiation therapy +/- chemotherapy), and long term overall and cancer specific survival. **Results:** A cohort of 120 patients with preexisting diabetes and squamous cell carcinoma of the head and neck was compared with 300 nondiabetic head and neck cancer patients. Overall mortality was significantly higher in the diabetic cohort ($p < 0.05$). Stage at diagnosis and treatment selection did not appear to differ between cohorts to any statistically significant degree. **Conclusions:** As in cancers of other body sites, head and neck cancer patients with preexisting diabetes demonstrate worse overall mortality compared to their nondiabetic counterparts. This poorer prognosis may be related to later stage at diagnosis, less aggressive treatment, and/or negative interactions between diabetes, the immune system, and tumor pathophysiology.

A43. **Sarcoidosis of the Thyroid: A Case Report and Review of the Literature**

Renee L. Makowski, MD, Tacoma, WA; David J. Peterson, DO, Tacoma, WA; Kerry L. O'Brien, MD, Tacoma, WA; Wayne J. Harsha, MD, Tacoma, WA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the clinical history, examination findings, and histology associated with sarcoidosis involving the thyroid gland.

Objectives: To describe a case report of a patient with sarcoidosis of the thyroid and review of the existing literature. **Study Design:** Case report from a military tertiary care referral center. **Methods:** Report of a unique case with review of the literature on sarcoidosis of the thyroid. **Results:** 67 year old male with lithium induced hypothyroidism and sarcoidosis presented with a thyroid nodule. Fine needle aspiration biopsy demonstrated atypical cellular features with epithelioid histiocytes found in loose syncytial aggregates and a background of lymphocytes, findings concerning for possible papillary thyroid carcinoma. The final pathology from his thyroidectomy revealed multiple nodules and replacement of thyroid tissue with chronic inflammatory cells and a scattering of multiple well formed interstitial noncaseating granulomas composed of epithelioid histiocytes, a mixed inflammatory infiltrate, and multinucleated giant cells. A lymph node further demonstrated multiple interstitial noncaseating granulomas composed of epithelioid histiocytes surrounded by mixed inflammatory infiltrate and multinucleated giant cells. The final diagnosis was sarcoidosis of the thyroid. **Conclusions:** Sarcoidosis is a disease of unknown etiology characterized by a combination of clinical and radiologic findings and histologic evidence of noncaseating granulomas. Most commonly affecting the lungs and lymph nodes, thyroid involvement with sarcoid has been documented in association with hyper and hypothyroidism and thyroid cancer. Though rare, otolaryngologists should be aware of the association between sarcoidosis and thyroid diseases in patients with thyroid findings and pulmonary complaints or sarcoidosis. While there is not a defined cause-effect relationship, research does suggest a complex immunologic and genetic mechanism for this association.

A44. **Free Tissue Transfer in Solid Organ Transplant Patients**

Matthew W. Miller, MD, Portland, OR; Mark K. Wax, MD, Portland, OR; Steven B. Cannady, MD, Rochester, NY; Eben L. Rosenthal, MD*, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to identify that free tissue transfer in solid organ transplant patients on immunosuppression has complication rates similar to those of non-transplant patients. Participants should recognize that free tissue transfer remains a treatment option for large head and neck tissue defects in the transplant population.

Objectives: Patients with head and neck malignancies who have had solid organ transplant and require free tissue transfer are a unique population. Immunosuppression affects wound healing through inhibition of inflammatory mediators. This study was performed to evaluate the effect of immunosuppression on the rate of perioperative complications and the success of free tissue transfer in the head and neck. **Study Design:** Retrospective chart review. **Methods:** Retrospective chart review was performed at two institutions. Solid organ transplant patients undergoing free tissue transfer for head and neck malignancies from 1998-2008 were included. Complications analyzed included: flap failure, wound infection, seroma, hematoma, recipient site dehiscence, and donor site dehiscence. **Results:** A total of 21 flaps in 17 patients were performed. Solid organ transplantations were kidney (11/17), liver (4/17), heart (2/17), and lung (1/17). Seven patients (9/21 flaps) had complications, including: wound infection (3/21), hematoma (3/21), flap failure (1/21), donor site dehiscence (1/21), and seroma (1/21). The average hospital stay was seven days. The average length of followup was 13.5 months. Survival was 53% at the time of last followup. **Conclusions:** Solid organ transplant patients are at an increased risk of cutaneous malignancies due to chronic immunosuppression. These patients will occasionally require free tissue transfer for coverage of large defects of the head and neck. This study demonstrates that free tissue transfer is a viable option in transplant patients with morbidity similar to nontransplant patients.

A45. **A Novel Classification System for Perineural Invasion: Histologic Subcategory Relates to Patient Outcome**

Mia E. Miller, MD, Los Angeles, CA; Beth Palla, MD, Los Angeles, CA; David A. Elashoff, PhD, Los Angeles, CA; Chi K. Lai, 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 understand a novel classification system for perineural invasion in head and neck squamous cell carcinoma and the prognostic significance of its subcategories.

Objectives: To define a novel classification system of categories of perineural invasion as: intratumoral, peripheral (within 0.2 mm of tumor edge), or extratumoral; and to determine the prognostic significance of each of these in patients with squamous cell carcinoma of the head and neck (HNSCC). **Study Design:** A retrospective chart review and histologic analysis of patients with HNSCC in the setting of a tertiary care medical center. **Methods:** A clinical chart review of 60 patients with HNSCC who underwent primary surgical treatment from January 2005 through December 2007 was completed. Clinical information collected included patient age, gender, alcohol and tobacco use, tumor location, TNM stage, postoperative adjuvant chemotherapy and/or radiation treatment, and patient outcome. PNI was categorized as intratumoral, peripheral, or extratumoral. A Kaplan-Meier disease free survival regression was then performed to see if PNI related to regional disease recurrence. **Results:** Extratumoral and peripheral PNI were associated with a shorter time to recurrence than intratumoral PNI. **Conclusions:** It is important to delineate perineural invasion as intratumoral, peripheral (within 0.2 mm of tumor edge), or extratumoral. This novel classification system has import with regards to clinical outcome and may help us define a

cohort of patients that may require more aggressive management.

A46. **Algorithms for Difficult Airway in Adults: The Role of Otolaryngologist**

Atta Mohyuddin, MD, London, UK; Nasir Islam Bhatti, MD, Baltimore, MD; David Feller Kopmann, MD, Baltimore, MD; Lauren Berkow, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the importance of difficult airway as it relates to otolaryngologists and be able to comprehend their skills and competencies in a difficult airway team.

Objectives: The potential role of the otolaryngologist and head and neck surgeons (OHNS) in difficult airway has not been defined in the past, our aim was to examine the various difficult airway algorithms, highlight the expertise of otolaryngologists, in laryngoscopy, bronchoscopy and tracheostomy, and propose a new algorithm that incorporates these specific skill proficiencies. **Study Design:** It is a scientific review of the literature which studies all the difficult airway algorithms and specify the scenarios of the difficult airway and then the skill specific role for otolaryngologist. **Methods:** We included studies in humans over 18 years old, published between 1980 and 2009. The exclusion criteria were studies performed in the pediatric population, letters and case reports and non-English language literature. **Results:** There are 15 algorithms for difficult airway in adults. The more globally used algorithms were the American Society of Anesthesiologist, Difficult Airway Society UK and Canadian Airway Focus Group. There are differences among the more commonly used difficult airway algorithms. We proposed an algorithm for difficult airway incorporating the expertise which otolaryngologists can bring to the difficult airway team. **Conclusions:** The OHNS have a unique skill set for managing difficult airway patients with good outcome. We propose an algorithm that incorporates these skills with goals of further defining the specific role of the OHNS.

A47. **Excision of a Recurrent Oropharyngeal Malignant Lesion Utilizing a Minimally Invasive Transoral Robotic Surgical (TORS) Technique**

Lucia S. Olarte, MD, New York, NY; Karan Dhir, MD, New York, NY; Eric M. Genden, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to compare open surgical techniques with minimally invasive techniques for the management of recurrent oropharyngeal lesions.

Objectives: The morbidity associated with open surgical approaches for the management of oropharyngeal lesions has led to minimally invasive techniques such as the transoral robotic surgery (TORS) in lieu of a midline mandibulotomy approach. There is a paucity of literature outlining its use for recurrent lesions. **Study Design:** Case report and literature review. **Methods:** A 78 year old male with multiple medical problems presented with a third recurrence of an oropharyngeal malignancy. The primary oropharyngeal malignancy was treated with radiation therapy. He subsequently underwent a partial glossectomy and pharyngectomy with free flap reconstruction for multiple recurrences. Finally, a TORS was performed for excision of a third recurrence. The operative course, length of hospital stay and postoperative followup was recorded. **Results:** The patient underwent a TORS excision of an oropharyngeal recurrence without complications. Frozen section histology demonstrated negative margins intraoperatively. An oral diet was commenced on hospital day 1 and we discharged on hospital day 3. **Conclusions:** The TORS technique has proven to be a minimally invasive surgical option for tumors of the oropharyngeal region. We present its use for the treatment of recurrent lesions with encouraging results.

A48. **Treatment Response of Esthesioneuroblastoma to Neoadjuvant Chemotherapy**

Aric K. Park, MD, Boston, MA; Kevin Taheri, BA, Houston, TX; Richard O. Wein, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role of neoadjuvant chemotherapy in the treatment of esthesioneuroblastoma. The traditional results of surgery with or without chemoradiation will be reviewed for comparison.

Objectives: Esthesioneuroblastoma (olfactory neuroblastoma) is a rare nasal cavity tumor arising from the olfactory epithelium. Treatment consists of surgical resection with possible XRT. The role of neoadjuvant chemotherapy has not yet been identified. We present a case report of a patient that demonstrated significant partial response to neoadjuvant chemotherapy. **Study Design:** Case report with review of the literature. **Methods:** Retrospective review of the medical records. **Results:** A 46 year old man presented with a large mass of the nasal cavity. Histopathology revealed esthesioneuroblastoma Hyams grade IV tumor, Kadish stage C involving the right nasal cavity with extension into the anterior cranial fossa, ethmoid and sphenoid sinuses with compression of the medial wall of the right maxillary sinus with bony erosion. The patient was treated with neoadjuvant chemotherapy consisting of two cycles of etoposide (100 mg/m²) and cisplatin (33 mg/m²). Imaging was repeated after each cycle. Repeat MRI following neoadjuvant chemotherapy revealed significant interval decrease in size of the complex sinonasal mass without persistent intracranial involvement, amenable to en bloc surgical excision. Pathologic examination demonstrated a 1.2 x 0.6 cm tumor with negative margins representing a significant response of the tumor to neoadjuvant chemotherapy. Currently the patient is doing well with no evidence of recurrence or other unexpected complication. **Conclusions:** Neoadjuvant chemotherapy consisting of etoposide and cisplatin is a potential effective therapeutic option in the treatment of esthesioneuroblastoma with intracranial extension prior to surgical resection. Due to the rarity of this tumor larger, multi-institutional studies will be required to validate the efficacy of this treatment in comparison to current adjuvant chemotherapy protocols.

A49. **Transnasal Panendoscopy for Cancer Staging: Feasibility and Evaluation of Outcomes**

Sera Pena, BS, New Orleans, LA; Vladimir Zuzukin, MD, New Orleans, LA; David D. Beahm, MD, New

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the feasibility, advantages, disadvantages, complications, and outcomes of using transnasal endoscopy for head and neck cancer staging in an outpatient setting under local anesthesia.

Objectives: To evaluate the feasibility of an in-office panendoscopy for staging of head neck cancer using a transnasal esophagoscopy (TNE). **Study Design:** Retrospective. **Methods:** Patients who underwent an in-office TNE for evaluation of head and neck cancer at a tertiary care medical center were identified. The TNE scope was used to perform an in-office esophagoscopy and bronchoscopy under local anesthesia in unsedated patients. Clinical, demographic, procedure related data was recorded. **Results:** The average age was 58.5 years old (range, 41-74), with 100% of them being male. Primary site was the oropharynx (3/7), oral cavity (2/7), larynx (1/7), and unknown primary (1/7). T-stage distribution was T4 (1/7), T3 (3/7), T2 (2/7), and Tx (1/7). Most common presenting symptoms included an oral lesion (42%), dysphagia (28.5%), and neck mass (28.5%). 86% (6/7) received an appropriate pathological diagnosis (squamous cell carcinoma) with TNE assisted biopsy of the primary lesion. One patient with a negative biopsy underwent a formal endoscopy and biopsy to complete pretreatment cancer staging 14% (1/7). There were no major complications. In 6 patients where biopsy confirmed malignancy, pretreatment planning could be completed with appropriate imaging studies and without the need for a formal panendoscopy in the operating room under general anesthesia. **Conclusions:** Transnasal panendoscopy is a safe, effective, and feasible for head and neck cancer staging. In-office TNE assisted evaluation can eliminate the need for a formal panendoscopy in the operating room in select patients thus making pretreatment cancer evaluations efficient and cost effective.

A50. **Use of Quantitative Immunohistochemistry to Identify Predictors of Response in Patients with Advanced Thyroid Cancer Treated with Sorafenib**

Evan R. Ransom, MD, Philadelphia, PA; Jason M. Leibowitz, Merion Station, PA; William M. Lee, MD, Philadelphia, PA; Andrea B. Troxel, MD, Philadelphia, PA; Michael D. Feldman, MD PhD, Philadelphia, PA; Marcia S. Brose, MD PhD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe a new assay for identifying cell signalling molecules targeted by anticancer therapeutics.

Objectives: To identify molecular predictors of response using quantitative immunohistochemistry (Q-IHC) on tissue from 50 patients with metastatic thyroid cancer treated with sorafenib. **Study Design:** We collected pretreatment archival specimens from 50 of 55 patients as part of a phase II single arm study in which 55 patients with advanced thyroid cancer were given sorafenib and followed for response and progression free survival. **Methods:** As a pilot case, thin cut sections (5um) from one patient were obtained from archival pretreatment and on-treatment surgical samples. These were stained in parallel for phospho-ERK and labeled with diaminobenzidine (DAB). Digitized slides were analyzed using multispectral imaging (MSI) software. Image stacks (200x magnification) were captured between 420-720nm (at 20nm intervals), generating MSI data "cubes". Reference spectra for DAB and hematoxylin were created. After rigorous training, imaging software identified tumor cells and nuclei in an automated fashion. Intensity of DAB staining for each nucleus was determined by the image analysis program. Individual cell data were then grouped and plotted as a frequency distribution (log scale). **Results:** In our pilot case 1897 tumor nuclei were identified in the pretreatment section and 2391 in an on-treatment section. Average nuclear DAB intensities were 846.972 (pretreatment) and 229.249 (on-treatment). Frequency distribution curves generated showed statistically distinct distributions, confirming decreased phospho-ERK in the on-treatment specimen. **Conclusions:** We show that Q-IHC can be used to obtain molecular data from tissue samples. This approach will be used to identify predictive markers as well as potential novel targets for treatment of sorafenib failures.

A51. **Correlation of Radiographic and Dermal Pathologic Findings in Head and Neck Cancer**

Matthew E. Spector, MD, Ann Arbor, MI; Kathleen K. Gallagher, MD, Ann Arbor, MI; Jonathan B. McHugh, MD, Ann Arbor, MI; Suresh K. Mukherji, MD, Ann Arbor, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that dermal lymphatic invasion affords a worse prognosis in head and neck cancer, although CT scan findings do not always correlate with the histopathology.

Objectives: Patients with head and neck cancer have a poor prognosis when regional or distant metastasis is present. Dermal lymphatic invasion also portends a poorer prognosis, but it can be difficult to identify these patients preoperatively. The purpose of this study is to correlate CT scan findings of patients with head and neck mucosal squamous cell carcinoma with their respective dermatopathology to determine if dermal lymphatic involvement can be predicted before surgery. **Study Design:** Retrospective, case series. **Methods:** Medical records were reviewed of patients with head and neck cancer who underwent surgery at our institution and who had skin resected as part of their primary head and neck cancer. Their respective CT scans were also reviewed to determine if findings such as stranding around the site of skin involvement were present. Finally, the pathology slides of these patients were reviewed. **Results:** Ten patients were identified who had skin resected at the time of surgery and whose preoperative CT scans suggested dermal lymphatic invasion. The corresponding pathology slides showed only one of the ten patients had dermal lymphatic invasion. **Conclusions:** Dermal lymphatic invasion affords a poor prognosis in patients with head and neck cancer, although CT scan is poor at detecting this finding. More research is needed into detecting dermal lymphatic invasion to determine prognosis.

A52. **T**ransoral Resection of Parapharyngeal Space Lipoma

Thomas A. Stewart, MD, Loma Linda, CA; Michael D. Sim, BA, Loma Linda, CA; Oscar D. Garcia, MD, Loma Linda, CA; Paul D. Kim, MD, Loma Linda, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the management of parapharyngeal space lipomas and demonstrate a good technique for safe removal.

Objectives: Tumors of the parapharyngeal space are relatively rare, accounting for approximately 0.5% of all tumors of the head and neck region. These tumors can be of parotid and minor salivary gland origin, neurogenic origin, and vascular, muscular, and connective tissue origin. Lipomas of the parapharyngeal space are extremely rare, with only about ten cases reported in the literature to date. There are five common approaches to removing these tumors including transcervical, transmandibular, transparotid, lateral skull base, and transoral approaches. Our objective is to present a case report of a parapharyngeal lipoma that was successfully resected using a transoral approach. **Study Design:** Case report. **Methods:** We performed a literature search on parapharyngeal space lipomas and investigated the different surgical approaches that can be used. **Results:** An 81 year old male presented with a parapharyngeal space mass that was found incidentally on CT scan while evaluating for other medical issues at another institution. The scan showed that the mass was not invading any adjacent structures and its signal intensity was consistent with a lipoma. The patient denied any symptoms such as fevers, chills, weight loss, obstructive symptoms or apnea, dysphagia, odynophagia, globus sensation, neurologic changes, or pain. A head and neck exam was essentially normal except for a bulge of the left soft palate and posterior pharynx that was soft, compressible, nontender, and without fluctuance. He had no lymphadenopathy. A transoral approach was used to successfully resect the lesion without any complications. **Conclusions:** Lipomas of the parapharyngeal space are extremely rare. Although not commonly used, a transoral approach is a suitable and safe option for the resection of such lesions.

A53. **T**hyroid Fine Needle Aspiration Biopsy: Optimizing the Technique

J. Tee Todd, BS, Augusta, GA; David J. Terris, MD*, Augusta, GA; Michelle D. Reid-Nicholson, MD, Augusta, GA; Paul W. Biddinger, MD, Augusta, GA; Edward A. Chin, MD, Augusta, GA; Melanie W. Seybt, MD, Augusta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to compare two techniques of fine needle aspiration biopsy, with and without ultrasound guidance.

Objectives: Decisions regarding management of thyroid nodules rely heavily on the cytologic diagnosis. Fine needle aspiration biopsy (FNAB) has emerged as the standard for evaluating these nodules, but remains limited by the potential for sampling error and inadequate yield. Ultrasound (US) guidance may improve the adequacy of biopsy samples. We sought to compare palpation guided FNAB to US guided FNAB. **Study Design:** A retrospective analysis of thyroid patients managed at an academic medical center. **Methods:** A retrospective analysis of 944 patients managed at an academic medical center was conducted after institutional review board approval was obtained. Two hundred forty FNABs were performed in 215 patients during a 6 year period (1997-2002); 238 of these were palpation guided and 2 were US guided. One thousand three FNABs were performed in 729 patients during the subsequent 6 years (2003-2009); all of these were accomplished using the US guided technique. Outcome measures included rate of diagnostic yield and correlation with pathologic findings. **Results:** One hundred seventy-seven of 238 palpation guided biopsies (74.4%) resulted in samples that were adequate for diagnosis. Eight hundred ninety-three of 1005 US guided biopsies (88.8%) yielded sufficient samples. This difference was statistically significant ($p < 0.001$). **Conclusions:** US guided FNAB is more likely to yield a diagnostic cytologic specimen. US guided FNAB therefore reduces the need for repeat biopsies and should be considered as the primary diagnostic step in evaluating thyroid nodules.

A54. **M**anagement of the Difficult Papilla: Current Techniques and Review of Literature

Rohan R. Walvekar, MD, New Orleans, LA; Barry Schaitkin, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss options for dilating the ductal papilla prior to performing salivary endoscopy.

Objectives: To develop an algorithm to manage dilation of the papilla that is one of the rate limiting steps in sialoendoscopy. **Study Design:** Review of literature and preliminary experience from an expert panel. **Methods:** A PubMed literature search was performed with key words, "sialoendoscopy, duct dilatation, sialoendoscopy, salivary endoscopy, Seldinger technique". **Results:** Currently, there are several described techniques that are used to dilate the papilla. Most common described techniques include serial duct dilation and the Seldinger's technique. Other techniques include using arterial stents, staining techniques, sialdoctotomy preserving the papilla, and papillotomy. Novel concepts and techniques are also described. **Conclusions:** There is still no consensus on the best option for managing the salivary duct. Broadly, techniques can be divided into invasive and noninvasive. Technical points and an algorithm for management of the difficult papilla are proposed.

A55. **A** Rare Case of Eccrine Spiradenoma of the Upper Lip

Denise Rae Wong, MD, Minneapolis, MN; Douglas A. Olson, MD, St. Paul, MN; Harley S. Dresner, MD,

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the evaluation and management of eccrine spiradenoma of the upper lip.

Objectives: To describe a rare case of eccrine spiradenoma of the upper lip. **Study Design:** Case report. **Methods:** Retrospective case review at a university medical center. **Results:** A 76 year old female presented for evaluation of a midline upper lip nodular mass. It was initially appreciated incidentally, but had been present for at least several months in duration. The patient denied any associated pain, drainage, lip trauma, changes in size of the mass or prior history of similar lesions in the head and neck region. Physical examination of the upper lip revealed a midline submucosal, highly mobile, nontender nodule approximately 1 cm in size near the frenulum. An excisional biopsy was performed and revealed a firm, multilobulated, and nodular lesion with smooth boundaries. The lesion was completely excised with adequate margins obtained. Surgical pathology was consistent with eccrine spiradenoma with no atypia or malignancy identified. To date, the patient has had no evidence of recurrence. **Conclusions:** Eccrine spiradenoma is an uncommon benign adnexal tumor of the eccrine sweat glands. These tumors can appear in any part of the body, but tend to develop on the upper, dorsal aspect of the body. Approximately one-third occur in the head and neck. The risk of malignant transformation is a rare phenomenon, but can develop within a longstanding, initially benign solitary lesion. With only one other reported case of eccrine spiradenoma involving the perioral region, we present an interesting case of eccrine spiradenoma of the upper lip with discussion of its clinical presentation, histopathologic characteristics, and management.

A56. Follicular Dendritic Cell Sarcoma: A Differential in Neck Mass

Estelle S. Yoo, MD, Shreveport, LA; Jaiyeola O. Thomas, MD, Shreveport, LA; Patrick A. Adegboyega, MD, Shreveport, LA; Timothy S. Lian, MD, Shreveport, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe clinicopathologic features of the follicular dendritic cell sarcoma, to discuss the importance of including FDCCS in the evaluation of neck masses, and to address the controversy in management of FDCCS.

Objectives: This study describes clinicopathologic features of the follicular dendritic cell sarcoma (FDCCS), discusses the importance of including FDCCS in the evaluation of neck masses, and addresses the controversy in therapeutic management of FDCCS. **Study Design:** Retrospective case report. **Methods:** Retrospective chart review of a patient with histopathologic diagnosis of follicular dendritic cell sarcoma on a surgical specimen at a tertiary care hospital with a followup duration of 12 months. **Results:** The patient is a 27 year old Caucasian woman with a 5 cm right neck mass that has been gradually enlarging for 7 months without compressive symptoms. The immunohistochemical evaluation of the fine needle aspirate of this mass demonstrated strongly positive follicular dendritic markers, CD21 and CD35, with positive results for vimentin. Flow cytometry was negative for lymphoma. Histologic features in surgical specimen demonstrated large spindle cells with prominent meningioma-like whorls intermingled in background of small lymphocytes with effacement of the lymph node by the tumor cells. The patient was treated with primary surgical resection with disease free margins. She refused further adjuvant radiation therapy considering lifelong morbidity resulting from irradiation. **Conclusions:** Follicular dendritic cell sarcoma can mimic clinical presentation of various neoplastic lesions in the head and neck. Immunohistochemical staining positive for CD21, CD35, vimentin, negative result on the flow cytometry, along with a histologic evidence of follicular dendritic cell proliferation lead to a diagnosis of FDCCS. The controversy in treatment method of surgery alone versus surgery with adjuvant therapy requires further investigation in the future.

Laryngology-Bronchoesophagology

A57. Airway Collapse Due to Unsuspected Epiglottic Cyst

Egbert J. de Vries, MD, Weston, FL; Johanna Serrano, BS, Weston, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate knowledge in the management of an unsuspected epiglottic cyst during an airway emergency.

Objectives: Review a case of an unsuspected epiglottic cyst that led to airway collapse and respiratory arrest. Discuss the classification, diagnosis and treatment of epiglottic cysts. **Study Design:** Case report and literature review. **Methods:** Case report. **Results:** Epiglottic cysts are generally benign lesions, which can affect all age groups. Depending on their location and size, they can cause airway obstruction and potentially lead to sudden death. We report the case of a 59 year old female who developed airway distress followed rapidly by respiratory arrest soon after the administration of a muscle relaxant. This allowed the collapse of a previously unknown epiglottic cyst into her airway. During resuscitation, oral intubation could not be achieved and emergency cricothyrotomy was performed. The etiology of the obstruction was made at bedside fiberoptic laryngoscopy the following day and confirmed during surgery. The occlusive epiglottic cyst was successfully treated with marsupialization. The patient was immediately decannalized and recovered without sequelae. **Conclusions:** A high index of suspicion may allow the treatment of unsuspected epiglottic cysts at the time of discovery.

A58. Analysis of Swallowing Function Using DIPP-Motion Pro 2D

Kazunori Fujiwara, MD, Yonago, Japan; Katsuyuki Kawamoto, MD, Yonago, Japan; Hiroya Kitano, MD,

Educational Objective: At the conclusion of this presentation, the participants will recognize the new analytic computer system's ability to analyze function of swallowing.

Objectives: Cineradiography has made it possible to perform detailed visual analysis of the second stage of swallowing. It has been reported that cineradiography has been performed to analyze hyoid and laryngeal movements during swallowing; however, due to cost and preparation time, this method has not yet reached the clinical application stage. To overcome these problems, we have devised a new computerized system for quantitative analysis of video fluorography images using commercial DIPP-Motion Pro 2D software. The benefits of this system are: 1) DV images are fed into the computer as animations and analyzed directly; 2) numerous points can be marked, and tracked automatically; 3) with coordinate setting and scale correction, the distance and velocity of movement are measured automatically; and 4) the functions that synchronize graphs with cineradiography video makes it easy to have a proper visual understanding. **Study Design:** Computer analysis of swallowing function. **Methods:** With this system, quantitative studies were performed to analyze swallowing movements in subjects without dysphagia. **Results:** The median hyoid bone movement is 1.03cm (X-axis)—1.59cm (Y-axis). The median laryngeal movement is 0.91cm (X-axis)—2.46cm (Y-axis). The maximum bolus speed is 99.15 cm/sec. **Conclusions:** We can analyze swallowing function conveniently and effectively with this system. It also could display the data with visual information. Therefore, it may become a tool to analyze swallowing function quantitatively in clinical practice. It also allows us to effectively exchange information with other medical personnel and gain informed consent.

A59. **Laryngopharyngeal Reflux and Post-Intubation Dysphonia**

Andrew R. Hetland, MD, Madison, WI; Charles N. Ford, MD*, Madison, WI; Nadine P. Connor, PhD, Madison, WI

Educational Objective: At the conclusion of this presentation, the participants should be able to understand 1) risk factors for post-intubation dysphonia; 2) the effects of laryngopharyngeal reflux on voice; and 3) the relationship of laryngopharyngeal reflux on post-intubation dysphonia.

Objectives: Post-intubation dysphonia is a well documented phenomenon. Presence of laryngopharyngeal reflux (LPR) may exacerbate this condition. However, there is a dearth of information identifying reflux as a risk factor for post-intubation dysphonia. The purpose of this study was to determine the relationship of LPR to post-intubation dysphonia. Our hypothesis was that patients with LPR are predisposed to dysphonia following endotracheal intubation. **Study Design:** Prospective observational study. **Methods:** Preoperative patients (n=82) completed the Reflux Symptom Index (RSI), Voice Handicap Index-10 (VHI-10), and an additional survey to record relevant surgery data, risk factors, and demographics. A followup VHI-10 was also completed at one week following surgery. Data pertaining to the intubation, endotracheal tube, and duration of intubation were also collected. **Results:** Participants with a RSI score of greater than 13 and/or those with a history of reflux were stratified to medicated and unmedicated reflux groups (18 subjects) while the remaining participants comprise the nonreflux group (64 subjects). No statistically significant differences in VHI-10 were observed for any of the subject groups. **Conclusions:** No pre- to post-surgery differences were expected for the nonreflux patients. However, for the reflux patients, differences were anticipated due to well documented changes in the laryngopharynx in patients with laryngopharyngeal reflux. The finding of no significant differences may be due to the small sample size of reflux patients or sensitivity of the measure employed. No relationship was noted between reflux and post-intubation dysphonia.

A60. **Surgical Treatment of MALT Lymphoma of the Larynx: Beyond Biopsy**

Ruwan Kiringoda, BA, Columbus, OH; Laura A. Matrka, MD, Columbus, OH (Presenter); Brad W. deSilva, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the rare situation in which MALT lymphoma may merit surgical treatment alone; 2) explain the classification of lymphoma as relevant to the laryngologist and head and neck surgeon; and 3) discuss the presentation and risk factors related to MALT lymphomas of the aerodigestive tract.

Objectives: To present a case of MALT lymphoma of the larynx treated with surgical resection alone, and to understand 1) typical presentation; 2) factors determining treatment decisions; 3) difficulty of intraoperative pathologic diagnosis; and 4) association of MALT lymphomas with chronic inflammatory processes. **Study Design:** Case report and literature review. **Methods:** Preoperative presentation and intraoperative details were collected on a case of MALT lymphoma of the larynx. A literature review was completed with attention to the rarity of surgical treatment alone, the difficulty of frozen section analysis, and the typical presentation and precipitating factors associated with MALT lymphoma of the aerodigestive tract. **Results:** A 55 year old male presented with dysphonia, mild dysphagia, and no significant dyspnea. Preoperative exam revealed a smooth, bulky mass arising from the left aryepiglottic fold. The patient underwent local standby tracheostomy and surgical resection of the supraglottic mass and has been observed without further medical intervention for the past 14 months. Imaging shows no progression of his lymphoma. Of note, two frozen sections showed only chronic inflammation, and the suspicion for lymphoma was raised only on permanent section. **Conclusions:** MALT lymphoma of the larynx may require surgical management beyond biopsy alone. The laryngologist should be familiar with the possibility of MALT lymphoma of the larynx, particularly in the setting of chronic inflammation. A high degree of suspicion should be maintained during surgical resection, with the recognition that frozen section may be less reliable.

A61. **Two Staged Laryngeal Regeneration Using Tissue Engineering Techniques in a Canine Model**

Yoshiharu Kitani, MD, Kyoto, Japan; Shin-ichi Kanemaru, MD PhD, Osaka, Japan; Shigeru Hirano, MD PhD, Kyoto, Japan; Satoshi Ohno, MD, Kyoto, Japan; Tsuyoshi Kojima, MD, Kyoto, Japan; Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the efficacy of the tissue engineering techniques for the laryngeal regeneration after a partial hemilaryngectomy and discuss the availability and the limitation of bone marrow derived stromal cells and atelocollagen for the staged regeneration of the newly regenerated vocal fold at the chronic phase.

Objectives: We have previously reported that 3% collagen coated polypropylene mesh wrapped with autologous fascia was a useful material for laryngeal regeneration after a partial hemilaryngectomy. However, a difference in the vertical level of the vocal folds was found. To increase the volume of the vocal fold, bone marrow derived stromal cells (BSCs) were injected into the newly regenerated vocal fold 6 months after the operation. The aim of this study is to examine the efficacy of BSCs in repairing injured vocal folds at the chronic phase. **Study Design:** In vivo animal study. **Methods:** A left partial hemilaryngectomy was performed on 8 adult beagles. Three percent collagen coated polypropylene mesh was wrapped in fascia then fixed in place over the defect. Six months after the operation, either BSCs and atelocollagen solution or only atelocollagen solution were injected into the treated vocal fold. To measure the volume change of the vocal folds three dimensional computed tomography was periodically performed. Vibratory examinations were also performed with excised larynges. **Results:** Three months after the injection, the volume was up about 10% compared to the volume before injection in both groups. Vibratory data of BSCs group were better than that of only atelocollagen group. **Conclusions:** This study suggests that the injection of BSCs and atelocollagen was useful for staged regeneration of newly regenerated vocal fold at the chronic phase, but the efficiency of volume increase was limited. It was indicated that BSCs contribute to the improvement of tissue properties of the vocal folds.

A62. **Three Dimensional Compartmentalization of Myosin Heavy Chain Isoforms in the Human Thyroarytenoid Muscle**

Laura A. Matrka, MD, Columbus, OH; Peter J. Reiser, PhD, Columbus, OH; L. Arick Forrest, MD, Columbus, OH; Brad W. deSilva, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss the variability in myosin content throughout various compartments of the human thyroarytenoid muscle; 2) understand the range of myosin heavy chain isoforms present in the muscle; 3) explain the variability in fatigue resistance, power and muscle shortening velocity among different isoforms; and 4) compare this range of isoforms to that present in other muscle types and in other mammals.

Objectives: Myosin heavy chain (MHC) is the primary determinant of muscle shortening velocity in muscle fibers. Isoforms include MCH-I, II-A, II-D, and II-B, in order of increasing velocity and power. Previous animal work has demonstrated a wide and compartmentalized range of MHC isoforms in the thyroarytenoid muscle, consistent with its multiple functions of phonation, respiration, and airway protection. This study seeks to elucidate the detailed pattern of MHC isoforms in the human thyroarytenoid muscle. **Study Design:** Basic science research. **Methods:** Five longitudinally oriented specimens from fresh cadaveric thyroarytenoid muscle were obtained from medial to lateral (ML1 — ML5) at the midline of the cord. Another five specimens were obtained from superior to inferior at both the medial edge of the thyroarytenoid muscle (M1-M5) and the lateral edge (L1-L5). Specimens were weighed, prepared for gel electrophoresis, and analyzed for total MHC content and percentage of each isoform. **Results:** Total MHC content varied markedly between medial and lateral compartments, with highest myosin content laterally. Within the medial but not the lateral compartments there was a higher MHC content inferiorly. MHC-IIA was the predominant isoform, comprising 60-70% of MHC content. MHC-I was present overall at a higher percentage than in other mammals. **Conclusions:** The high level of MHC laterally was striking. We therefore hypothesize that greater force is generated laterally, farthest from the vocal ligament. Furthermore, the isoforms associated with slower contraction velocities and increased fatigue resistance, MHC-IIA and MHC-I, predominated in the human samples compared to the dog.

A63. **Use of 3D Reconstruction of CT Images in Surgical Planning of Laryngeal Fracture Repair**

Amy K. Mettman, MD, Dallas, TX; Ted Mau, MD PhD, Dallas, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the advantages of using 3D reconstruction of CT images to analyze laryngeal fractures for surgical planning.

Objectives: At the conclusion of this presentation, the participants should be able to discuss the advantages of using 3D reconstruction of CT images to analyze laryngeal fractures for surgical planning. **Study Design:** Case report and development of image processing algorithm. **Methods:** A 30 year old man sustained blunt trauma to the neck. Axial CT images showed a significantly displaced posterolateral cricoid fracture. The images were imported into Adobe Photoshop to separate the densities corresponding to the cricoid and thyroid cartilages. The separated images were processed with custom routines written in MATLAB. 3D reconstructions of the laryngeal framework were generated for surgical planning. **Results:** Image processing algorithms were developed using MATLAB to allow versatile 3D reconstruction of the laryngeal framework. Independent renderings of the cricoid and the thyroid with different opacities allowed viewing of the cricoid fracture through the thyroid cartilage, which facilitated surgical planning. The 3D reconstructions suggested an

open, lateral approach to the fracture line and also pointed to the necessity of a second approach to apply force in the appropriate direction to reduce the fracture. The surgery was carried out using a combined lateral approach and temporary cricothyrotomy. A thyrotomy or laryngeal stent was not necessary. Postoperative CT images were reconstructed in a similar manner and demonstrated successful reduction of the cricoid fracture. **Conclusions:** The use of 3D reconstructions from routinely obtained axial CT images can facilitate the appreciation of the 3D anatomy of laryngeal fractures and potentially improve surgical planning.

A64. **N**ear Total Laryngectomy for Functional Preservation of Recurrent Laryngeal Nerve Branches for Potential Future Laryngeal Transplantation

Randal C. Paniello, MD*, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to understand how near total laryngectomy offers the best chance of normal laryngeal function if the patient were to undergo laryngeal transplantation in the future.

Objectives: Laryngeal transplantation may become feasible in the next several years. A functional transplant will require separate reinnervation by nerves that are activated synchronously with laryngeal adductor and abductor functions, ideally by branches of the original recurrent laryngeal nerve. This report reviews the potential to preserve these nerve branches by use of the near total, rather than total, laryngectomy procedure. **Study Design:** Case series. **Methods:** A chart review was performed of patients for whom a near total laryngectomy (NTL) was selected with the specific purpose of preserving intrinsic laryngeal muscles innervated by their native motor nerves. Anatomic features of the tumors that make this option available were delineated. **Results:** Three patients underwent NTL as treatment for malignancy involving the larynx. Each patient was relatively young and expressed an interest in pursuing a laryngeal transplant at a future date if such a procedure were offered. In each case the NTL was successful at controlling the tumor, and the patient was left with aspiration free swallow and prosthesis free alaryngeal voice. Ultrasound examination demonstrated persistent bidirectional movement of the remaining cricoarytenoid joint. **Conclusions:** The NTL procedure may be the ideal method for recurrent laryngeal nerve “banking” for possible future use in laryngeal transplantation. It preserves the original laryngeal neuromuscular units for both adduction and abduction, as will be required for a functional transplant. This procedure should be considered in all younger patients that require laryngectomy.

A65. **R**ecurrent Supraglottic Pyogenic Granuloma, Treated with Excision and Topical Mitomycin C

Katherine S. Perry, BS, Washington, DC; Joseph F. Goodman, MD, Washington, DC; Steven A. Bielamowicz, MD*, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the common locations and treatment of pyogenic granulomas, and discuss the role of mitomycin C as a treatment for pyogenic granulomas.

Objectives: To describe a previously unreported location of and treatment for a pyogenic granuloma. **Study Design:** Case report and review of the literature. **Methods:** Literature search was performed with PubMed using the following key words: “pyogenic granuloma”, “mitomycin C”, and “capillary hemangioma”. **Results:** A 35 year old male presented with dysphonia several months after excision of an epiglottic pyogenic granuloma at an outside facility. Using transnasal distal chip laryngoscopy, he was found to have a mass pedicled on the laryngeal surface of the epiglottis. He was treated with suspension microlaryngoscopy, excision of the lesion, and application of topical mitomycin C (0.4mg/cc) to the site of attachment of the lesion. Mitomycin C is an antineoplastic agent isolated from streptomyces species, which cross-links DNA guanosine residues, thereby preventing replication and specifically inhibiting fibroblast proliferation. Pathological examination of the specimen revealed a pyogenic granuloma. Five months after treatment the lesion has not recurred. Upon review of the literature we found no previous case reports of supraglottic pyogenic granuloma treated with topical mitomycin C. **Conclusions:** Pyogenic granuloma is a benign vascular lesion of uncertain etiology, most commonly developing on the skin, but rarely occurring on a mucosal lesion. In this case of a recurrent pyogenic granuloma, we observed no recurrence five months after post-resection treatment of the site with mitomycin C. Further investigation is needed to conclusively establish the efficacy of this treatment.

A66. **S**accular Cysts: A Current Review of Characteristics and Management

VyVy N. Young, MD, Pittsburgh, PA; Libby J. Smith, DO, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) compare and contrast to other case series of saccular cysts in the literature; 2) update the general understanding of saccular cysts; 3) promote awareness of advances in treatment options; 4) develop an updated management algorithm (specifically with regard to tracheostomies, and endoscopic versus external approach); and 5) review photographs and video of saccular cysts and the endoscopic excision of these lesions.

Objectives: Review a large cohort of adult saccular cyst patients, update current management of saccular cysts. **Study Design:** Retrospective review of adult patients who underwent endoscopic resection of their saccular cyst. **Methods:** Medical records were reviewed of all adult patients with saccular cysts identified between July 1, 2005 and August 31, 2009. **Results:** Sixteen patients were identified. All complained of dysphonia. Saccular cysts were predominantly left sided (62.5%). The majority were anterior (85.7%); 14.3% were combined anterior/lateral. There were no isolated lateral saccular cysts. Surgical intervention was performed in 13 patients (81%); 100% were endoscopic. No patient required an external approach. Two patients recurred (15%), both within 2 months. One was managed conservatively; the other underwent secondary endoscopic resection. **Conclusions:** Saccular cyst is uncommonly encoun-

tered but can cause debilitating or even life threatening symptoms. Over the years, management of these lesions has changed dramatically, from drainage to marsupialization to external excision. This study demonstrates that with current, improved endoscopic techniques, these patients can be managed endoscopically with great success rates, without the need for an external approach. The literature describes only one other series with a similar number of adult saccular cyst patients. The current study differs considerably from this report in terms of type of saccular cysts, and their location, management, and outcome. This is the first report in the literature to describe a large number of adult saccular cyst patients treated exclusively with endoscopic excision. The general otolaryngologist should consider endoscopic excision of saccular cysts in their treatment algorithm when managing this uncommon problem.

Otology

A67. **Temporal Bone Simulator as a Training and Assessment Tool for Temporal Bone Dissection**

Wes A. Allison, MD, Louisville, KY; Arun K. Gadre, MD, Louisville, KY; Sanford T. Hamilton, MD, Salt Lake City, UT

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of a current temporal bone simulator technology as it relates to resident training and assessment.

Objectives: The objective of this study was to evaluate a temporal bone simulator as both a training and assessment tool for temporal bone dissection. **Study Design:** Prospective. **Methods:** The simulator consisted of a plaster temporal bone module with color coded landmarks/conductive metal alloy interior lining that if penetrated gave an error display. Dissection times were recorded as well as the number of injuries to the each of 4 key structures—sigmoid sinus, dura, semicircular canals, and facial nerve. 6 otolaryngology residents, 3 junior level and 3 upper level, participated in this study. Residents performed a complete simulator temporal bone dissection including identification of these four key structures. The simulator dissection was done prior to a two day cadaver temporal bone course and then again shortly after this course. Dissection times and number of injuries to key structures were compared for both dissections. **Results:** The 3 upper level residents recorded no injuries to the key structures on either of the dissections. The junior level residents had a total of 11 injuries to key structures in the first dissection versus a total of 2 injuries in the second dissection. Upper level dissection times improved from 38.7 min to 24.3 min on average, and lower level times improved from 77.5 min to 45.2 min on average. **Conclusions:** The temporal bone simulator was successful in showing objective improvement in dissection times for all residents. It was also effective in evaluating junior level residents' ability to avoid key structures. With further refinement this simulator could be a useful training and assessment tool for otolaryngology residents.

A68. **Head Shaking Nystagmus Is Associated with Greater Self-Perceived Dizziness Handicap in Unilateral Peripheral Vestibulopathy**

Simon I. Angeli, MD*, Miami, FL; Sandra L. Velandia, AuD, Miami, FL; Hillary Snapp, AuD, Miami, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the association of self-perceived dizziness handicap and bedside clinical tests such as the head shaking test.

Objectives: To determine the association of the bedside test of head shaking nystagmus (HSN) with patients' self-perceived dizziness handicap, as well as this test's sensitivity and specificity in unilateral peripheral vestibular hypofunction. **Study Design:** Retrospective case control study. Academic, tertiary referral center. **Methods:** Fifty-three adult patients with unilateral peripheral hypofunction defined by the caloric test of the electronystagmography (ENG) with documented bedside HSN and who had completed questionnaires of self-perceived dizziness handicap. The sensitivity and specificity of HSN in diagnosing unilateral vestibular hypofunction defined by ENG caloric testing and by abnormal gain and symmetry of the VOR by rotary chair testing. Score of self-perceived dizziness handicap questionnaires. **Results:** When using the caloric irrigation test as the reference standard for unilateral vestibular hypofunction, the sensitivity, specificity and positive predictive value of the bedside HSN were 31%, 96% and 97%, respectively. When comparing with results of rotational chair testing (VOR gain and symmetry), the sensitivity of the test increases to 71%. Patients with positive bedside HSN had greater self-perceived dizziness handicap than those with negative bedside HSN ($p=0.0377$, Wilcoxon test). **Conclusions:** The bedside HSN is not a good screening test for detecting a unilateral reduced caloric response. However, greater perceived handicap was documented in patients with a positive HSN test.

A69. **Bilateral Facial Nerve Paralysis Associated with Acute Otomastoiditis: A Case Report**

Bob B. Armin, MD, Los Angeles, CA; Audrey Calzada, MD, Los Angeles, CA; Akira Ishiyama, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the presentation and treatment of facial nerve paralysis caused by acute otomastoiditis.

Objectives: Describe surgical management of facial nerve paralysis caused by acute otomastoiditis. **Study Design:** Case report with a literature review. **Methods:** A case report is described. Background, incidence, disease course, and treatment options are presented through a literature review. **Results:** We present the case of a 55 year old male, who presented to the emergency room with

bilateral otorrhea and 2 day history of bilateral facial paralysis. CT demonstrated bilateral mastoid opacification. Examination revealed bilateral purulent otorrhea, mastoid tenderness, and complete facial nerve paralysis with symptoms more severe on the right. Intravenous and topical antibiotics and steroids were started, and bilateral ventilation tubes were placed. Facial nerve function failed to improve after 2 weeks of directed antibiotics; therefore, a right tympanomastoidectomy was performed. By postoperative day 3, some right facial nerve function was noted. On one month followup, right facial nerve function had almost fully recovered, while the function on the left remained poor. A left tympanomastoidectomy was subsequently performed with similar significant postoperative improvement in facial nerve function. **Conclusions:** The treatment of otogenic facial nerve paralysis is a subject of debate with medical management currently forming the basis of treatment. However, these recommendations are greatly based on studies on pediatric cases of otitis media. We present a unique case of a patient with bilateral facial nerve paralysis, not responsive to initial conservative management, but responding to bilateral mastoidectomies. This case demonstrates the important role of surgical intervention in the management of complete facial nerve paralysis in adult patients with acute otomastoiditis.

A70. Cochlear Implantation following a Major Natural Disaster

Moises A. Arriaga, MD MBA*, New Orleans, LA; Tammy H. Crabtree, MCD CCC-A, New Orleans, LA; Herbert W. Marks, MD, New Orleans, LA; Dennis d'Antoni, MD, New Orleans, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) demonstrate the logistic impact of a natural disaster on cochlear implantation; and 2) explain strategies to minimize the logistic impact of natural disasters on cochlear implantation.

Objectives: This retrospective study reviews the issues and results of reestablishing a cochlear implant program following a natural disaster. **Study Design:** Retrospective study. **Methods:** Retrospective chart review of a cochlear implantation program reestablished following a natural disaster. **Results:** Efforts to support previous implant recipients with temporary arrangements for programming, device troubleshooting and replacement components began within two weeks of the disaster. New adult implantation resumed within 15 months and the new, relocated pediatric program began implantation surgery 25 months following the disaster. Up to now (48 months following the disruption) 49 new implants have been accomplished (29 children and 20 adults) with increasing patient evaluations projected to exceed the pre-disaster pace of implantation by the 5 year point post-disaster. **Conclusions:** 1) Specific contingency plans should be in place for potential service disruptions to cochlear implant patients; and 2) cooperative efforts by industry, university officials, hospital administration and other implant centers permitted timely care of existing implants patients and continuation of implantation surgery with all commercially available implant devices.

A71. Novel Method of External Auditory Canal Atresia/Stenosis Repair

Joshua R. Bedwell, MD, New York, NY; Ana H. Kim, MD, New York, NY; Christopher J. Linstrom, MD*, New York, NY; George Alexiades, MD, New York, NY; Simon C. Parisier, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss various techniques of external auditory canal atresia/stenosis repair. They should be able to compare the advantages of utilizing a novel method of silastic-graft complex to position the new external canal lining over the traditional skin graft management. They should be aware of the expected outcomes of external canal atresia/stenosis repair, and the most common complications.

Objectives: To describe a novel method of external auditory canal stenosis/atresia repair involving silastic fixation of the epidermal surface of the split thickness skin graft prior to placement, and to compare the results of this technique with the traditional technique. **Study Design:** Retrospective chart review. **Methods:** Medical records of 32 patients who had undergone external auditory canal stenosis/atresia repair during the period of 2001-2009 were reviewed. 16 patients underwent repair utilizing a technique in which the split thickness skin graft used to line the neo-EAC was fixed to a thin sheet of silastic prior to placement. These were compared to a series of 16 patients who underwent surgery utilizing the traditional approach. Factors examined included cosmesis, auditory outcome, complications, and need for revision. **Results:** Fixation of the split thickness skin graft onto silastic facilitated handling and placement during the procedure. Auditory and cosmetic outcomes were similar between the two groups. Revisions were necessary in 6/16 of the traditional group and 3/16 in the silastic group. **Conclusions:** Fixing the epidermal surface of the skin graft prior to placement in external auditory canal stenosis/atresia repair facilitates handling and positioning of the graft. This novel technique resulted in excellent cosmesis, and decreased need for revision surgery.

A72. Preauricular Infratemporal Approach for Removal of a Tophaceous Calcium Pyrophosphate Mass of the Infratemporal Fossa: Case Report and Review of the Literature

Alexander G. Bien, MD, Los Angeles, CA; Gregory P. Lekovic, MD PhD, Los Angeles, CA; Rick A. Friedman, MD PhD*, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the differential diagnosis of lesions of the infratemporal fossa and demonstrate an understanding of the presentation and surgical treatment of tophaceous pseudogout in this location.

Objectives: Presentation of a tophaceous calcium pyrophosphate mass of the infratemporal fossa and discussion of the presentation, radiology, pathology, and the surgical approach for resection. **Study Design:** Retrospective case review and review of the literature.

Methods: Medical record and radiographic review; PubMed literature search. **Results:** There are several forms of calcium pyrophosphate dihydrate deposition disease (CPDD); the rarest form is tophaceous pseudogout. Tophaceous pseudogout involves massive crystal deposition and usually involves a solitary joint—most commonly the temporomandibular joint (TMJ). A 57 year old otherwise healthy male presented with a four year history of slowly increasing left preauricular edema, trismus, and recent onset ipsilateral hearing loss. Preoperative CT scan showed a lobulated, calcified mass in the left infratemporal fossa involving the anterior margin of the sphenoid along with erosion of the zygoma. There was mass effect on the anterior external auditory canal but no obvious involvement of the TMJ. In order to guide treatment and rule out a malignant process such as chondrosarcoma, an open biopsy of the mass was taken and was consistent with calcium pyrophosphate deposition. The patient underwent a preauricular infratemporal fossa approach with zygomatic osteotomies for removal of the tophaceous mass. The mass appeared to originate from the anterior glenoid fossa. Pathology on the mass showed needle and rhomboid-shaped, polarizable birefringent crystals along with large histiocytic appearing mononuclear cells and multinucleated cells. **Conclusions:** Tophaceous pseudogout of the infratemporal fossa can masquerade as other benign or malignant lesions, necessitating preoperative biopsy. The preauricular infratemporal fossa approach is effective for removal of benign infratemporal fossa masses.

A73. **Treatment of Glomus Jugulare Tumors with Gamma Knife Radiosurgery**

Philip G. Chen, MD, Charlottesville, VA; James H. Nguyen, BA, Charlottesville, VA; Jason P. Sheehan, MD PhD, Charlottesville, VA; Spencer C. Payne, MD, Charlottesville, VA; George T. Hashisaki, MD*, Charlottesville, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the efficacy of radiosurgery for treatment of glomus jugulare tumors and compare it with surgical resection.

Objectives: Surgical resection, embolization, radiation therapy, and, more recently, stereotactic radiosurgery have been used to treat glomus jugulare tumors (GJT). However, the optimal treatment is still debated. The authors report their data on treatment of GJTs with gamma knife radiosurgery (GKS). **Study Design:** Retrospective chart review. **Methods:** 15 patients (9 female, 6 male) were treated with GKS at a single tertiary care institution for GJTs. Criteria for patient inclusion were GKS followed by at least one post-treatment MR or CT image. Radiologic volumetric analysis was performed. These results were compared with other published series and a pooled analysis was performed. **Results:** Change in tumor size was defined as a 15% volume change. The mean total radiological followup was 40.5 months. Mean marginal dose was 14.6 Gy. The mean tumor size at presentation was 7.1 cc and mean final volume was 6.4 cc. Four patients (26.7%) had documented tumor growth after treatment (median 21 mo). Six tumors decreased (40%) and 5 remained unchanged (33.3%). Treatment failures received a mean marginal dose of 13.2 Gy compared with 15.1 Gy in patients with treatment success ($p < 0.05$). The overall treatment success rate after GKS in published cases is reviewed. **Conclusions:** GKS is an effective treatment option for patients with GJTs, including those with prior surgical resection. This is the first report that marginal radiation doses greater than 13 Gy may be optimal to attain tumor control. Further studies are needed to elucidate the role of GKS alone and in conjunction with surgery.

A74. **WITHDRAWN--The Effectiveness of Split Thickness Skin Grafting in Canal Wall Down Tympanomastoidectomy**

Jamey L. Cost, MD, Morgantown, WV; Stephen J. Wetmore, MD*, Morgantown, WV

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the differences in healing times between patients undergoing CWD mastoidectomy with skin graft placement and those patients undergoing mastoidectomy only; and 2) compare the complications seen in patients undergoing CWD mastoidectomy with and without skin graft placement.

Objectives: To compare healing time in patients undergoing canal wall down (CWD) mastoidectomy with split thickness skin graft placement versus patients undergoing CWD mastoidectomy only. Also, to determine if there are any differences in complications of healing between these two groups. **Study Design:** Prospective randomized study. **Methods:** Patients undergoing CWD tympanomastoidectomy for the first time were randomly assigned to undergo split thickness skin graft placement versus no grafting at the time of their procedure. Patients were seen for postoperative visits at 3, 6, 9, and 12 weeks and 6 months thereafter. At each visit, mastoid cavities were examined to determine the percentage of epithelialization. The presence of complications including meatal stenosis, otorrhea, granulation tissue, and perforation was also identified. **Results:** Fourteen patients were included in this study. Ten patients were randomly assigned to undergo skin graft placement while 4 patients were randomly assigned to the control group. At three weeks postoperatively, 9/10 patients in the skin graft group and 0/4 of the control group had achieved successful epithelialization. Average time to successful epithelialization for the skin graft group was 3.6 weeks while the control group was 6.8 weeks. No differences in healing were noted between the two groups during subsequent followup visits, and once healing was complete, no significant differences in complications between the groups were observed. **Conclusions:** A significant difference in healing was seen between the skin graft group and the control group at the three week postoperative interval and in overall healing time. However, no significant differences in complications between the groups were noted.

A75. **Audiologic and Otologic Manifestations of Hutchinson-Gilford Progeria Syndrome**

Elizabeth A. Guardiani, MD, Washington, DC; Christopher K. Zalewski, MA CCC-A, Bethesda, MD; Carmer C. Brewer, AuD, Bethesda, MD; Melissa A. Merideth, MD MPH, Bethesda, MD; Wendy J. Introne, MD, Bethesda, MD; Hung J. Kim, MD, Bethesda, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to define the audiologic and otologic findings in Hutchinson-Gilford Progeria syndrome.

Objectives: To define the audiologic and otologic phenotype of Hutchinson-Gilford Progeria syndrome (HGPS). **Study Design:** Prospective case series. **Methods:** Fifteen patients with HGPS were enrolled in a prospective natural history study; fourteen were evaluated in the neurotology clinic and eleven received audiologic evaluations. The physical exam and audiologic findings of these patients were reviewed to define an otologic and audiologic phenotype for HGPS in the largest series of subjects in the literature. **Results:** All patients were noted to have stiff auricular cartilages, small or absent lobules and hypoplasia of the lateral soft tissue portion of the external ear canal leading to a shortened canal. 10/14 patients (71%) had dry cerumen impaction and 4/14 patients (29%) reported a history of recurrent otitis media. 19/22 ears (86.4%) demonstrated low frequency conductive hearing loss in the 250 Hz to 500 Hz range. 16/22 ears (73%) had type A tympanograms. 3/22 ears (14%) displayed bimodal or “W” peaked tympanograms. 2/22 ears (9%) had type B tympanograms. 1/22 ears (4%) had a type C tympanogram. 9/10 patients had distortion product otoacoustic emissions consistent with normal peripheral hearing sensitivity. **Conclusions:** HGPS is caused by a mutation in the LMNA gene resulting in the production of an abnormal nuclear protein; this in turn affects nuclear structure and function. Patients with HGPS have characteristic otologic features due to cartilaginous and subcutaneous tissue abnormalities and typically demonstrate low frequency conductive hearing loss despite largely normal tympanometry. It is important to be aware of these conditions in managing these patients.

A76. **O**perative Management of Posterior Semicircular Canal Dehiscence from a High Jugular Bulb

Samuel P. Gubbels, MD, Madison, WI; Paul W. Lenkowski, MD, Iowa City, IA; Marlan R. Hansen, MD*, Iowa City, IA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss operative approaches for the management of dehiscence of the posterior semicircular canal due to a high jugular bulb. Furthermore, the participants should be able to identify the advantages and disadvantages of different surgical management strategies for dehiscence of the posterior semicircular canal.

Objectives: To describe the clinical evaluation, operative management and results of operative management of a posterior semicircular canal dehiscence caused by a high jugular bulb using a novel approach. **Study Design:** Retrospective case report and literature review. **Methods:** Comprehensive preoperative audiological, clinical and radiological evaluation was performed to correlate the patient's symptoms with the radiographic abnormality prior to surgical intervention. The operative approach, as well as the postoperative clinical and audiological results is detailed. **Results:** The patient had clinical and audiometric findings consistent with semicircular canal dehiscence and imaging demonstrating erosion of the posterior semicircular canal by a high jugular bulb. A transmastoid approach was taken to directly resurface the area of canal dehiscence after mobilization of the high jugular bulb. Direct resurfacing of the eroded canal provided resolution of vestibular symptoms without damage to the inner ear. Review of the literature reveals that this is the first description of jugular bulb mobilization and direct resurfacing of a dehiscence of the posterior semicircular canal and is to be contrasted with the approach of canal plugging described by other surgeons. **Conclusions:** Dehiscence of the posterior semicircular canal due to a high jugular bulb can cause clinical and audiometric findings similar to those of superior semicircular canal dehiscence syndrome. Resurfacing of the area of dehiscence after mobilization of the jugular bulb can be performed to directly address the area of semicircular canal erosion and provide relief to the vestibular symptoms without causing hearing loss.

A77. **T**he Course of the Facial Nerve in Evaluation of Congenital Aural Atresia Repair Candidacy

Patrick J. Haas, AB, Cincinnati, OH; Daniel I. Choo, MD*, Cincinnati, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the preoperative evaluation of children with congenital aural atresia and make appropriate decisions regarding surgical candidacy.

Objectives: We hypothesized that the path of the facial nerve, represented by the distance between the facial nerve and the glenoid fossa, could be used as a surrogate to predict fitness for surgery. **Study Design:** Retrospective chart review. **Methods:** CT scans from 34 atretic ears (26 patients) were evaluated using the Jahrsdoerfer grading scale. These scores were compared to the distance between the facial nerve and glenoid fossa at the level of the basal turn of the cochlea. **Results:** There is no significant correlation between the Jahrsdoerfer score and the facial nerve-glenoid fossa distance. **Conclusions:** The facial nerve-glenoid fossa distance should not be used in evaluating fitness for aural atresia repair except in cases where the facial nerve location prevents safe drilling of a canal.

A78. **R**esidual Recurrence following Staged Canal Wall Up Tympanoplasty for Middle Ear Cholesteatoma

Yasuyuki Y. Hinohira, MD, Tokyo, Japan; Naoaki N. Yanagihara, MD, Matsuyama, Ehime Japan; Masahiro M. Komori, MD, Nankoku, Kochi Japan; Naohito N. Hato, MD, Toon, Ehime Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand residual recurrence is not rare in canal wall up tympanoplasty even though a staged procedure is employed; and 2) consider the risk factor of the residual

lesion.

Objectives: Residual recurrence is a critical issue in canal wall up tympanoplasty for middle ear cholesteatoma. Staged procedures are employed when the residual lesion is suspected at the primary surgery. However, there are few reports that describe how frequently and where the residual recurrence occurs following staged procedures. We demonstrate the residual recurrence in our 10 year experience. **Study Design:** Retrospective study. **Methods:** Between 1998 and 2007, 94 of the 184 ears with cholesteatoma were operated on using planned staged procedures. Postoperative managements including microscopic, oto-endoscopic, audiometric examinations were performed once per 4 to 6 months. Computed tomography (CT) was performed annually till at least five years postoperatively. **Results:** In the followup period there were 4 residual recurrent cases (4.3%; 4/94), although no recurrent case caused by retraction pocket was seen. 3 of the 4 recurrent cases were diagnosed with CT, and the recurrent lesions were indicated as a cystic mass in the epitympanum, facial canal or tegmen plate. They were all school boys under 15. A localized transmastoid removal was performed. Residual diseases in the 3 cases arose from the same place as having been identified and removed at the second stage operation. **Conclusions:** Residual recurrence is not rare in canal wall up tympanoplasty even though staged procedures are employed. It occurred more frequently in boys. In our limited experience, it is a considerable issue that the residual disease may have arisen from remnants that have been removed at the second stage operation.

A79. **When Do We Choose the “Better Balance” Ear for Cochlear Implants?**

Sarah C. Hugh, BAsC, Toronto, ON Canada; David B. Shipp, MA FAAA, Toronto, ON Canada; Joseph M. Chen, MD, Toronto, ON Canada; Julian M. Nedzelski, MD*, Toronto, ON Canada; Vincent Y.W. Lin, MD, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to identify situations in which an “only balancing” or “better balancing” ear should be selected for a cochlear implant and explain the rationale for selecting this side. Participants should be able to compare the benefits of implanting the “only balancing” or “better balancing” ear with the risks of doing so.

Objectives: In cochlear implant planning, the ear with poorer vestibular function, as determined through electronystagmography, is often selected as the site for implantation since surgery carries a low risk of iatrogenic labyrinthine injury. We sought to determine reasons for placing a cochlear implant in the “better balance” ear and subsequently develop an algorithm for ear selection in the setting of asymmetric caloric reduction. **Study Design:** A retrospective cohort study of patients implanted with a cochlear implant at a tertiary center cochlear implant program from 1984—June 2009 was performed. **Methods:** Based on electronystagmography results, patients with asymmetric caloric reduction were identified. Of these patients, those who were implanted in the “better balance” ear were selected for chart review. The charts were reviewed to determine rationale for ear selection. **Results:** Of the 724 cochlear implant patients implanted from 1984—June 2009, electronystagmography tests demonstrated that 130 (18%) had asymmetric abnormal responses. 35 (27%) of the patients with asymmetric abnormal responses were implanted in the “better balance” ear. Review of these 35 patient charts revealed that reasons for selection of the “better balance” ear fell into four categories: anatomical contraindications, attempting to attain binaural hearing, avoiding implantation of an ear with marked auditory deprivation, and patient preference. **Conclusions:** We have identified four situations in which surgeons should implant the “better balance” ear, as this may lead to better outcomes for the cochlear implant patient.

A80. **Facial Nerve Paralysis following Transtympanic Penetrating Middle Ear Trauma**

Alfred Marc C. Iloreta, MD, New York, NY; Benjamin Malkin, MD, New York, NY

Educational Objective: At the conclusion of this presentation participants should be able to understand the possible complications of penetrating middle ear trauma and to discuss the management of an ensuing facial nerve paralysis.

Objectives: To present a case of delayed onset facial nerve paralysis following transtympanic penetrating middle ear trauma and review the literature regarding this uncommon injury. **Study Design:** Case report and literature review. **Methods:** The patient chart, including pertinent history, physical examination, clinical course and ancillary studies was reviewed. A literature search was performed and appropriate papers were identified. **Results:** We report the case of a 26 year old woman who presented to our outpatient department with unilateral complete facial nerve paralysis and severe hearing loss. The patient had experienced a transtympanic penetrating middle ear trauma one day before when she had fallen and a long earring was pushed into the ear canal. Approximately 6 hours after the trauma she noticed the onset of facial nerve weakness, subsequently progressing to complete paralysis. Physical examination revealed a 40% superior tympanic membrane perforation and House-Brackmann grade 6/6 paralysis. Audiometry confirmed a maximal conductive hearing loss. A high resolution CT scan of the temporal bones showed dislocation of the incudomalleal joint with ossicular displacement; there was no gross abnormality of the tympanic segment of the facial nerve. The patient was treated with high dose steroids and on last followup, 14 days after the initial trauma, her facial nerve function had improved to House-Brackmann grade 4/6. A literature search found very few reported cases of this mechanism of facial nerve injury. **Conclusions:** Facial nerve paralysis is an uncommon complication of penetrating middle ear trauma but appears to have a good prognosis when the onset is delayed.

A81. **Acquired Cholesteatoma Presenting as a Large Pars Squamosa Temporal Bone Mass**

Eric M. Jaryszak, MD PhD, Washington, DC; Christopher Vanison, MS, Washington, DC; Amanda L. Yaun, MD, Washington, DC; Diego A. Preciado, MD PhD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the differential diagnosis of a pars squamosa temporal bone mass, discuss unusual locations in which cholesteatoma may appear, and explain the need for long term followup in canal wall down mastoidectomy patients.

Objectives: To present a case of an acquired cholesteatoma presenting as a large lateral pars squamosa temporal bone mass and review the literature on cholesteatoma presenting in unusual locations. **Study Design:** Case report and review of the literature. **Methods:** While congenital cholesteatomas have been reported to arise in atypical locations such as the maxillary sinus and occipitoparietotemporal junction, there have been very few reports of acquired cholesteatomas arising in unusual locations. A 16 year old female with an acquired cholesteatoma presenting as a large lateral squamous temporal bone mass with intracranial extension nine years after canal wall down (CWD) mastoidectomy and six years after revision surgery is presented. Her management and followup are discussed and a review of the literature for atypical locations of cholesteatoma is presented. **Results:** Review of the English literature revealed only a single case of acquired cholesteatoma within the squamous temporal bone. Our patient underwent successful excision of the mass through a lateral approach, confirming the diagnosis. **Conclusions:** Acquired cholesteatoma typically arises in the middle ear and mastoid. Rarely, it can present in atypical locations. The consequences of undiagnosed, untreated cholesteatoma can be significant. This case highlights the need for routine long term surveillance in children with CWD mastoidectomy cavities.

A82. **O**titis Media with Effusion after Surgery under General Anesthesia

Rie Kanai, MD, Osaka, Japan; Ken-ichi Kaneko, MD PhD, Nagasaki, Japan; Masanao Kishimoto, MD, Fukui, Japan; Yumi Ito, MD, Fukui, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the incidence of postoperative OME after surgery under general anesthesia, and how to deal with postoperative OME.

Objectives: We considered surgery under general anesthesia could be one of the risk factors of otitis media with effusion (OME), therefore we evaluated the incidence of postoperative OME after surgery under general anesthesia. **Study Design:** Prospective study. **Methods:** The subjects were 106 patients (196 ears; 46 males, 60 females; mean 53.6 years; range 16-85 years) who had undergone surgery under general anesthesia without OME before surgery. Otomicroscopic findings and tympanograms were evaluated three times; on the day before surgery, 1-2 days (Post-1) and 5-9 days (Post-2) after surgery. **Results:** At Post-1, middle ear effusion was observed in 8 ears (4.1%) of 7 cases. Surgical sites of these patients were the head and neck in 5 cases, the lower limbs in 1, the spine in 1. In all cases, effusion was disappeared at Post-2. The average of intratympanic pressure was 18.1 ± 1.5 daPa (mean \pm SEM) and 62.7 ± 4.9 daPa in preoperative and Post-1, respectively ($p < 0.001$). The average of second postoperative pressure was 19.5 ± 1.8 daPa, which didn't differ from the preoperative pressure ($p=0.45$). **Conclusions:** We found that intratympanic pressure would change to negative temporarily after surgery under general anesthesia and OME occurred in 4.1% ears. These results suggest that surgery under general anesthesia itself could be one of the risk factors of OME. Postoperative OME improved within about a week. We recommend waiting for a week without treatment when we diagnose OME after surgery under general anesthesia.

A83. **B**one Destructive Mechanisms of Cholesteatoma

Shin-ichi Kanemaru, MD PhD, Osaka, Japan; Yayoi Kikkawa, MD PhD, Kyoto, Japan; Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to know bone destructive mechanism model of cholesteatoma that macrophage migration inhibitory factor (MIF) induced mechanical stress as a trigger played a possible key role of the bone destructive mechanisms of cholesteatoma.

Objectives: To observe the expression of cytokines; Ki 67, P53, MMP-8, 13, L26, UCHLI, CD68 and MIF in cholesteatoma and to determine their roles in the destruction of bone and extra cellular matrix. Cholesteatoma is characterized by the highly invasive epithelium into the tympanic cavity. Though the mechanisms of the destructive properties of cholesteatoma have not yet been known, they may be caused by enzymes and cytokines released by cholesteatomas. **Study Design:** Analytical study. **Methods:** Specimens: 11 samples from cholesteatoma and 4 normal external auditory tissues, were analyzed by immunohistochemistry using monoclonal antibodies to Ki67, p53, MMP-8, MMP-13, L26, UCHLI, CD68 and MIF. The rates of positive expression of these cytokines were estimated. The percentage of positive expression of these cytokines were determined by the ratio of average number of the positive cells in the total cells in the 3 microscopic fields of cholesteatoma minus that of normal control tissue. **Results:** The overexpression of Ki67, MMP8, MMP13 and MIF were observed simultaneously in cholesteatoma with/without inflammatory granulation. Especially, MMP8 and MIF were strongly expressed in all specimens of cholesteatoma. **Conclusions:** 1) This study indicated that the overexpression of cytokines; Ki67, MMP-8, 13 and MIF was observed in cholesteatoma; and 2) from the results of this study and the former reports, we established bone destructive mechanism model of cholesteatoma that MIF induced mechanical stress as a trigger played a possible key role of the bone destructive mechanisms of cholesteatoma.

A84. **F**acial Schwannoma: Clinical Presentation and Surgical Management

Matthew L. Kircher, MD, Maywood, IL; John P. Leonetti, MD, Maywood, IL; Sam J. Marzo, MD, Maywood, IL

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

and radiographic patterns seen in patients with facial schwannoma and understand the impact of surgical management on facial nerve function.

Objectives: To evaluate the clinical presentation and radiographic patterns in patients with facial schwannoma and understand the clinical utility of facial nerve decompression versus nerve resection and grafting on tumor control and facial nerve function. **Study Design:** Retrospective cohort study. **Methods:** This retrospective review identified 15 patients with facial nerve schwannomas treated between 1990 and 2009. Data were obtained from patient charts, radiographic and audiometric files. **Results:** Hearing loss (HL) was identified at presentation in 13 of 15 (87%) patients with a CHL in 5, SNHL in 6 and mixed HL in 2 patients. Facial weakness was present in 8 of 15 patients (54%) with facial twitching and tinnitus noted in 3 (20%) patients. Most patients 13/15 (87%) had multiple segments of facial nerve involved with the most commonly involved segment being the tympanic portion. Six patients underwent bony facial nerve decompression, 8 underwent nerve tumor resection with grafting. Facial nerve function at greater than 1 year followup was available in 10 patients with H-B grade III/IV in 7 and grade VI in 3 patients. **Conclusions:** Clinical presentation of facial schwannoma is indicative of the affected neurovascular structures. The goals of surgery include the preservation of residual facial function with bony decompression and the rehabilitation of facial function with nerve resection and grafting.

A85. **A Model for Training and Assessment of Myringotomy and Tube Placement Skills**

Sonya Malekzadeh, MD, Washington, DC; Brett Wilson, RN, Washington, DC; Greg Milmoie, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that training on a low fidelity myringotomy and tube placement skills box results in procedure competency for novice residents.

Objectives: Developing technical skill is essential to surgical training, but using the operating room for basic skill acquisition may be inefficient and expensive. This study describes the development of a low fidelity, low cost myringotomy and tube placement skills box trainer. At the same time, the study determines if myringotomy and tube placement skills training using this task box trainer results in procedure competency for novice residents as measured by global rating scale, checklist, time needed to complete task and resident confidence level. **Study Design:** Prospective, randomized study. **Methods:** First year general surgery residents (n=20) with no previous experience in myringotomy and tube placement were prospectively randomized to receive hands on skills training or to a didactic session. The training group practiced for one hour and the didactic group received a one hour lecture. A blinded examiner tested the subject before and after training. Performance was measured by a global rating scale, checklist, and time to complete the task. Resident confidence levels were also examined. **Results:** Statistical analysis revealed a trend towards improvement of total global rating scores between the didactic and skills lab group. There was a statistically significant difference in time improvement between the didactic and skills lab group (p-value=0.0211). Overall, residents felt they could perform the procedure faster (p-value=0.0069) and noted an improvement in their abilities to perform the procedure (p-value=0.0007). **Conclusions:** There was a positive effect of training on myringotomy and tube placement skills as measured by global rating scale, time and resident confidence. In addition, this low fidelity myringotomy and tube surgical box trainer is inexpensive and easy to reproduce. Otolaryngology surgical curricula should contain myringotomy and tube placement skills training for junior residents.

A86. **Cervical Plexus Block in Bilateral Simultaneous Cochlear Implants: An Innovative Idea We Won't Adopt**

Mazin A. Merdad, MD, Toronto, ON Canada; Karen A. Gordon, PhD, Toronto, ON Canada; Blake C. Papsin, MD*, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to compare between the different methods of cervical plexus nerve blocking, understand how the phrenic nerve might get affected, and explain the association between bilateral cervical plexus blocking and early postoperative fever through the involvement of the phrenic nerve.

Objectives: To determine whether there is a significant association between bilateral cervical plexus block administered immediately prior to bilateral simultaneous cochlear implant (BSCI) surgery and early postoperative fever. **Study Design:** Analytical cross-sectional study of cases from a single tertiary care pediatric hospital. **Methods:** Data were collected for all 91 children who underwent BSCI at our institution. Of these, 34 received bilateral cervical plexus block (block group) and 57 did not (control group). **Results:** There was no significant difference in the mean postoperative analgesic requirements between the block group and the controls (independent sample t-test, $P > 0.05$). There was, however, a significant association between bilateral cervical plexus block and early postoperative fever (Fisher's Exact test, $P = 0.009$). The blocked group was 6.24 times more likely to develop an early postoperative fever than the controls, after adjusting for other variables (logistic regression, $P = 0.004$). **Conclusions:** Bilateral cervical plexus block provided no extra benefits to patients undergoing BSCI. On the contrary, there was a significant association between bilateral cervical plexus block and early postoperative fever. Possible mechanisms will be discussed.

A87. **CO₂ Laser Myringoplasty**

Jason T. Miller, MD, Durham, NC; David M. Kaylie, MD*, Durham, NC; Debara L. Tucci, MD*, Durham, NC

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

CO2 laser with tissues of the tympanic membrane; 2) the physiology of retracted eardrums secondary to eustachian tube dysfunction; and 3) candidacy and expected outcomes for laser myringoplasty.

Objectives: To report hearing results in patients with tympanic membrane retraction pockets after laser myringoplasty. This is done using a CO2 laser with a handheld flexible fiber to contract the pocket. Also to show the benefits of handheld CO2 fibers over KTP and line-of-sight CO2 lasers. **Study Design:** Retrospective review. **Methods:** A handheld fiber for CO2 laser was used. While asleep, the retraction pocket was reinflated using Valsalva, hydrodissection or manual dissection. The pockets were treated with multiple 2W per 100msec pulses to contract the pocket. Tympanostomy tubes were placed in all patients. **Results:** Laser myringoplasty was performed on 19 patients and 24 ears. Audiograms were performed on average three weeks postoperatively. Air bone gaps were calculated for pure tones at 0.5, 1, 2 and 3 kHz. The average preoperative ABG for the 24 ears was 13.9dB. The average postoperative ABG was 8.5dB (P=0.02) The twenty ears with no effusion experienced an ABG closure from 12.1dB to 7.8dB whereas four ears with an effusion had an average ABG closure from 22.7dB to 7.00dB. **Conclusions:** Laser myringoplasty for treatment of TM retraction using a CO2 laser with handheld flexible fiber significantly improves hearing. This system allows precise control of energy delivery to the TM. It also allows for laser delivery outside of direct line of sight. Patients with hearing loss and no effusion had significant immediate hearing improvement. Patients with effusions experience the greatest hearing improvement. Patients with TM adherence to ossicles that cannot be elevated with Valsalva are at greater risk for suboptimal hearing results.

A88. **P**neumolabyrinth and Pneumocochlea—Natural History, Interventions, and Outcomes Jacob S. Minor, MD, Aurora, CO; Vincent D. Eusterman, MD, Denver, CO

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand potential mechanisms for the pathophysiology of pneumocochlea; 2) discuss the epidemiology and etiology of pneumolabyrinth and pneumocochlea; and 3) explain how outcomes vary with degree of hearing loss and type of intervention.

Objectives: Pneumolabyrinth and pneumocochlea are characterized by the presence of air within the inner ear and fewer than forty cases are reported in the literature. As no thorough review of these cases exists, there is scant information on the etiology, epidemiology, and associated physical exam and radiologic findings in these patients. Also, no report has been made of the interventions attempted and correlating outcomes with presenting pathology. This summary of published cases of pneumolabyrinth with or without pneumocochlea presents this information along with a new case of isolated pneumocochlea. **Study Design:** Case report with literature review. **Methods:** A review of the literature examined all papers on PubMed under the search terms “pneumocochlea” and “pneumolabyrinth”. The references of these papers were also examined for any other cases that might have been overlooked with the initial survey and any additional case reports thus identified were also included. **Results:** Including the current report, a total of thirty-two cases are reviewed. Among the cases with information available, over seventy percent were male. Eighty percent were post-traumatic, the remainder iatrogenic. Patients have various degrees of hearing loss and generally severe vertigo. Isolated pneumocochlea may present without vertigo. Vestibular improvement is nearly universal. Recovery of hearing was greatest among patients with the smallest degree of loss, and was nonexistent among those with profound loss, regardless of intervention. **Conclusions:** Management decisions should be made in regard to the degree of hearing loss and associated injuries. Prognosis appears to vary with degree of hearing loss.

A89. **C**orrelation of Unilateral Sporadic Vestibular Schwannoma Growth Rates with Genetic and Immunohistochemical Abnormalities Atta Mohyuddin, MD, London, UK; David Gareth Evans, MD, Manchester, Lancashire UK; Richard T. Ramsden, MD, Manchester, Lancashire UK

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the growth rates in association with genetic mutation in NF2 gene and immunohistochemical markers in unilateral sporadic schwannoma tumors.

Objectives: We examined the relationships between an index of USVS growth, and genetic abnormalities and pathological growth indices. **Study Design:** 65 patients with unilateral sporadic vestibular schwannoma had experimental analysis of their tumor and blood for both NF2 genetic alterations and growth factors in a tertiary center. **Methods:** Single strand conformational polymorphism analysis and heteroduplex methods were used to screen for mutations in all 17 exons of the NF2 gene in USVS from 63 patients. Loss of heterozygosity (LOH) analyses were also carried out. An index of USVS growth (clinical growth index, CGI) was calculated as maximum tumor diameter divided by duration of symptoms. The immunohistochemical growth indices were based on monoclonal antibodies to Ki-67 and another tumor cell proliferation marker (platelet derived growth factor, PDGF). **Results:** CGI was highly variable and did not significantly decrease with increasing age at diagnosis. Either somatic NF2 mutations or LOH were found in 88% of tumors. PDGF and Ki-67 increased significantly with increasing age at diagnosis, and PDGF was lower in tumors with LOH than in those without LOH. In multiple linear regression analysis, CGI was significantly higher in people with higher PDGF, after accounting for age at diagnosis and LOH. **Conclusions:** An index of USVS growth increases with increasing PDGF, after accounting for age and LOH.

A90. **I**nverting Papilloma of the Middle Ear: A Case Report and Review of the Literature Brendan P. O’Connell, MS, Charleston, SC; Alejandro Rivas, MD, Nashville, TN (Presenter); George B. Wanna, MD, Nashville, TN; David S.C. Haynes, MD*, Nashville, TN

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

an uncommon cause of middle ear disease. Clinicians should be aware of anatomic locations involved and the role of surgical excision with mandatory long term followup.

Objectives: Inverting papillomas (Schneiderian type papillomas) are relatively uncommon benign neoplasms found almost exclusively in the sinonasal cavity. Surgical excision with adequate margins is the preferred method of treatment, however high recurrence rates have been reported after incomplete resection. Lesions arising outside the sinonasal cavity are extremely rare occurrences. This report seeks to increase awareness of an unusual presentation for inverting papilloma thereby eliminating delays in diagnosis and decreasing the morbidity associated with this lesion. **Study Design:** Case report and review of the literature. **Methods:** A case of middle ear inverting papilloma and its subsequent treatment course at a tertiary care referral center was analyzed and a review of the literature was performed. **Results:** A 52 year old male with a past medical history of sinonasal inverting papilloma presented with complaints of right ear fullness and pulsatile tinnitus. CT scan demonstrated an abnormal soft tissue mass within the right middle ear just inferior to the ossicles and medial to the tympanic membrane. The patient underwent surgery for tumor resection and histopathologic examination revealed the mass to be inverting papilloma of the middle ear. An adequate excision was performed and the patient remains disease free six months postoperatively. **Conclusions:** Inverting papillomas of the middle ear are exceedingly rare. Given the locally aggressive nature and small but undeniable risk for malignant transformation, clinicians should be aware of anatomic locations involved and the role of surgical excision with mandatory long term followup.

A91. **Stapes Surgery in the Pediatric Population: Our 20 Year Experience**

Rajanya S. Petersson, MD, Rochester, MN; Matthew L. Carlson, MD, Rochester, MN; Charles W. Beatty, MD*, Rochester, MN; Colin L. W. Driscoll, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss indications for stapes surgery in the pediatric population; 2) describe techniques and expected outcomes; 3) understand potential complications.

Objectives: We review our institution's experience with pediatric stapes surgery over a 20 year period, including indications, techniques, outcomes, and complications. **Study Design:** Retrospective case series. **Methods:** A retrospective chart review was performed for all patients aged 18 and under who underwent stapes surgery between 1988 and 2008. **Results:** Eighteen patients having undergone 21 surgeries by four surgeons were included for review. Seventy-seven percent of patients were female. Mean age at time of surgery was 13.8 years (range 7-18 years). Otosclerosis and congenital stapes fixation were the most common indications. Three patients carried diagnoses of genetic syndromes. Eighteen ears underwent small fenestra laser stapedotomy procedures, two ears required the use of a drill, and one stapedectomy with footplate removal was performed. Six different types of prostheses were used. One ear, which required footplate drilling, had poorer hearing postoperatively. Otherwise, air bone gap closure ranged from <10 dB to 40 dB. Complications were few and included temporary dizziness, persistent need for hearing aids, and need for revision surgery. There were no cases of permanent sensorineural hearing loss or facial nerve paralysis. **Conclusions:** Stapes surgery for the pediatric population has received limited attention in the literature. This appears to be a safe and effective treatment for otosclerosis and congenital stapes fixation. However, all treatment options, including hearing aids and observation, should be discussed, and decision making for surgery may be deferred until the pediatric patient can participate in the process.

A92. **Implantation of the Common Cavity Malformation May Prevent Meningitis**

Benjamin R. Roman, MD, New York, NY; Daniel H. Coelho, MD, Richmond, VA; J. Thomas Roland Jr., MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the common cavity malformation and the increased risk for meningitis, as well as to discuss a management algorithm that addresses both cochlear implantation and the prevention of meningitis.

Objectives: Severe and profoundly hearing impaired children with congenital malformations of the inner ear can benefit from cochlear implantation. However, these patients, especially those with a common cavity defect, have a higher incidence of CSF leak and resulting meningitis pre- and post-implantation and may require surgery to repair the CSF leak. We suggest and discuss a shift in the management of these children, to simultaneously aid hearing and prevent meningitis. **Study Design:** A review of the literature and retrospective case report. **Methods:** A two year old girl with bilateral common cavity defects who had previously undergone cochlear implantation developed contralateral CSF leak resulting in meningitis. After resolution of the infection, cochlear implantation was performed at the same time as definite CSF leak repair. A literature review was performed to find other cases that address cochlear implantation in the setting of meningitis for the common cavity defect. **Results:** Cochlear implantation and repair of the CSF leak has successfully prevented recurrent meningitis in this case during two years of followup since surgery. She has been deriving hearing benefit from her bilateral implants. **Conclusions:** This case suggests a role for cochlear implantation during CSF leak repair in children with a cochlear malformation. Furthermore, cochlear implantation at an early age may be warranted in these patients before CSF leaks and meningitis have occurred.

A93. **Vestibular Ocular Reflex Response in Caspase-3 Knockout Mice**

Eric S. Rosenberger, BA, Galveston, TX; Tomoko A. Makishima, MD PhD, Galveston, TX; Scott J. Wood, PhD, Galveston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate knowledge regarding the effect of caspase-3 gene mutations on the vestibular apparatus of mice via identified structural abnormalities. They should be able to compare phenotypes based on their subsequent vestibular ocular reflex response performance and discuss the role of central velocity storage mechanisms in regard to these performances.

Objectives: Caspase-3 is a cysteine protease integral for programmed cell death. Caspase-3 knockout mice exhibit deafness and circling behavior, suggestive of inner ear dysfunction. Deficiency of this gene results in hair cell death in the cochlear apparatus. Unlike the auditory system, the details of the vestibular dysfunction remain undocumented. Video-oculography has been utilized to measure the vestibuloocular reflex (VOR) in mice and exemplifies a noninvasive method to test vestibular function. This study sought to quantify VOR response differences between genotypes and to determine whether heterozygous mice show an intermediate vestibular phenotype.

Study Design: Four mice each of caspase-3 knockout, heterozygous, and C57BL6 wild type mice were tested (aged 2 months). The frequency response of the VOR in darkness for each group was characterized during horizontal rotation at 5 frequencies ranging from 0.05Hz to 0.8Hz (peak velocity of 60 deg/sec). The linearity of the VOR was tested at 0.2 Hz (peak velocities ranging from 30 to 120 deg/sec). **Methods:** The mice were immobilized on a rotating platform and placed inside a dark chamber utilizing infrared VOR recording cameras. **Results:** No response at any frequency or velocity was recorded for caspase-3 knockout mice. Heterozygous mice performed equal to wild type mice in all but the lowest frequency (0.05Hz). **Conclusions:** Rapid frequencies produce no difference between heterozygous and wild type mice, suggesting that adequate vestibular development has occurred. Differences at the lowest frequency may reflect impairment of central velocity storage mechanisms in heterozygous mice that may be elucidated with further vestibular function analysis and histological studies.

A94. ~~Withdrawn~~--Mitotic Blockade with Ionizing Radiation: A New Means to Investigate Hair Cell Regeneration

Mark S. Schneyer, MD, Charlottesville, VA; George T. Hashisaki, MD*, Charlottesville, VA; Jeffrey T. Corwin, PhD, Charlottesville, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss proliferative and nonproliferative mechanisms of hair cell regeneration and to explain how ionizing radiation can be used as a tool to investigate hair cell regeneration.

Objectives: 1) To investigate the efficacy of ionizing radiation for mitotic blockade in avian utricular neuroepithelium; 2) to determine whether radiation induced mitotic blockade has value as a new tool to investigate hair cell regeneration; and 3) to determine an appropriate radiation dose for mitotic blockade in avian utricular neuroepithelium. **Study Design:** Utricles were harvested from White Leghorn chickens aged 2 to 8 days and were treated with either 2000, 4000, or 8000 rads of radiation or no radiation at all. Immediately after radiation, utricles were placed in sterile cell culture media containing bromodeoxyuridine (BrdU) and were incubated for 3 days. The utricles were then fixed and prepared for fluorescent detection of BrdU. **Methods:** Antiproliferative effects were measured using immunohistochemistry with labeling for BrdU, phalloidin, and myosin VIIa. Utricular mounts were examined with confocal microscopy. **Results:** Irradiated utricles at all doses demonstrated a statistically significant decrease in the number of BrdU+ cells compared to control utricles. Additionally, among radiation doses, a dose of 4000 or 8000 rads resulted in a statistically significant reduction in BrdU+ cells compared to 2000 rads. The difference between 4000 and 8000 rads was not statistically significant. **Conclusions:** Ionizing radiation is very effective in blocking mitosis in avian utricular neuroepithelium. While 2000 rads significantly blocks proliferation, increasing the dose to 4000 rads leads to a further mitotic blockade and would be the preferred dose.

A95. Quality of Life after Treatment for Acoustic Neuroma Using the New PANQOL Scale

Brian T. Shaffer, MD, Philadelphia, PA; Michael S. Cohen, MD, Pittsburgh, PA; Douglas C. Bigelow, MD, Philadelphia, PA; Michael J. Ruckenstein, MD*, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the importance of disease specific instruments in quality of life studies.

Objectives: To compare quality of life in acoustic neuroma patients undergoing different treatment algorithms using the PANQOL scale, a new validated and disease specific quality of life instrument. **Study Design:** Cross-sectional observational study. **Methods:** One hundred forty-three patients with acoustic neuromas and 40 general otolaryngology controls completed the 26 question PANQOL scale and the SF-36 general health related quality of life scale. PANQOL data was analyzed in relation to chart medical data. **Results:** The only PANQOL domain to show a significant difference between conservative, gamma knife, and microsurgery treatment groups was the face domain, which was worst in the microsurgery group and best in the conservative group. The SF-36 did not capture any significant differences between treatment groups. All treatment groups had significantly lower PANQOL hearing and balance scores compared to controls. Acoustic neuroma cases had a significantly better PANQOL general health score compared to general otolaryngology controls. Conservative management cases showed an inverse correlation between tumor size and PANQOL face and pain scores. Gamma knife cases showed an inverse correlation between tumor size and PANQOL general health, energy and total scores, and also an inverse correlation between time since treatment and PANQOL face score. Microsurgery cases showed an inverse correlation between tumor size and PANQOL pain score. **Conclusions:** Individual PANQOL domain scores showed important correlations with patient and tumor characteristics that were unique to different treatment algorithms. Only PANQOL hearing and balance scores were significantly worse in cases compared to controls. The PANQOL scale should prove useful in future prospective studies.

A96. *A* Prospective Study of Cardiovascular Risk Factors and Incident Hearing Loss in Men

Josef Shargorodsky, MD, Boston, MA; Roland D. Eavey, MD MS*, Nashville, TN; Sharon G. Curhan, MD ScM, Boston, MA; Gary G. Curhan, MD ScD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the associations between cardiovascular risk factors and the risk of hearing loss development in men.

Objectives: Hearing loss is the most common sensory disorder in the US, afflicting over 36 million people. Cardiovascular risk factors have been associated with hearing loss risk in cross-sectional studies, but prospective data are currently lacking. **Study Design:** Prospective analysis of the association between diagnosis of hypertension, diabetes mellitus, hypercholesterolemia, smoking and obesity and incidence of hearing loss. **Methods:** Participants were 26,917 men in the health professionals followup study, aged 40-75 years at baseline in 1986. Study participants completed questionnaires about lifestyle and medical history every two years. Information on self-reported professionally diagnosed hearing loss and year of diagnosis was obtained from the 2004 questionnaire and cases were defined as hearing loss diagnosed between 1986 and 2004. Cox proportional hazards multivariate regression was used to adjust for potential confounders. **Results:** 3,488 cases of hearing loss were identified. History of hypertension (OR 0.96, 95% CI 0.88-1.03), diabetes mellitus (OR 0.92, 95% CI 0.78-1.08), or obesity (OR 1.02, 95% CI 0.90-1.15 for BMI \geq 30 compared to normal range of 19-24.9) was not significantly associated with hearing loss risk, while hypercholesterolemia (OR 1.10, 95% CI 1.02-1.18) and past smoking history (OR 1.09, 95% CI 1.01-1.17) were associated with a significantly increased risk of hearing loss after multivariate adjustment. **Conclusions:** A history of hypertension, diabetes mellitus, or obesity is not associated with increased risk of hearing loss, while a history of past smoking or hypercholesterolemia has a small but significant association with increased risk of hearing loss in adult males.

A97. *F*requency of mtDNA Mutations in Nonsyndromic Hearing Loss

Richard J. Vivero, MD, Miami, FL; Xiaomei Ouyang, MD, Miami, FL; Denise Yan, MD, Miami, FL; Simon I. Angeli, MD*, Miami, FL; Xue Z. Liu, MD, Miami, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to explain mitochondrial DNA (mtDNA) as an etiology of nonsyndromic sensorineural hearing loss.

Objectives: The aim of the study is to assess the frequency of mitochondrial DNA mutations in a cohort of individuals with nonsyndromic sensorineural hearing loss. **Study Design:** Individuals with nonsyndromic sensorineural hearing loss were recruited for participation between 2002 and 2008 from a tertiary care otologic practice. **Methods:** Genomic DNA was subject to PCR RFLP analysis for A1555G and A7445G mutation. Confirmation of the A7445G mutation was completed by direct sequencing. Mutation A3243G was detected by amplification of base pairs 3163 to 3323 and digestion with *Apal*. **Results:** 350 probands (3 mos - 80 years old) were screened for A1555G, G7444A, and A3243G mtDNA mutations. The frequency of common mitochondrial mutations is 1.4% (5/350) in this cohort including A1555G, G7444A, and A3243G being in four patients with nonsyndromic deafness and one patient with Melas syndrome. **Conclusions:** The mitochondrial A1555G mutation (0.6%, 2/350), G7444A (0.6%, 2/350) substitution, and A3243G (0.3%, 1/350) are among the significant causes of ARNSD in this population.

A98. *A*nesthetic Complications Associated with Pediatric Cochlear Implantation

Joseph S. Yeh, MD, New York, NY; Jung T. Kim, MD, New York, NY; Anil K. Lalwani, MD*, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the common complications associated with general anesthesia in children undergoing cochlear implantation and discuss factors that are predictive of complications.

Objectives: Cochlear implantation is effective in the treatment of childhood SNHL and is associated with minimal surgical complications. Nonetheless, there is trepidation regarding general anesthesia in young infants and children. We investigated whether young age is a risk factor when undergoing general anesthesia for cochlear implantation. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review of 123 patients younger than 18 years, who underwent CI between 2006 and 2008 at a tertiary academic referral center was conducted for identification of intra- and postoperative anesthesia related complications. Patients were stratified by American Society of Anesthesiologist (ASA) physical status classification and by age groups. **Results:** Of the 123 CI procedures, 8 patients had nine anesthesia related complications: postoperative wheezing/stridor (5 cases), laryngospasm (3 cases), and emesis during inhalational induction (1 case). Divided by age group, 12 patients were < 12 mo with 1 complication (8%), 18 patients were between 1 and 2 years with 1 complication (5.6%), 35 patients were between 2 and 5 years with 1 complication (3%), 39 patients were between 5 and 12 years with 5 complications (13%), and 19 patients were > 12 years with no complication (0%). Divided by ASA classification, 62 patients in ASA I had 2 complications (2%), 53 patients in ASA II had 4 complications (8%), and 8 patients in ASA III/IV had 2 complications (25%). **Conclusions:** General anesthesia is well tolerated by pediatric patients undergoing cochlear implantation, even under 1 year of age. Intraoperative and postoperative complications are primarily respiratory and are more related to ASA status than age.

Pediatrics

A99. Pediatric Case of Gorham's Disease with Extensive Maxillofacial Involvement

Samer Al-khudari, MD, Detroit, MI; Mark Toma, BS, Detroit, MI; Vanessa Schweitzer, MD*, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the diagnosis and management options in Gorham's disease.

Objectives: To present a rare pediatric case of Gorham's disease with extensive head and neck involvement. **Study Design:** Case report and literature review. **Methods:** Literature review of Gorham's disease in pediatric patients with head and neck manifestations with discussion of a representative case within our health system. **Results:** We describe a rare and fatal pediatric case of Gorham's disease originating in the mandible, and progressing over 5 years to involve the maxilla, sphenoid bone, temporal bone, occipital bone, and infratemporal fossa. A nine year old male initially presented after presumed mandibular dental trauma. An insidiously progressive massive maxillofacial osteolysis ensued. The diagnosis of Gorham's disease was established only after infectious, malignant, inflammatory and endocrinologic diseases were excluded. Facial photographs and computerized tomographic images demonstrate the dysmorphic facial features and vanishing bone disease. The maxillofacial literature is reviewed and possible medical and surgical management is discussed. Gorham's disease in a pediatric patient with extensive head and neck involvement is exceptionally rare. **Conclusions:** To the best of our knowledge our case represents the third case in the literature to document Gorham's disease in a pediatric patient with maxillofacial involvement.

A100. Neck Soft Tissue Perineurioma in a Child

Sean Callahan, MD, Dallas, TX; Seckin Ulualp, MD, Dallas, TX (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to understand clinical presentation of a rare neoplasm.

Objectives: To describe clinical, radiologic, and histological features of a neck soft tissue perineurioma in a child. **Study Design:** Case review. **Methods:** Chart of a 13 year old girl referred to a tertiary care pediatric hospital for assessment of neck mass was reviewed. Data included relevant history and physical examination, diagnostic workup, and management. **Results:** The child has been having a neck mass located on level 5 for 5 months. Parents noticed that the mass appeared after having an upper respiratory tract infection. She was diagnosed with lymphadenopathy. After receiving an unknown antibiotic, the mass has not resolved. The mass had slowly increased in size. Physical examination revealed a well appearing child in no respiratory distress. There was a neck mass located on level five. Palpation of the mass showed smooth, rubbery, nontender, and nonpulsatile mass. The mass appeared to be attached to skin. MR imaging documented subcutaneous, well defined lesion in the supraclavicular region just posterior to the sternocleidomastoid muscle. The mass showed intense uniform enhancement. Upon resection of the mass, histologic evaluation showed well circumscribed, unencapsulated cellular lesion that focally entraps dermal appendages. The lesion was strongly positive for CD34, GLUT-1, EMA and claudin. Focal positivity was also present in SMA and S-100. Calponin and factor 13a were negative. The final diagnosis was soft tissue perineurioma. At 10 month followup, the surgical site was healed with no evidence of recurrence. **Conclusions:** Soft tissue perineurioma, a rare and slowly growing tumor, needs to be considered in the differential diagnosis of neck mass in children.

A101. Retained Suture Needle after Tonsillectomy

Sherry L. Fishkin, MD, Brooklyn, NY; Michael C. Singer, MD, Brooklyn, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the management of a retained foreign body after tonsillectomy.

Objectives: To describe a rare case of a retained foreign body (suture needle) after tonsillectomy. **Study Design:** Case report and literature review. **Methods:** A case of a retained foreign body after tonsillectomy is described and a review of the literature is performed. **Results:** A nine year old boy was referred with an incidental finding of a foreign body in the nasopharynx, seen on lateral neck x-ray. In Haiti, the patient had undergone an adenotonsillectomy three years earlier for chronic tonsillitis. Six months ago the patient returned to his physician complaining of nasal obstruction. An x-ray performed at that time revealed an apparent foreign body. At presentation the patient denied symptoms of dysphagia, odynophagia or any neck pain. Physical exam revealed only edematous inferior turbinates. There was no evidence of a foreign body. Computer tomography imaging of the neck demonstrated a radio-opaque foreign body, consistent with a suture needle, in the right parapharyngeal space at the level of the soft palate. Given the risk of possible migration and injury, the patient underwent transoral removal of the foreign body. A C-arm x-ray machine was used intraoperatively for localization, as the foreign body was deeply buried in the parapharyngeal space. The foreign body was a one centimeter suture needle with a broken off swage end. The patient did well postoperatively. **Conclusions:** This is only the second reported case of a retained suture needle. As in this case, identified foreign bodies must be removed in a timely fashion to prevent possible migration and injury to surrounding structures.

A102. An Unusual Lateral Nasal Wall Mass: Heterotopic Glial Tissue

Eric Flavill, MD, Dallas, TX; Seckin Ulualp, MD, Dallas, TX (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to describe differential diagnosis of

lateral nasal mass.

Objectives: To describe clinical, radiologic, and histological features of a heterotopic glial tissue presented as a rare cause of lateral nasal wall mass in a child. **Study Design:** Case review. **Methods:** Chart of a 13 month old male referred to a tertiary care pediatric hospital for assessment of nasal mass was reviewed. Data included relevant history and physical examination, diagnostic workup, and management. **Results:** The child has been having a nasal mass located on the right lateral nasal wall since the early days of life. Parents noticed that the mass has been slowly increasing in size as the mass started to cause external deformity of the nose. The child had no difficulty breathing through nose, no epistaxis, no recurrent sinus infection, and no snoring. Physical examination revealed a mass located on the right lateral nasal wall causing displacement of the nose to the left. CT imaging documented non-lipomatous soft tissue mass involving the right nasal soft tissues and protruding into the anterior right nasal cavity. The foramen cecum appeared mildly enlarged. MRI of the lesion documented a lobulated mass located in the region of nasal process of the right maxillary bone. There was no apparent intracranial extension. Upon resection of the mass using lateral rhinotomy approach, histologic evaluation showed glial tissue intermixed with fibrous bands. Immunohistochemical staining documented positive glial fibrillary acid protein confirming heterotopic glial tissue. At 7 month followup, the surgical site was healed with no evidence of recurrent lesion. **Conclusions:** Heterotopic glial tissue, although uncommon, should be considered in the differential diagnosis of lateral nasal wall mass in children.

A103. Unexpected Pathologies in Pediatric Parotid Lesions: Management Paradigms Revisited
Eric M. Jaryszak, MD PhD, Washington, DC; Rahul K. Shah, MD*, Washington, DC; Rebecca J. Howell, MD, Washington, DC; Nancy M. Bauman, MD, Washington, DC; Diego A. Preciado, MD PhD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the management of persistent pediatric parotid masses and explain the role of surgery as a diagnostic and therapeutic tool for these lesions.

Objectives: To present case vignettes of unusual parotid pathologies and discuss management paradigms in the context of these lesions. **Study Design:** Retrospective case series. **Methods:** Five consecutive patients over the past 18 months undergoing parotidectomy for a parotid neoplasm, each with an unusual pathology, were reviewed. **Results:** Ages ranged from 17 months to 16 years. All presented with a remarkably similar clinical course, consisting of a mostly painless, persistent parotid mass for more than 3 months. Most (4/5 patients) had been treated with antibiotics prior to otolaryngology consultation. Fine needle aspiration (FNA) was performed on 3 patients and was diagnostic in one. Complete excision was performed in each child through a parotidectomy approach (3 total, 2 lateral lobe). The final pathology consisted of metastatic neuroblastoma (17 mos. old), undifferentiated primitive sarcoma (22 mos. old), mucoepidermoid carcinoma (11 years old), nodular fasciitis (12 years old), and hyperplastic lymph node (16 years old). The patient with neuroblastoma died. **Conclusions:** The differential diagnosis for a persistent pediatric parotid mass is expansive. In most cases it is impossible to discern the pathology, or rule out malignancy, based upon the clinical course, imaging, or FNA results. Excisional surgical management remains the gold standard diagnostic and therapeutic tool for most patients. Our anecdotal case series highlights the importance of having a low threshold for parotidectomy in these children.

A104. An Unusual Case of Nasal Pyriform Aperture Stenosis
Kailash Narasimhan, MD, Detroit, MI; James M. Cotichia, MD, Detroit, MI; Ryan George, BS, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the embryologic origins of nasal pyriform aperture stenosis, the appropriate evaluation of these patients, and surgical treatment options.

Objectives: 1) To report a clinically and radiographically unique case of nasal aperture stenosis; and 2) review the embryology, presentation, surgical treatment, and current literature on this congenital anatomic anomaly. **Study Design:** Case report and literature review. **Methods:** The patient chart was reviewed, along with CT imaging studies and professional intraoperative photography. A literature search was performed using PubMed. **Results:** Patient is a 4 year old male who presented with chronic rhinosinusitis and on endoscopy was found to have an obstructive stenosis at the level of the pyriform aperture. Classic pyriform aperture stenosis was presumed, however CT imaging showed isolated soft tissue narrowing without any bony stenosis or overgrowth. Operative repair consisted of sublabial approach, excision of stenotic tissue, placement of skin graft, application of mitomycin C and nasal stent placement. Postoperative endoscopy showed resolved obstruction and resolution of sinus symptoms. Our patient is unique from the standard nasal aperture stenosis because the deformity was unilateral. Also, the stenosis was radiologically and endoscopically confirmed to be a strictly soft tissue stenosis, without any bony component. These two major differences could also explain the late presentation of this patient for treatment. We hypothesize that, much like traditional pyriform aperture stenosis, an embryologic overgrowth occurred in the nasal process of the maxilla. **Conclusions:** After extensive PubMed review, this case report is the first to document a strictly soft tissue nasal aperture stenosis without any bony component. Treatment involves a midfacial approach similar to that of traditional pyriform stenosis.

A105. Endoscopic Coblation of Advanced Juvenile Nasopharyngeal Angiofibroma
Rosser K. Powitzky, MD, Oklahoma City, OK; Brandon W. Pierson, MS, Oklahoma City, OK; German Paul Digoy, MD, Oklahoma City, OK; John R. Houck, MD, Oklahoma City, OK

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize advantages and disadvantages of a new method of debulking advanced juvenile nasopharyngeal angiofibromas endoscopically using a coblator device.

Objectives: To introduce and outline the advantages of an endoscopic coblation assisted debulking of advanced juvenile nasopharyngeal angiofibroma (JNA). **Study Design:** Two case reports. **Methods:** Two male patients undergoing an endoscopic debulking of the intranasal extension of their advanced JNA tumors were reviewed. Their tumors contained orbital, infratemporal fossa, and intracranial extensions with cavernous sinus invasion (Fisch stage IVb and Radowski's stage IIIb). Embolization of tumor feeding vessels was performed before surgery. The tumors were then partially coblated via an endoscopic approach using a Coblator II System with Evac 70 Plasma Wand in conjunction with an image guided navigation system. **Results:** Both patients achieved symptomatic remission of their nasal obstruction with removal of the intranasal extent of their tumor. Coblation provided a controlled and relatively bloodless debulking of the JNAs without requiring the timely usage of multiple instruments, including bipolar and suction cautery, laser, and microdebrider. **Conclusions:** Although less morbid than open approaches, contemporary endoscopic techniques used to remove intranasal extensions of large JNAs may require a frustrating number of instruments and cause a higher frequency of intralesional hemorrhage and unnecessary injury to healthy tissue. Coblation has the advantage of debulking tumor tissue with simultaneous coagulation properties that provide adequate hemostasis and good visualization. Our review is the first to describe image guided endoscopic coblation of JNA tumors. We show this technique to be a safe and effective minimally invasive approach to assist removal of intranasal portions of advanced JNA tumors.

A106. **Utility of the Followup CT Scan in Pediatric Deep Neck Infections**

Andrew J. Tompkins, MD, Columbus, OH; Charles A. Elmaraghy, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the diagnostic utility of obtaining a second CT scan in the management strategy of pediatric deep neck infections.

Objectives: Evaluate the utility of a followup CT scan to manage pediatric deep neck infections and compare these measures against other clinical predictors. **Study Design:** Retrospective chart review. **Methods:** We performed a chart review on pediatric patients with a deep neck infection from March 2000 to February 2009 who had an initial CT scan for diagnosis as well as a second CT scan as part of their management strategy. Clinical, operative and radiologic data were recorded. CT scans were compared at equal window and level for maximal measurements in the cranial-caudal and axial dimensions as well as enhancement characteristics. **Results:** Sixty-two patients met our inclusion criteria. 27/62 (44%) were managed medically alone and 35/62 (56%) required combined medical and surgical treatment. 27/35 (77%) taken to the operating room had pus, yielding a 8/35 (13%) false positive rate. The average time between the two CT scans was 2.26 days. Using increased size and enhancement, we found a sensitivity of 100%, specificity of 77%, positive predictive value of 77% and negative predictive value of 100%. When compared to clinical data such as persistent fevers and limited neck mobility, using a followup CT scan was a more accurate predictor of obtaining pus with surgery ($p < 0.05$). **Conclusions:** Using a followup CT scan to evaluate the progression of a pediatric deep neck infection may yield better management accuracy. Performing a repeat CT scan, with the potential harm of additional radiation, must be weighed against the risks of potential unnecessary surgery.

Plastics-Aesthetics

A107. **Spitz Lesions: A Diagnostic and Clinicopathologic Dilemma**

Neda Ahmadi, MD, Washington, DC; Steven P. Davison, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the diagnostic techniques used to differentiate among Spitz nevus, atypical Spitz nevus and spitzoid melanoma. Participants should also be able to explain the distinct treatment modalities used in the management of Spitz lesions.

Objectives: Spitz lesions present a difficult clinicopathologic dilemma in plastic surgery. The spectrum of these lesions ranges from benign to malignant. These distinct entities include Spitz nevus, atypical Spitz nevus and spitzoid melanoma. Histopathologic differentiation of these lesions can be challenging, and reports of spitzoid melanoma initially diagnosed as benign Spitz nevi are reported in the literature. The goal of this study is to discuss the diagnostic tools (including comparative genomic hybridization) crucial in differentiating benign from malignant Spitz lesions and to propose an appropriate management for each lesion. **Study Design:** Case reports. **Methods:** Medical records of 3 patients referred for a suspicious pigmented lesion were reviewed. Data regarding demographics, lesion site, pathology reports, and treatment were gathered. **Results:** Three patients with three distinct entities of Spitz lesions managed at our institution were identified. The pathologic differentiation among these lesions was difficult and multiple pathologists were involved. All three patients underwent excision (varying margins) with or without sentinel node biopsy. The patient with spitzoid melanoma also received interferon treatment. **Conclusions:** Plastic surgeons are likely to be faced with the dilemma of differentiating between Spitz nevus and spitzoid melanoma at some point in their career. The management of these patients is significantly impacted by the pathologic analysis and should not be undertaken until it is confirmed. In our experience, it is not unusual to have three or more independent pathologic examinations before initiating management. We believe that a team approach between the plastic surgeon and the pathologists is crucial when diagnosing and managing patients with Spitz lesions.

A108. **Three Dimensional CT Derived Custom Implant for Repair of Facial Defects**

Jason S. Hamilton, MD, Los Angeles, CA; Hootan Zandifar, MD, Los Angeles, CA; Ryan F. Osborne, MD*, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the benefits of 3 dimensional CT scan derived custom implant for use of facial defect repair.

Objectives: To demonstrate the use of custom 3 dimensional CT scan derived implant for use of facial defect repair. **Study Design:** A case report of a 28 year old male with previous history of sinus cancer and resection that left him with a defect of left malar eminence is presented. **Methods:** A 3 dimensional CT derived implant was developed for the patient. This was then surgically placed and secured to the surrounding structures with excellent cosmetic result. **Results:** The custom implant was successful in creating a natural cosmetic result. **Conclusions:** Use of 3 dimensional CT derived custom implant can achieve excellent results while decreasing operative time and achieving great results.

A109. **R**econstruction of Complex Nasal Dorsal Sidewall Defects

Thorsen W. Haugen, MD, Danville, PA; John L. Frodel, MD, Danville, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to compare outcomes of dorsal sidewall reconstructions using extended cheek flaps and contralateral nasal skin to traditional methods. The study objective is to provide participants with expanded reconstructive options for the dorsal nasal sidewall unit.

Objectives: To demonstrate an alternative to traditional reconstruction techniques of complex dorsal sidewall defects through the advancement of contralateral nasal skin and extended use of cheek flaps. We will secondarily demonstrate that the maintenance of the nasal dorsal sidewall unit is unnecessary. **Study Design:** In this retrospective study, we will present 11 patients with complex dorsal sidewall defects who were repaired using contralateral nasal skin and extended cheek flaps. **Methods:** Eleven patients with complex dorsal sidewall defects underwent reconstruction using extended cheek flaps and contralateral nasal skin. One year postoperative photographs were obtained to assess outcomes. **Results:** One year postoperative results showed comparable to superior outcomes of repair using contralateral nasal skin and extended cheek flaps, without maintaining the dorsal sidewall unit, as compared to traditional methods. **Conclusions:** To maintain the nasal dorsal sidewall unit, superior, central dorsal, and nasal sidewall defects have traditionally been reconstructed utilizing a variety of techniques including skin grafts and regional flaps such as glabellar flaps and frontal flaps. We demonstrate that maintaining the nasal dorsal sidewall unit is not necessary, and excellent results can be achieved though the expanded use of cheek advancement flaps.

A110. **T**he Efficacy of Rhinoplasty Alone in Facial Rejuvenation

Kian Karimi, MD, Gainesville, FL; Robert T. Adelson, MD, Gainesville, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss nasal profile analysis, understand the change in the aging nose, understand the use of digital morphing software, and investigate whether rhinoplasty alone is a rejuvenating procedure.

Objectives: To review nasal profile analysis, understand the changes in the aging nose, understand the use of digital morphing software, and investigate whether rhinoplasty alone is a rejuvenating procedure. **Study Design:** Randomized prospective study. **Methods:** After IRB approval, 48 Caucasian female subjects were photographed in a standardized fashion and underwent digital rhinoplasty with morphing software to conform with aesthetic ideals. Either the morphed or unmorphed photograph of each subject was shown to each of 48 evaluators, who fell into a younger and older cohort. Without knowing the study design, these evaluators were asked to estimate the age of the subject in the photograph within a 5 year age range. **Results:** Evaluators did not find the morphed subjects to be statistically younger. This fell true for both the younger and older cohort. **Conclusions:** Rhinoplasty alone is not rejuvenating when evaluated from the profile view.

A111. **T**otal Excision of an Intraosseous Zygomatic Hemangioma via Subciliary Approach

Linda N. Lee, MD, Boston, MA; Kevin S. Emerick, MD, Boston, MA; William C. Faquin, MD PhD, Boston, MA; David A. Kieff, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the clinical, radiographic, and histopathologic features of intraosseous zygomatic hemangioma, as well as the workup and treatment of this rare entity. Participants will review the various surgical approaches for removing these facial lesions and will understand how in select cases, the otolaryngologist can offer a very cosmetically favorable approach to excise these lesions through a subciliary incision.

Objectives: To review the presentation and management of intraosseous hemangiomas of the face and malar regions, and to review advantages and disadvantages of surgical approaches for removal of these lesions, including the Weber-Ferguson, hemi/bicoronal, extended transconjunctival, transoral gingivobuccal, and extended subciliary incisions. **Study Design:** Case report and review of the literature. Surgical, radiographic, and histopathologic findings are shown and discussed. **Methods:** We describe a case of a 44 year old woman with a two year history of a slowly enlarging, tender mass over her right zygoma. Magnetic resonance imaging demonstrated a lytic, expansile lesion centered within the cortex of the zygoma at the zygomaticomaxillary suture. **Results:** Total excision of the mass was achieved through a single extended subciliary incision. The lesion was dissected circumferentially out of the zygoma with a cuff of normal bone. Histopathologic examination revealed an intraosseous hemangioma. **Conclusions:** Intraosseous hemangioma is a rare

lesion of the zygomatic area. En bloc surgical excision is the best treatment for these expansile masses. The cure rate is excellent if complete removal is achieved; however, as these are benign lesions, postoperative cosmetic deformities remain a significant issue when considering the surgical approach. Many reconstructive methods have been described to minimize bony defects following excision but do not address the extensive external skin incisions that are required and scarring that can result. A thorough understanding of the many skin incision options and selection of the least invasive approach that will permit complete resection are paramount. In select cases, an extended subciliary approach can provide the necessary exposure and a cosmetically favorable result.

A112. Giant Chondroid Syringoma of the Nose

Linda T. Nguyen, BS, San Diego, CA; Jennifer Kum, MD, San Diego, CA; Chris M. Bergeron, MD, San Diego, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe, characterize, and diagnose chondroid syringomas, rare, benign apocrine derived tumors that most commonly occur in the head and neck region.

Objectives: 1) Describe an unusual case of a giant chondroid syringoma of the nose; 2) define clinical, laboratory, and histologic features of chondroid syringomas; 3) discuss treatment and followup care for patients with chondroid syringomas. **Study Design:** Case presentation and literature review. **Methods:** A patient with chondroid syringoma of the nose was studied. Clinical history, laboratory data, imaging studies, and histopathology were reviewed. **Results:** A 43 year old male presented to our clinic with a 4 year history of a slowly growing mass on his left nasal ala. On exam, the lesion was a nontender, slightly ulcerated, cylindrical shaped mass measuring 1.5 cm (diameter) by 3.5 cm (length). The patient was taken to the operating room for excision of the mass. The diagnosis of benign chondroid syringoma was made upon histopathologic exam of the surgical specimen. Negative margins were obtained, and the wound was closed with a local rotation flap. The patient recovered uneventfully from surgery and there have been no signs of recurrence on serial followup examinations. Based upon our review of the literature, our case represents the largest chondroid syringoma of the external nose to be reported. **Conclusions:** Chondroid syringomas are rare, benign tumors of apocrine glands that most commonly occur in the head and neck region. We present the largest chondroid syringoma of the external nose to be reported to date. The treatment of choice is surgical excision with clear margins while retaining important aesthetic and functional units. The specimen should be examined closely to confirm the diagnosis and rule out malignancy.

A113. Surgical Management of the Paralyzed Face in Neurofibromatosis Type 2 Patients

Kalpesh T. Vakharia, MD, Boston, MA; Scott Randall Plotkin, MD PhD, Boston, MA; Mack Cheney, MD, Boston, MA; Tessa Hadlock, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the issues related to facial paralysis in patients with neurofibromatosis type 2 patients. Also they will be educated about a technique of facial reanimation which has been successful in rehabilitating NF2 patients at our center.

Objectives: Neurofibromatosis type 2 (NF-2) is a tumor suppressor syndrome defined by bilateral vestibular schwannomas. Facial paralysis—either from tumor growth or from surgical intervention—is a devastating complication of this disorder and can contribute to disfigurement and corneal keratopathy. Historically, physicians have not attempted to treat facial paralysis in these patients. We review clinical experience with free gracilis muscle transfer for the purpose of facial reanimation in patients with NF-2. **Study Design:** Retrospective case series. **Methods:** Five patients with NF-2 and complete unilateral facial paralysis were referred to the facial nerve center at our institution. Charts and operative reports were reviewed; treatment details and functional outcomes are reported. **Results:** Patients were treated between 2006 and 2009. 3 patients were men and 2 were women. The age of presentation of debilitating facial paralysis ranged from 13 to 50 years old. All patients were treated with a single stage free gracilis muscle transfer for smile reanimation. Each obturator nerve of the gracilis was coapted to the masseteric branch of the trigeminal nerve. Measurements of relative oral commissure excursion between the reanimated and the unaffected side revealed near symmetric smiling movement in all cases. **Conclusions:** Management of facial paralysis in patients with NF-2 is oftentimes overlooked when defining a care plan. The paralyzed midface may be treated successfully with single stage free gracilis muscle transfer in the motivated patient.

A114. Two Stage Nasolabial Flaps for Facial Reconstruction: Revisiting the Three Week Rule for Pedicle Division

Jeremy B. White, MD, Washington, DC; Steven D. Macht, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the versatility of the interpolated nasolabial flap for nasal reconstruction. One should understand the current trends in pedicled flap division times and challenge the popular dictum of waiting a full three weeks before flap division and inset. Interpolated flap physiology studies will be discussed.

Objectives: To determine the safety of early pedicle division of two stage nasolabial flaps. **Study Design:** Retrospective case review. **Methods:** A review was conducted of medical records of patients who had immediate reconstruction with two stage nasolabial flaps following MOHS surgery between 1999 and 2007. **Results:** Twenty delayed nasolabial flap nasal reconstructions were performed in nineteen patients. The average patient age was 60 years old, ranging from 38 to 82 years old, with a 3:2 female to male ratio. The most common dermatologic pathology was basal cell carcinoma, but there were also defects from trauma and surgical removal of other

cancers. The nasal ala was involved in more than 55% of cases, while the tip and dorsum were involved in 50% and 10% of surgical defects, respectively. Four patients were active smokers. The average defect area was 1.85 cm², ranging from 0.12 to 8.75 cm². Pedicle division occurred at any point between four and sixteen days, with a mean time to division of 7.8 days. **Conclusions:** The presented experience indicates that it is safe and effective to divide a interpolated nasolabial flap pedicle well before two weeks after the initial surgery. In the case of patients who are active smokers or who have bleeding disorders, however, the surgeon must consider delaying pedicle division to at least one week to decrease the risk of complications. By shortening the time to the second stage, patients may be able to minimize many of the inconveniences and infectious complications of prolonged soft tissue exposure.

A115. **Septal Perforation in Crohn's Disease**

Ahmed A. Younes, MBBCh MSc, Rochester, MN; Oren Friedman, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the nasal manifestations of Crohn's disease and identify this disease as a possible cause of nasal septal perforation.

Objectives: 1) To report Crohn's disease as a possible cause of nasal septal perforation; 2) to review the literature about nasal manifestations of Crohn's disease. **Study Design:** Review of literature and case report. **Methods:** Literature review for the nasal manifestations of Crohn's disease and case report of a patient with Crohn's disease manifested in the nose by septal perforation. **Results:** Seven cases of nasal involvement in Crohn's disease have been reported in the literature. We report a new case of nasal septal perforation in Crohn's disease. **Conclusions:** Crohn's disease should be considered in the workup diagnosis for nasal septal perforation of unknown etiology.

A116. **Subcutaneous Carboxy Therapy Injection for Aesthetic Improvement of Scars**

Hootan Zandifar, MD, Los Angeles, CA; Raphael Nach, MD, Los Angeles, CA; Jason S. Hamilton, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify benefits of carboxy therapy in scar revision.

Objectives: To present a case report of a patient with scar post-rhytidectomy improved with carboxy therapy. **Study Design:** Case report. **Methods:** Patient had undergone rhytidectomy several years prior to presentation with hypertrophy of submental and preauricular scar. She underwent 10 carboxy therapy treatments with significant improvement in scar results. **Results:** Before and after photos demonstrate improvement of the scars after 10 carboxy therapy treatments. **Conclusions:** Because of the relative absence of toxicity, the ease of use and the predictable results, carboxy therapy is a great tool in the armamentarium of cosmetic surgeons.

Sinus-Rhinology

A117. **Comparison of HemoStase versus FloSeal in Controlling Bleeding during Endoscopic Sinus Surgery: A Non-Inferiority Randomized Controlled Clinical Trial**

Jason A. Beyea, MD PhD, London, ON Canada; Brian W. Rotenberg, MD, London, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the differences in composition of HemoStase and FloSeal, discuss the merits of each as a hemostatic agent, and compare their relative success in hemostasis during endoscopic sinus surgery.

Objectives: To evaluate the effectiveness of a novel agent for the control of nasal bleeding during endoscopic sinus surgery, HemoStase. HemoStase is a plant derived hemostatic agent, which has not previously been used in sinus surgery. We hypothesize that the volume of bleeding during endoscopic sinus surgery will not be statistically significantly different between the control group (FloSeal) and the experimental group (HemoStase). **Study Design:** Randomized controlled clinical trial. Tertiary care center sinus/rhinology practice. **Methods:** Eighteen patients with a history of chronic rhinosinusitis with polyposis who have failed maximal medical therapy and have decided to undergo functional endoscopic sinus surgery (FESS). Participants were randomized into one of the two groups (control FloSeal group or experimental HemoStase group). Both groups will undergo FESS. In the control group, intraoperative actively bleeding sites in the nose will be controlled with FloSeal. In the experimental group, intraoperative actively bleeding sites in the nose will be controlled with HemoStase. Main outcome measure is total operative blood loss. Blood loss will be a sum of blood removed by suction during the surgery (recorded in milliliters) and blood on surgical sponges (weighed, converted to milliliters). Data will be analyzed using independent t-test assuming equal variance. **Results:** Preliminary results with the first seven recruited patients reveal bleeding (mL, Mean \pm SEM) was not significantly different between the FloSeal (269 \pm 50) and HemoStase (218 \pm 108) groups ($p=0.43$). **Conclusions:** The results of this study will provide an evaluation of a novel product for the control of intraoperative bleeding during endoscopic sinus surgery.

A118. **Influence of Itraconazole on T-cell Mediated Deviation**

Elizabeth W. Chance, MD, Charlottesville, VA; Spencer C. Payne, MD, Charlottesville, VA; Larry L. Borish,

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the effect of itraconazole in T-cell immune deviation.

Objectives: The objective of this study was to determine if itraconazole can alter the natural history of allergic inflammatory disorders through its influence on the activation and differentiation pattern of T-cells. Proliferation assays utilizing fluorescence assays and flow cytometry were used to determine the presence, number, and type of T-cell subpopulations within each experimental group. Also, we sought to verify that itraconazole can alter the production of Th2 mediated cytokines. RT-PCR was employed to quantify gene transcripts for cytokines associated with Th1- and Th2-like subpopulations. **Study Design:** Prospective, controlled experiment. **Methods:** Samples of whole blood were taken from healthy volunteers. Following magnetic enrichment (>95% pure) of naïve T cells (defined as CD45RA+) from whole blood samples, cells were activated with anti-CD3 and CD28 alone or in the additional presence of anti-IL-4 and IL-12 (Th1 immune deviating) or IL-4 with anti-IFN-g (Th2 immune deviating). Parallel samples contained the additional presence of itraconazole. **Results:** Successful immune deviation of naïve T cells into Th1- or Th2-like cells was demonstrated. Itraconazole had modest influences on control or Th1 immune deviating conditions. However, the addition of itraconazole under Th2 deviating conditions significantly inhibited expression of IL-5, IL-13, and IFN-g (both as mRNA transcripts by qPCR and secreted protein by ELISA). **Conclusions:** Itraconazole inhibits naïve T cells under Th2 immune deviating conditions.

A119. Unusual Presentations of Sinonasal Undifferentiated Carcinoma

Michelle Soltan Ghostine, MD, Loma Linda, CA; Samer S. Ghostine, MD, Los Angeles, CA; Mark R. Rowe, MD, Loma Linda, CA; Dennis F. Chang, MD, Loma Linda, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss various locations and presentations of sinonasal undifferentiated carcinoma.

Objectives: Sinonasal undifferentiated carcinoma (SNUC) was first described by Frierson in 1986 as an aggressive and rare malignancy of the nasal cavity or paranasal sinuses with a very poor prognosis. It is notorious for its locoregional spread and recurrence. SNUC is thought to originate from the nasal ectoderm or schneiderian epithelium of the paranasal sinuses. Although, intracranial extension is seen in SNUC it has only been described in the anterior fossa. Herein, the authors report for the first time two unusual cases of SNUC extending into the sella and clivus. **Study Design:** A case series of two patients with unusual locations of SNUC. The first patient presented with signs and symptoms of a pituitary lesion that was later discovered to be SNUC. The second patient had a clival mass. **Methods:** Both patients underwent transnasal endoscopic debulking of the tumors with both an otolaryngologist and a neurosurgeon. **Results:** Both patients had postoperative chemotherapy and radiation therapy. Although, both patients succumbed to their disease and died a lot can be learned from these unusual presentations of SNUC. **Conclusions:** SNUC is known to cause bone destruction and invasion into adjacent structures such as the orbit, cranial vault and skull base. However, it has never been known to invade the pituitary gland or clivus. These cases highlight the aggressiveness of the disease and the possibility of it spreading to these unusual locations.

A120. Surgical Management of Compressive Optic Neuropathy Due to Orbital Osseous Lesions

Gregg H. Goldstein, MD, New York, NY; Eunice E. Park, MD MPH, New York, NY; Ebrahim Elahi, MD, New York, NY; Michael R. Shohet, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the techniques, efficacy, indications and limitations for surgical approaches of orbital decompression in patients with compressive optic neuropathy due to osseous lesions. Endoscopic management will be highlighted.

Objectives: This study will describe five optic nerve decompressions in the setting of compressive optic neuropathy with decreasing visual acuity. **Study Design:** A review of the initial evaluation and management, preoperative planning and surgical approach to treat worsening visual acuity and orbital compression will be presented with reference to three distinct cases. **Methods:** The patient charts were reviewed. The pertinent history, physical exam findings, imaging studies, pathology, operative reports and ancillary intraoperative photographs and video recordings were reviewed. **Results:** Five endoscopic optic nerve decompressions were performed on three patients from 2005-2008. The study population consisted of two females and one male patient, age ranging from 10-61 years old, and all patients exhibited preoperative compressive optic neuropathy with decreasing visual acuity. The primary diagnoses consisted of Albright's syndrome with polyostotic fibrous dysplasia, osteoma and ossifying meningioma. There were no intraoperative or postoperative complications. Median hospital stay was less than 24 hours. Parameters such as visual fields, visual acuity, and intraoperative blood loss will be detailed. **Conclusions:** Recent advances in instrumentation and surgical technique have made decompression of the optic nerve a less invasive and more favorable procedure than the traditional craniotomy and transfacial approaches. But, partly due to the rarity of nontraumatic osseous lesions of the orbit, few series exist that describe a stepwise approach for orbital decompression for these compressive lesions. This study attempts to describe the details and results of the approaches to these osseous orbital lesions to improve or stabilize visual acuity once medical management has failed.

A121. CT and MR Imaging Characteristics of Acute Fulminant Invasive Fungal Sinusitis

Eli R. Groppo, MD, San Francisco, CA; Ashley H. Aiken, MD, Atlanta, GA; Ivan H. El-Sayed, MD, San

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the advantages and disadvantages of different radiologic modalities for diagnosing acute fulminant invasive fungal sinusitis.

Objectives: To determine radiographic findings on computed tomography (CT) and magnetic resonance imaging (MRI) predictive of acute fulminant invasive fungal sinusitis (AFIFS) in an immunocompromised patient population. **Study Design:** Retrospective case control. **Methods:** Cases were seventeen immunocompromised patients with confirmed AFIFS after surgical debridement/biopsy. Controls were 6 immunocompromised patients histopathologically negative for AFIFS after surgical debridement/biopsy. CT and MRI scans were independently reviewed by 2 neuroradiologists to identify imaging characteristics predictive of AFIFS. Operative reports, histopathology, microbiology, and survival data were reviewed. **Results:** There were no significant differences with regard to baseline characteristics between the 2 groups. There was moderate or substantial agreement ($\kappa = 0.40-0.77$) between the 2 radiologists for all imaging parameters except MRI loss of contrast enhancement ($\kappa = 0.16$). MRI was more sensitive than CT for the diagnosis of AFIFS (sensitivity 85-86% for both reviewers compared to 57-69%). MRI extra-sinus invasion was the most sensitive individual parameter (87-100%). MRI and CT had similar specificities, and extra-sinus invasion was the most specific individual parameter (83-83% for MRI compared to 81-83% for CT). The positive predictive values were high for both imaging modalities (93-94% for MRI compared to 89-93% for CT). The negative predictive values were lower for both modalities and varied more between reviewers (71-100% for MRI compared to 45-67% for CT). **Conclusions:** MRI is more sensitive at diagnosing AFIFS than CT. Both imaging modalities have similar specificities. Extra-sinus invasion was the most sensitive and specific single parameter evaluated.

A122. **B**alloon Sinuplasty in the Treatment of Intracranial Abscess

Luis G. Izquierdo, MD, Bethesda, MD; Jason L. Acevedo, MD, Silver Spring, MD; Jeffrey L. Cutler, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the diagnosis and management of intracranial abscess as related to complicated sinusitis.

Objectives: Intracranial complications of sinusitis are rare, but potentially life threatening sequela. While orbital complications can be severe and potentially lead to blindness, intracranial complications are the most feared and can be deadly. While modern diagnostic and therapeutic modalities such as CT, MRI, antibiotics, and modern surgical technique may have decreased the morbidity and mortality of these infections, they remain pertinent. We describe the case of an eighteen year old male who presented with concurrent frontal lobe brain abscess and frontal sinusitis. **Study Design:** Report of a case and review of the literature. **Methods:** Balloon sinuplasty of the frontal sinuses. **Results:** The patient was taken to the OR at the time of diagnosis for concurrent craniotomy for abscess drainage and bilateral frontal balloon sinuplasty. Postoperatively he had no complication and was treated with intravenous antibiotics. The patient did well throughout his hospital course and was discharged home on postop day number eight. He returned for a post-treatment head CT at one month which demonstrated complete resolution of the abscess, as well as good aeration of the frontal sinuses bilaterally. **Conclusions:** Balloon sinuplasty for the treatment of complicated frontal sinusitis is a promising treatment modality for these challenging patients. It has the advantages of short operative time, minimal morbidity, and a low risk of chronic scarring of the frontal recess.

A123. **M**inimally Invasive Endoscopic Septoplasty: A Review of Technique and Outcomes in 296 Cases

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

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the surgical technique of minimally invasive endoscopic septoplasty and discuss the advantages, disadvantages, and outcomes.

Objectives: Endoscopic septoplasty is an increasingly popular surgical procedure, with many technical variations. This study reviews our experience with a new minimally invasive endoscopic septoplasty technique and reports the outcomes. **Study Design:** 296 cases of minimally invasive endoscopic septoplasty performed at a tertiary care medical center from August, 2006 to August, 2008 were retrospectively reviewed. Outcomes, including complications and revisions were reviewed. **Methods:** The minimally invasive endoscopic surgical technique reported herein requires no septal splints, quilting stitches, incision closure, or nasal packing, thus allowing patients to return to work the following day. Cases were reviewed with respect to revision rates and complications including septal hematoma, postoperative bleeding, septal perforation, septal flapping, and adhesions. **Results:** 296 patients were identified with a mean age of 49.6 and a male to female ratio of 1.6:1. Of these patients, 260 were primary cases, and 36 were revision cases. The mean followup was 10.6 months. Indications included access for functional endoscopic sinus surgery (61.2%), nasal obstruction (33.1%), obstructive sleep disease (14.2%), and nasal congestion/facial pain (6%). Complications included postoperative bleeding (2%), septal perforation (1%), adhesions (1%), septal hematoma (0.03%), and septal flapping (0.03%). Two (0.06%) patients required nonoperative treatment for postoperative bleeding. Sixteen patients (5%) had persistent extreme caudal deviation of which three (1%) underwent revision septoplasty. **Conclusions:** Minimally invasive endoscopic septoplasty is an alternative to conventional open and limited endoscopic septoplasty. This unique technique avoids splints, stitches, or packing, improves patient comfort, and decreases operating time while maintaining a low complication profile.

A124. Subpopulations of Lymphocytes in Nasal Polyps

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Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate which subtypes of lymphocytes are more prevalent in certain forms of chronic rhinosinusitis (CRS). Our goal is to use this information to better understand the pathogenesis of nasal polyps and to improve our treatment of this difficult to control disease.

Objectives: To better understand the pathogenesis of nasal polyps in various forms of CRS by analyzing their lymphocyte subpopulations. **Study Design:** Consecutive CRS patients undergoing FESS had their polyps undergo flow cytometry. The diverse forms of CRS that were examined were non-eosinophilic sinusitis ± allergy, eosinophilic sinusitis ± allergy, allergic fungal sinusitis (AFS), CRS among cystic fibrosis patients, aspirin exacerbated CRS, and a control group. **Methods:** Part of a fresh sinonasal polyp from the middle meatus was obtained and processed according to an established protocol to undergo flow cytometry. Four color flow cytometry performed and gated for CD19, CD3, CD4, CD8, and CD 56 cells to evaluate for B cell, T cells, cytotoxic T cell, helper T cell and natural killer cell populations. This information was compared between the study groups and to the control group. **Results:** Forty-nine samples were obtained and examined. CD4 was higher among all the eosinophilic sinusitis groups than the control ($p < 0.05$). There was no difference in CD4 between the NES and control. There was no statistical difference ($p > 0.05$) when examining CD8, NK, or CD 3 among all groups. Although there was no significant difference in CD19 cells among the groups, there was a trend $p = 0.1$ for higher CD 19 in AFS. **Conclusions:** Our data show that there are some differences between the various groups of CRS for T cells, specifically CD4. B cells may play a role in the development of nasal polyps for CRS.

A125. Fibromyxomatous Spindle Cell Neoplasm of the Ethmoid Sinus with Extension into the Optic Cavity: Report of a Case and Review of the Literature

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Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the presentation and management of fibromyxomatous spindle cell neoplasms, a rare cause of sinonasal disease.

Objectives: Fibromyxomatous spindle cell neoplasms represent a recently described form of fibrous dysplasia. **Study Design:** Case report and review of the literature. **Methods:** A 43 year old woman presented to our clinic with chronic sinusitis and an infiltrative ethmoid mass consistent with a large mycetoma. Clinical manifestations of the tumor included right frontal and paraorbital pain with proptosis and chronic eye drainage. Comparison of CT images to prior studies demonstrated a slowly growing mass with diffuse enhancement in the right ethmoid complex with obstruction of the frontal sinus and erosion through the lamina papyracea. The tumor was removed, with subsequent pathology demonstrating a fibromyxomatous spindle cell neoplasm. Unfortunately, the tumor recurred following surgery and within three months had grown to its initial size. **Results:** Myxomatous tumors are rarely found in the paranasal sinuses. Paranasal fibromyxomas have been reported in the literature. These rare tumors are characterized as aggressive lesions with a propensity for recurrence. In this manuscript, we present the first reported case of a fibromyxomatous spindle cell neoplasm occurring in the ethmoid sinuses. While immunohistochemistry is necessary to differentiate this lesion from paranasal myxomas, the clinical course of both entities appears similar. **Conclusions:** Fibromyxomatous spindle cell neoplasm is a rare tumor of the ethmoid sinus. This entity must be included in the differential diagnosis for an aggressively growing lesion of the paranasal sinuses.

A126. Frontal Sinus Encephalocele Masquerading as a Nasal Polyp and Mucocele: Beware the Posterior Table Defect

Renee L. Makowski, MD, Tacoma, WA; John J. Simmer, MD, Tacoma, WA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the importance of thorough preoperative history taking, examination and imaging review in cases of intranasal lesions involving the frontal sinus.

Objectives: To present a case report of a frontal encephalocele that mimicked as a nasal polyp and erosive mucocele. **Study Design:** Case report from a military tertiary care referral center. **Methods:** Report of a unique case with discussion of possible preventable pitfalls and review of the pertinent literature. **Results:** 60 year old male presented with 9 months of worsening unilateral nasal obstruction, chronic rhinorrhea, and frontal sinus pressure. He failed medical management and denied recurrent sinusitis, nasal polyps, sinus surgery, or head trauma. Examination revealed a large polypoid mass appearing to emanate from the middle meatus, nearly occluding the left nasal cavity. Preoperative CT demonstrated a soft tissue mass centered in the nasal cavity, opacifying the left ethmoids and frontal sinus. A small bony dehiscence of the posterolateral frontal sinus wall appeared secondary to a mucocele. The patient underwent septoplasty and endoscopic removal of the lesion, which appeared consistent with a large polyp. The final pathology demonstrated mature glial and neuronal elements. Postoperatively he reported clear rhinorrhea and further history revealed similar clear rhinorrhea preoperatively that ceased as his obstruction worsened. Flexible endoscopy through the frontal recess demonstrated pulsatile soft tissue and a left frontal lobe encephalocele were appreciated on MRI. The patient underwent bifrontal craniotomy, reduction, and layered repair without incident. **Conclusions:** Encephaloceles are most commonly reported in pediatric populations, or adults with prior

trauma or iatrogenic injury. This case report, with associated photographs and imaging studies, demonstrates an unusual patient presentation of sinus pathology that may warrant more extensive preoperative history and workup.

A127. **T**ranspalatal Greater Palatine Canal Injection: How to Bend the Needle for Pediatric Sinus Surgery?

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Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the proper procedure for bending and inserting the needle when administering the greater palatine injection to pediatric patients. In addition, the study will explain the indications for using radio-anatomic correlation when injecting these patients.

Objectives: The greater palatine canal (GPC) local anesthetic injection is used to limit posterior bleeding during sinus surgery in adults. Given the potential for causing iatrogenic damage to the intraorbital contents, this procedure is not commonly utilized in the pediatric population. No studies have described the anatomic development of the GPC during facial growth. By using age stratified radio-anatomic analysis, the dimensions of the greater palatine canal and the clinical implications are described for pediatric patients. **Study Design:** Age stratified radio-anatomic study. **Methods:** High resolution CT measurements included the thickness of the mucosal plane overlying the GPC, the length of the GPC, and the distance between the base of the pterygopalatine fossa, orbital floor, and sphenopalatine foramen (SPF). **Results:** The length of the GPC correlated directly with the age of the patient. It varied from 15.3mm±1.8 in the youngest age group (<2 years) to 26.7mm±1.7 in the oldest (15-16 years). The height of the orbit relative to the hard palate approximated the adult dimensions described in the literature by 12-13 years of age (49.8mm±1.7). **Conclusions:** The GPC injection presently described for adult patients (the needle is bent 45 degrees and inserted to a depth of 25mm) may be safely administered to pediatric patients greater than 12 years of age without risk to the intraorbital contents. For patients younger than 12 years or patients with craniofacial abnormalities, radio-anatomic correlation is indicated to safely administer anesthesia and vasoconstrictive agents in anticipation of endoscopic sinus surgery.

A128. **N**asoseptal “Rescue” Flap: A Novel Modification of the Nasoseptal Flap Technique for Pituitary Surgery

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Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role, advantages, and disadvantages of the rescue flap modification of the posterior pedicle nasoseptal flap for pituitary surgery.

Objectives: The introduction of the pedicled nasoseptal flap (NSF) has decreased postoperative CSF leak rates from >20% to <5% during expanded endoscopic skull base surgery. The NSF is routinely raised at the beginning of the operation to protect the posterior pedicle during sphenoidotomy. However in most pituitary tumor cases, an intraoperative CSF leak is not expected. In these cases a rescue flap approach is used, which consists of partially harvesting the most superior and posterior aspect of the flap to protect its pedicle and provide access to the sphenoid face during the approach. The “rescue flap” can be fully harvested at the end of the case if the resultant defect is larger than expected or if an unexpected CSF leak develops. **Study Design:** Technical report. **Methods:** Video image presentation with technical pearls and pitfalls. **Results:** The rescue flap technique allows for binaural and bimanual access to the sella without compromise of the pedicle during the extended sphenoidotomies and tumor removal. If an intraoperative CSF leak is obtained, the rescue flap is then converted into a normal nasoseptal flap for skull base reconstruction. If no leak is obtained, then the patient does not suffer the donor site morbidity from the full flap harvest. **Conclusions:** This new technique allows for sellar tumor removal prior to the nasoseptal harvest, thereby, eliminating donor site morbidity for those pituitary tumor patients who do not have an intraoperative CSF leak.

A129. **E**ndoscopic Transnasal Transsphenoidal Approaches to the Cavernous Sinus: An Anatomical Dissection Study, Report on Patients, and Comparison to Transcranial Approaches

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Educational Objective: At the conclusion of this presentation, the participants should be able to understand the complex neurovascular anatomy of the cavernous sinus and to understand what types of lesions can be resected from this area.

Objectives: The neurovascular anatomy of the cavernous sinus severely limits surgical approaches for resection of tumors. Recent advances in endoscopic skull base surgery have defined surgical corridors to this challenging area. We present a series of cadaveric dissection using both endoscopic and traditional approaches to the cavernous sinus and review the successful application of the endoscopic technique to eight patients. **Study Design:** A cadaveric dissection and retrospective chart review. **Methods:** Ten fresh injected

cadaver heads were studied by the endoscopic and transcranial approaches to the cavernous sinus. A review of 275 cases of endoscopic transsphenoidal surgeries yielded 8 patients with cavernous sinus tumors who underwent endoscopic resection by senior authors. These charts were retrospectively reviewed. **Results:** Due to our cadaveric dissections we gained the confidence to apply these endoscopic approaches to eight cavernous sinus lesions. Preoperative symptoms included vision changes, pituitary dysfunction, and headaches. Five patients underwent resection of lesions extending from the sella and 3 underwent biopsy. Three required postoperative radiation and all had resolution of vision changes. Comparisons of pre- and postoperative MRI scans in these patients demonstrate a significant volume reduction of tumors following surgery. There were no carotid injuries or postoperative cerebrospinal fluid leaks. The pathology revealed adenomas, metastatic lymphoma, hemangioma, neuroendocrine tumor, and metastatic squamous cell carcinoma. **Conclusions:** Even though the cavernous sinus neurovascular structures pose a surgical challenge, this can be successfully overcome with image guidance, angled endoscopes, neurovascular studies and endoscopic Doppler to map the carotid artery. This area is amenable to endoscopic resection in carefully selected cases.

A130. **N**asoseptal Flap Repair of Traumatic Skull Base Cerebrospinal Fluid Leaks

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Educational Objective: At the conclusion of this presentation, the participants should be able to explain the benefits of the nasoseptal flap for repairing traumatic cerebrospinal fluid leaks.

Objectives: The vascularized nasoseptal flap has become a principal reconstructive technique for closure of defects following endonasal skull base surgery. Despite its potential utility, there has been no report of using the nasoseptal flap to repair traumatic cerebrospinal fluid (CSF) leaks and documenting the outcomes of this application. Specific concerns in skull base trauma include septal trauma with disruption of the flap pedicle, multiple leak sites, and issues surrounding persistent leaks after craniotomy. **Study Design:** Retrospective case series. **Methods:** We performed a retrospective review of all patients who underwent nasoseptal flap closure of traumatic CSF leaks by the primary author. Demographic data, use of CSF diversion techniques and outcomes were analyzed. **Results:** Fourteen traumatic leak patients were repaired with nasoseptal flaps. The defect etiology was motor vehicle collision in 8 patients (57%), prior sinus surgery in 4 (29%), and assault in 2 (14%). At the time of nasoseptal flap repair, four patients had failed prior avascular grafts and two had previously undergone craniotomies for repair. Followup data was available for all patients (mean 10 months). The overall success rate was 100 percent (no leaks), with 100 percent coverage—including three patients with two leak sites. One patient developed persistent headaches and elevated intracranial pressures, requiring placement of a ventriculoperitoneal shunt. Issues surrounding clival and suprasellar fractures into the CSF cisterns resulting in high flow CSF leaks are discussed. **Conclusions:** The nasoseptal flap is a versatile and reliable local reconstructive technique for ventral base traumatic defects, with a 100% CSF leak repair rate in this series.