

**MIDDLE & WESTERN SECTIONS  
COMBINED MEETING PROGRAM  
FEBRUARY 2-5, 2006  
CORONADO MARRIOTT, SAN DIEGO, CA  
THURSDAY, FEBRUARY 2, 2006**

4:00 pm - Speaker Ready Room - Avignon  
8:00 pm

5:00 pm - Registration - Foyer  
8:00 pm

6:00 pm - Exhibit Hall Open - St. Tropez C-D  
7:30 pm

6:00 pm - COMBINED WELCOME RECEPTION - ST. TROPEZ C-D  
7:30 pm

**FRIDAY, FEBRUARY 3, 2006**

7:00 - Registration - Foyer  
12:30

7:00 - Speaker Ready Room - Avignon  
5:00

7:00- BUSINESS MEETING (MEMBERS ONLY) -  
7:45 WESTERN SECTION - CANNES/ANTIBES

7:00 - Exhibit Hall Open - St. Tropez C&D  
12:00

7:00 - Continental Breakfast with Exhibitors - St. Tropez C&D  
7:50

8:00 - Spouse Hospitality - Monaco  
11:00

7:50 - SCIENTIFIC SESSIONS - ST. TROPEZ A&B  
12:00

7:50 Welcome and Remarks  
Paul J. Donald, MD\*, Vice President, Western Section  
David E. Schuller, MD\*, Vice President, Middle Section

Introduction of President, Stanley M. Shapshay, MD\*, New York, NY

7:55 - Presidential Address, Stanley M. Shapshay, MD\*, New York, NY  
8:05

8:05 - Introduction of Vice Presidential Citation Awardees  
8:30 Citations awarded by Western Vice President, Paul J. Donald, MD\*

*Mansfield F.W. Smith, MD\*, Sacramento, CA*

*Thomas C. Calcaterra, MD\*, Los Angeles, CA*

*Patrick J. Doyle, MD\*, Vancouver, BC*

Citations awarded by Middle Vice President, David E. Schuller, MD\*

*Bruce J. Gantz, MD\*, Iowa City, IA*

*Paul A. Levine, MD\*, Charlottesville, VA*

*D. Bradley Welling, MD PhD\*, Columbus, OH*

*Gregory T. Wolf, MD, Ann Arbor, MI*

8:30 Introduction of Special Guest  
Professor Egbert H. Huizinga, MD, Utrecht, Netherlands  
Paul J. Donald, MD\*, Sacramento, CA

8:32 Introduction of Guest of Honor  
Prof. Dr. Wolfgang Draf, Fulda, Germany  
David E. Schuller, MD\*, Columbus, OH, and Paul J. Donald, MD\*, Sacramento, CA

Guest of Honor Address

Results of Endoscopic Resection of Benign and Malignant Tumors of the Sinonasal Tract

Prof. Dr. Wolfgang Draf, Fulda, Germany

**MODERATORS: ANDREW N. GOLDBERG, MD MSCE\*, SAN FRANCISCO, CA**

#### 8:45 Predictive Factors and Outcomes in Endoscopic Sinus Surgery for Chronic Rhinosinusitis

Timothy L. Smith, MD, MPH\*, Portland, OR  
Sabrina M. Mendolia-Loffredo, MS, Milwaukee, WI  
Todd A. Loehrl, MD, Milwaukee, WI  
Purushottam W. Laud, PhD, Milwaukee, WI  
Ann B. Nattinger, MD, MPH, Milwaukee, WI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the effect of various patient factors on the objective and quality of life outcomes of endoscopic sinus surgery.

**OBJECTIVES:** To assess objective and quality of life (QOL) outcomes prior to and following endoscopic sinus surgery (ESS) in patients with chronic rhinosinusitis (CRS) and to determine preoperative factors that predict surgical outcome in these patients. **STUDY DESIGN:** Prospective outcomes study. **METHODS:** One hundred nineteen adult patients with CRS and a mean follow-up of 1.5 years were evaluated prospectively. Computed tomography (CT), endoscopy and QOL assessment was performed. Predictive value of patient factors was determined based on change in endoscopy and QOL scores following ESS. **RESULTS:** Objective outcomes: Patients with CRS demonstrated significant improvement on nasal endoscopy following ESS but preoperative, postoperative and change in scores were affected by certain patient factors. Endoscopy scores were significantly worse in patients with prior sinus surgery, polyps, asthma and ASA but these patients also experienced the greatest improvement in endoscopy scores. QOL outcomes: Pre- and postoperative QOL was positively affected by polyps and adversely affected by ASA, depression and female gender but these groups still experienced significant improvement in QOL scores. Pre- and postoperative QOL was unaffected by prior sinus surgery, asthma, smoking, allergies and all of these groups experienced significant improvement in QOL scores. Factors predictive of outcome: ASA and depression were predictive of worse outcome. Preoperative CT scores approached significance as being predictive of outcome. **CONCLUSIONS:** Surgical management of CRS was associated with significant improvement on objective and QOL measures however, specific patient factors, in particular ASA and depression, predict poorer outcome. Preoperative CT may be a predictor of endoscopic and QOL outcome and deserves further study.

#### 8:52 Bacterial Biofilms in Chronic Rhinosinusitis

Alicia R. Sanderson, MD, San Diego, CA (*Resident Travel Award*)  
Darrell H. Hunsaker, MD\*, San Diego, CA  
Jeff G. Leid, PhD, Flagstaff, AZ

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the composition of a biofilm and the causative bacterial species as well as discuss the potential role of biofilms in chronic rhinosinusitis.

**OBJECTIVES:** Chronic rhinosinusitis (CRS) is a common disease poorly controlled by antibiotics. There are many postulated etiologies of CRS, including allergy, superantigen, fungi, functional factors and biofilm. In 2004, we presented a preliminary study that demonstrated the presence of bacterial biofilms on the sinus mucosa of patients with CRS using fluorescent in situ hybridization and confocal laser microscopy. The advantage of FISH in biofilm identification is that it is the only method that identifies the specific bacteria creating the biofilm matrix. We now present the results of a larger series of patients. **STUDY DESIGN:** Prospective analysis of sinus mucosa samples from patients with chronic rhinosinusitis. **METHODS:** Patients with CRS as defined by the 2003 CRS task force who were scheduled for endoscopic sinus surgery were offered the opportunity to participate in the study. Biopsies of the sinus mucosa and cultures were taken at the time of surgery. Specimens were preserved in liquid nitrogen and forwarded for fluorescent in situ hybridization (FISH) testing for streptococcus pneumoniae, staphylococcus aureus, haemophilus influenza and pseudomonas aeruginosa. Biofilm positive samples were examined using confocal laser microscopy. **RESULTS:** Bacterial biofilms were present on ten of twelve specimens. The predominant species were haemophilus influenza and staphylococcus aureus. Streptococcus pneumoniae was identified on one sinus mucosa sample. Pseudomonas aeruginosa biofilm was not identified on any of the specimens. The intraoperative cultures of the planktonic bacteria present in the sinuses did not correlate with the biofilms identified using FISH. **CONCLUSIONS:** The presence of biofilms on the mucosa of chronic rhinosinusitis patients suggests a possible cause of antimicrobial therapy failure. The presence of the biofilms could change the approach to treatment, redirecting it toward dissolution or inhibition of the matrix. In vitro and animal studies investigating new medical treatments directed towards the dissolution of the matrix are currently pending.

#### 9:00 Laryngeal Wound Healing With Combined Laser Surgery With Cryotherapy: A Canine Acute Injury Model

Philip D. Knott, MD, Cleveland, OH  
Michael C. Byrd, MD, Cleveland, OH  
David Hicks, MD, Cleveland, OH  
Marshall Strome, MD MS\*, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand how the addition of cryosurgery to CO2 laser surgery affects larynx specific parameters of wound healing.

**OBJECTIVES:** To understand the effect of the addition of cryosurgery to CO2 laser surgery on larynx specific wound healing. **STUDY DESIGN:** Randomized canine acute injury model with videolaryngostroboscopic and histopathological outcomes analysis. **METHODS:** Twelve healthy adult male dogs underwent bilateral endoscopic CO2 laser transmuscular cordectomy (ELSWC Grade 3) followed by unilateral endoscopic glottic cryotherapy. The animals were randomly divided into 4 groups, and underwent videolaryngostroboscopy followed by sacrifice at 0, 2, 6, and 12 weeks postoperatively. Histopathologic sections were prepared with alcian blue, giemsa, H&E, Movat's, reticulin, Masson's trichrome, picrosirius and immunostains to collagen type 1 and 3. **RESULTS:** Videostroboscopy demonstrated an earlier restoration of glottic volume and a return of mucosal waves among animals treated with combined therapy by 6 weeks post-treatment. The mean depth of inflammatory reaction in the vocal cords treated with combined therapy was 1.07 mm vs. 1.15 mm in vocal cords treated with CO2 laser therapy alone. At 2 and 6 weeks postoperatively, combined treatment yielded decreased fibrin and decreased volume of neocollagen. At 12 weeks postoperatively, combined treatment was associated with greater collagen organization and decreased keratinization. **CONCLUSIONS:** Combined treatment with CO2 laser and cryotherapy appears to alter glottis specific wound healing, leading to decreased and more organized collagen formation with a resultant improvement in glottic function, when compared with CO2 laser surgery alone, in an acute canine injury model. Further studies among humans are warranted to further investigate the effects of cryotherapy on glottic wound healing.

#### 9:08 Comparative Histopathology of Cricopharyngeus Muscle: Implications for Pathogenesis of Achalasia and Zenker's Diverticulum

Jeffrey Tseng, MD, Milwaukee, WI (*Resident Travel Award*)  
Joel H. Blumin, MD, Milwaukee, WI  
Safwan Jaradeh, MD, Milwaukee, WI  
Robert J. Toohill, MD\*, Milwaukee, WI  
Albert L. Merati, MD, Milwaukee, WI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the differences between the neuromuscular pathology of Zenker's diverticulum patients and that seen in patients with primary cricopharyngeal achalasia. The participants will also be exposed to several theoretical explanations of the differences in the pathogenesis of these two disease entities.

**OBJECTIVES:** Cricopharyngeal (CP) dysfunction is believed to be a common pathologic mechanism in patients with cricopharyngeal achalasia (CA) and Zenker's diver-

ticulum (ZD). Previous studies have noted the predominance of neurogenic changes in CP muscle specimens from ZD patients. The objective of this study is to characterize the differences between CP muscle findings between patients with CA and those with ZD. **STUDY DESIGN:** Retrospective review. **METHODS:** 42 CP muscle specimens are identified from patients undergoing surgery for CA and ZD. Patient characteristics and neuromuscular pathology findings are recorded. Patients with prior radiation, botulinum treatment, or inadequate specimens are excluded. **RESULTS:** 27 evaluable specimens are studied from 17 ZD (mean age 71y) and 10 primary CA (mean age 58y) patients. ZD patients featured excessive size variation (17/17), grouping of atrophic fibers (5/17), target or targetoid formations (3/17), and ragged red fibers (6/17). CA patients had excessive size variation (9/10), grouping of atrophic fibers (3/10), target or targetoid formations (2/10), and ragged red fibers (2/10). The final pathologic diagnosis in the ZD group was neurogenic or mixed in 10 patients and myopathy in 7. In contrast, the CA patients were significantly more likely to have a primary myopathic process (8/10, 80%) with only 2 revealing a neuropathic process ( $p < 0.05$ ). **CONCLUSIONS:** Patients with Zenker's diverticulum are more likely to have a neuropathic process in the cricopharyngeus than the primarily myopathic process seen in CA. Given the age difference in the two populations, possible explanations include the superimposition of a neuropathic process on existing myopathy or perhaps two entirely different processes affecting the same anatomic area.

## 9:16 Discussion

### 9:21 The Effect of PPI Treatment on the Reflux Symptom Index (RSI) and Reflux Finding Score (RFS) in Patients Presenting With Postnasal Drip: A Prospective, Randomized, Double Blinded, Placebo Controlled Study

Matthew T. Gill, BA, Milwaukee, WI  
Todd A. Loehrl, MD, Milwaukee, WI  
Robert J. Toohill, MD\*, Milwaukee, WI  
Laura Brusky, MD, Milwaukee, WI  
Albert L. Merati, MD, Milwaukee, WI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the prevalence of reflux associated laryngeal symptoms and signs in a group of patients with a primary complaint of postnasal drip before and after a 3 month course of either acid suppression therapy or placebo.

**OBJECTIVES:** To evaluate the presence of reflux associated pharyngeal and laryngeal symptoms and signs in a group of patients with postnasal drip. **STUDY DESIGN:** 49 patients presented with postnasal drip without objective evidence of sinonasal inflammatory disease. They were then exposed to a prospective, double blinded, placebo controlled study involving proton pump inhibitor therapy for 3 months. **METHODS:** All patients underwent a thorough ENT history and physical exam including videoscopic study of the pharynx and larynx. Reflux symptom index (RSI) and reflux findings score (RFS) determinations recorded before and after the 3 month treatment period were then subjected to statistical comparison. **RESULTS:** 48 of 49 patients had a complete evaluation with 22 patients in the treatment group and 26 in the placebo group. The treatment group had a substantial reduction in mean RSI following acid suppression from 13.83 (SD±5.87) pretreatment to 8.86 (SD±6.02) post-treatment ( $p = 0.001$ ). The placebo group had a smaller reduction in mean RSI from 11.85 (SD±4.16) pretreatment to 9.38 (SD±5.19) post-treatment ( $p = 0.004$ ). The difference in symptomatic improvement between the two groups trended towards statistical significance ( $p = 0.09$ ). The mean pretreatment RFS for the treatment group was 6.78 (SD±2.46) versus 7.5 (SD±2.92) post-treatment ( $p = 0.18$ ). The mean pretreatment RFS for the placebo group was 7.27 (SD±2.46) versus 6.11 (SD±3.70) post-treatment ( $p = 0.13$ ). **CONCLUSIONS:** The reflux symptom index scores in patients with postnasal drip are significantly decreased following either acid suppression therapy or placebo, but there is a trend towards greater improvement with acid suppression. The RFS is essentially unchanged following therapy.

### 9:29 A Randomized Prospective Double Blind Study on the Efficacy of Dead Sea Salt Nasal Irrigations

Michael Friedman, MD\*, Chicago, IL  
Vidyasagar Ramakrishnan, MBBS MS, Chicago, IL  
Ninos J. Joseph, BS, Chicago, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to evaluate the efficacy of Dead Sea salt spray and irrigation solutions in patients with chronic rhinosinusitis.

**OBJECTIVES:** To compare the effect of nasal irrigation using hypertonic saline vs. hypertonic Dead Sea salt (DSS) solution in elimination of symptoms of chronic rhinosinusitis and improvement of quality of life (QOL). **STUDY DESIGN:** A randomized, prospective double blind study in a tertiary university affiliated medical center. **METHODS:** With IRB approval, 42 adult (> 20 years old) patients seeking treatment from symptoms of chronic rhinosinusitis were enlisted in the study. Inclusion criteria included persistent symptoms > 12 mo and absence of endoscopic or CT evidence of acute infection. Each patient underwent complete history and endonasal examination, appropriate CT imaging, and completed a QOL survey (RQLQ(S)). The patients were then randomized to two groups. Group 1 self-administered hypertonic saline solution spray and irrigation, twice daily; whereas patients in group 2 received hypertonic DSS spray and irrigation solutions. Patients and staff were blinded as to group assignment. Patients were reassessed for persistence or elimination of symptoms weekly and completed post-treatment QOL survey following the 4 week treatment period. **RESULTS:** Both groups had similar symptom and QOL scores prior to treatment. After treatment, both groups had significant improvement of symptom scores,  $14.9 \pm 6.9$  to  $8.6 \pm 1.9$  vs.  $17.4 \pm 8.4$  to  $5.9 \pm 1.3$  for groups 1 and 2 respectively. However, only group 2 showed improvement in QOL. **CONCLUSIONS:** This paper presents level I evidence on the superiority of DSS nasal irrigations over hypertonic saline for the elimination of symptoms of chronic rhinosinusitis.

### 9:37 Endoscopic Techniques and Resection of Anterior Skull Base and Paranasal Sinus Malignancies

Luke O. Buchmann, MD, Kansas City, KS (*Resident Travel Award*)  
Christopher G. Larsen, MD, Kansas City, KS  
Terance T. Tsue, MD, Kansas City, KS  
Larry A. Hoover, MD\*, Kansas City, KS

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to identify the different types of anterior skull base tumors and discuss the role of the endoscopic approach in their resection.

**OBJECTIVES:** To examine the role of endoscopic approaches to the resection of anterior skull base and paranasal sinus malignancies at one tertiary care medical center. **STUDY DESIGN:** Retrospective chart review over a period of 14 years. **METHODS:** Patients undergoing anterior skull base resections for malignancies over a 14 year period were reviewed. Data was collected on each patient with respect to the pathology of the tumor and approach used, as well as demographic and follow-up information. **RESULTS:** A total of 114 patients were treated at a tertiary care medical center for malignancies of the paranasal sinuses and anterior skull base. The most common diagnosis was squamous cell carcinoma occurring in 41% of the cases. The remaining pathologies included esthesioneuroblastoma (16%), adenoid cystic carcinoma (11%), melanoma (10%), carcinoma NOS (6%), lymphoma (4%), nasopharyngeal carcinoma (3%), and other tumor types (10%). Endoscopic techniques were used extensively in this population of patients. Combined approaches using a midfacial degloving approach and coronal approaches were used when indicated and complemented the endoscopic approach. The five year survival of those patients having endoscopic removal followed by radiation therapy and on occasion chemotherapy was excellent. Using endoscopic techniques allowed for very cosmetic results and facial deformities were used minimally. **CONCLUSIONS:** With complete endoscopic surgical resection followed by radiation therapy, local recurrence, morbidity, and cosmetic deformity have been minimized. The microscopic view provided by endoscopic techniques, with or without complementary approaches, allows for complete tumor removal.

### 9:45 Long-Term Results of Inferior Turbinate Hypertrophy With Radiofrequency Treatment: A New Standard of Care?

Matthew W. Porter, BS, Oklahoma City, OK

Nathan W. Hales, MD, Oklahoma City, OK (*Presenter*)  
Carey J. Nease, MD, Calhoun, GA  
Greg A. Krempf, MD, Oklahoma City, OK

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the short and long-term results of radiofrequency treatment of the inferior turbinate and compare it to the most common surgical treatments for inferior turbinate hypertrophy.

**OBJECTIVES:** The objective of this study was to compare the long-term efficacy and complication rates of radiofrequency volumetric tissue reduction (RFVTR) to other common reported surgical treatments of nasal obstruction in patients with inferior turbinate hypertrophy. **STUDY DESIGN:** Prospective, randomized, single blinded, placebo controlled trial with crossover option. **METHODS:** Of 32 patients enrolled in a prospective crossover trial, 19 patients receiving treatment for inferior turbinate hypertrophy with RFVTR completed two year follow-up. Patients evaluated their severity of obstruction, frequency of obstruction and overall ability to breathe via 10cm Visual Analog Scale (VAS). **RESULTS:** RFVTR for nasal obstruction showed continued benefit at two years post-treatment, with no indication of increasing symptomatology. The significant improvement demonstrated in frequency of obstruction, severity of obstruction, and overall ability to breathe ( $P < 0.05$ ) was maintained at two years. No complications occurred, and review of the literature shows lower short and long-term complications for RFVTR compared to other surgical methods. **CONCLUSIONS:** RFVTR is effective in treating inferior turbinate hypertrophy with sustained benefit at two years follow-up with significantly less complication than other surgical methods.

#### 9:53 Discussion

#### 10:00 Break/Visit with Exhibitors/View Posters - Foyer & St. Tropez C&D

**MODERATORS: L. ARICK FORREST, MD, COLUMBUS, OH**  
**RANDAL C. PANIELLO, MD\*, ST. LOUIS, MO**

#### 10:30 Vocal Cord and Voice Findings in Advair Users

Krzysztof Izdebski, PhD, San Francisco, CA  
Herbert H. Dedo, MD\*, San Francisco, CA (*Presenter*)  
Randall K. Wenokur, MD, Concord, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to: 1) describe and recognize vocal cord findings in Advair users; 2) choose treatments to eliminate and/or to reduce the encountered symptoms; and 3) improve differential diagnosis between Advair based dysphonia and other clinical conditions with similar symptoms.

**OBJECTIVES:** Improve differential diagnosis of inhaler induced dysphonia. Make the health providers more aware of the role Advair can play in causation of dysphonia. Provide efficacious treatment plan. **STUDY DESIGN:** Retrospective, single subject design of patients initially diagnosed with either adult onset of asthma, GERD and/or cough, who were placed on Advair, a dual action inhaler combining steroids and a bronchodilator. **METHODS:** Retrospective review of 19 patients (17 females) with dysphonia not responding to treatment that included medications (proton pump inhibitors, PPI) and voice rest/therapy. All referred patients underwent a complete ENT evaluation including computerized objective acoustic voice analysis and laryngovideostroboscopy. **RESULTS:** All cases presented with dysphonia and all but 2 showed TVC mucosal changes varying from mild bilateral erythema to profound mucosal changes appearing as white irregular coating located alongside the superior, middle and lower mucosal surfaces of the TVCs, including the vibratory edges and in one case deposits were present in the posterior commissure. Dysphonia showed a varying degree of aperiodicity of fundamental frequency and loudness including diplophonia, friction, pitch breaks and restricted phonatory range and duration. The severity of dysphonia correlated with the location and the extent of the mucosal coating, which in turn depended on the length of Advair usage. Treatment consisted of: 1) withdrawal of Advair; 2) antifungal medications; 3) stopping PPI; and 4) in two cases MDL with CO2 laser removal of the deposits followed up by lengthy postop voice rehabilitation. When asthma was present, switching to another inhaler was controlled by the pulmonary specialist. **CONCLUSIONS:** Dysphonia in Advair users can be reversed by nonsurgical means when early diagnosis is established. ENT, PCP, pulmonology specialists and other health providers need to be aware of the role Advair may play in dysphonia causation.

#### 10:38 In Vivo Optical Coherence Tomography of Laryngeal Cancer in 18 Patients

William B. Armstrong, MD\*, Orange, CA  
James M. Ridgway, MD, Orange, CA (*Presenter*)  
Shuguang Guo, PhD, Irvine, CA  
David E. Vokes, FRACS, Long Beach, CA  
Zhongping Chen, PhD, Irvine, CA  
Brian J.F. Wong, MD PhD, Orange, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the basic principles of optical computed tomography (OCT), the imaging capabilities of OCT, and potential uses of OCT for diagnosis and margin evaluation of laryngeal cancer.

**OBJECTIVES:** OCT is a high resolution optical imaging technique (~10 microns) that produces cross-sectional images of living tissues using light in a manner similar to ultrasound. This study evaluated the ability of OCT to identify imaging characteristics of laryngeal cancer and measure changes to the basement membrane, tissue microstructure, and the transition zone at the edge of tumors. **STUDY DESIGN:** Clinical investigation of optical imaging device. **METHODS:** One hundred sixteen patients were examined with OCT during operative endoscopy between February 2004 and May 2005. Eighteen patients with laryngeal cancer were imaged with a custom fiberoptic OCT system. Tumor and adjacent transition zones were examined in each patient along with systematic imaging of noninvolved subsites. OCT images were correlated with endoscopic photographs and surgical specimens. **RESULTS:** In vivo imaging was performed in five patients undergoing total laryngectomy, seven endoscopic laser partial laryngectomies, and seven operative laryngoscopies. Eight patients had prior radiotherapy. OCT images of cancer revealed basement membrane disruption and other abnormal microstructural features which were clearly contrasted by normal adjacent regions. Transition zones between benign and malignant tissues demonstrated gradual disruption of the basement membrane, vascular, and glandular architecture. Two patients with a history of prior treatment of laryngeal cancer were imaged for possible recurrence. In these subjects, OCT correlated with histological findings. **CONCLUSIONS:** OCT clearly demonstrates malignant infiltration through the laryngeal basement membrane and reliably images transition zones to invasive cancer. OCT has great potential to noninvasively assist mapping and staging of laryngeal malignancies and evaluation of treatment effects.

#### 10:46 The Native Microstructure of the Laryngeal Epithelium: A Comparison of In Vivo Optical Coherence Tomography and Histology

Meghann L. Kaiser, BS, Irvine, CA  
David E. Vokes, MD, Irvine, CA  
James M. Ridgway, MD, Orange, CA  
William B. Armstrong, MD\*, Orange, CA  
Brian J.F. Wong, MD PhD, Irvine, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of the presentation the participants should be able to recognize microscopic characteristics of normal laryngeal epithelium depicted by both in vivo OCT and light microscopy and understand the application of this information to diagnosis of microinvasive laryngeal lesions by OCT.

**OBJECTIVES:** Optical coherence tomography (OCT), a new imaging modality using near infrared light, produces cross-sectional tissue images with pixel resolution of 10 mm. Thus, OCT resolves basement membrane details, which is necessary for early diagnosis of laryngeal cancer. However, normative data is first needed on epithelial thickness for lesion characterization, and, to date, little exists. Our study's purpose is to measure normal laryngeal epithelial thickness by in vivo OCT and compare these values to those obtained from fixed laryngectomy specimens. **STUDY DESIGN:** Prospective review. **METHODS:** OCT images of clinically normal laryngeal subsites were selected from an image database of 116 patients undergoing operative endoscopy. Calibrated OCT measurements of epithelial thickness at various laryngeal subsites were recorded. Measurements of epithelial thickness from corresponding areas were obtained using optical micrometry on histologically normal regions of fifteen total laryngectomy specimens. Descriptive statistics, Pearson correlation tests and t-tests were performed. **RESULTS:** Mean epithelial OCT thicknesses were: vocal folds (129 micrometers), ventricular folds (125 micrometers), subglottis (99 micrometers), aryepiglottic folds (179 micrometers), laryngeal epiglottis (189 micrometers) and lingual epiglottis (271 micrometers). Epithelial thicknesses in fixed tissues were: vocal folds (103 micrometers), ventricular folds (79 micrometers), aryepiglottic folds (205 micrometers), subglottis (61 micrometers), laryngeal epiglottis (38 micrometers) and lingual epiglottis (130 micrometers). **CONCLUSIONS:** Measurements of glottic and subglottic epithelial thicknesses closely correlated ( $r=0.98$ ) with measurements from fixed specimens, and as seen in other tissues, the mean values at these fixed tissue subsites were approximately half the in vivo measurements. OCT is a high resolution imaging modality with potential as an important tool in diagnostic evaluation of laryngeal pathology.

#### 10:54 Airway Management in Children with Mucopolysaccharidoses

Andrea H. Yeung, MD, San Francisco, CA (*Resident Travel Award*)  
Kristina W. Rosbe, MD, San Francisco, CA  
Morton J. Cowan, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to 1) identify the most common airway abnormalities encountered in children with MPS; 2) identify the percentage of children who go on to require a tracheotomy for definitive airway management; and 3) create a practice guideline and algorithm for airway management in children with MPS.

**OBJECTIVES:** Mucopolysaccharidoses are a group of hereditary progressive disorders caused by excessive accumulation of glycosaminoglycans in various tissues. Specific airway involvement from deposits of mucopolysaccharides can manifest as a narrowed nasal airway, large tongue, adenotonsillar hypertrophy, a short and immobile neck, a thickened supraglottis and glottis or diffuse thickening of the tracheobronchial tree. We present a review of the natural history airway disease in children with MPS at our institution. **STUDY DESIGN:** Retrospective case review. **METHODS:** A retrospective review of 27 children with mucopolysaccharidoses between February 1, 1984, to February 1, 2004, was performed to review the natural history of airway disease at a tertiary referral academic medical center. **RESULTS:** Clinically significant upper airway obstruction occurred in nineteen patients (70%) and necessitated a tracheotomy in four patients (16%). Fourteen of the 27 patients underwent bone marrow transplantation and of those with evidence of upper airway obstruction, successful engraftment resulted in significant decrease in obstructive symptoms. **CONCLUSIONS:** Patients affected by these conditions require the vigilant attention of the otolaryngologist as sleep apnea and consequences of upper respiratory obstruction are common complications. A practice guideline and algorithm for airway management in children with MPS are presented. Successful bone marrow engraftment may allow for significant improvement in the airway of children with MPS.

#### 11:02 Discussion

#### 11:07 PANEL: ENDOSCOPIC SURGERY IS SUPERIOR TO EXTERNAL SURGICAL APPROACHES FOR THE TREATMENT OF FRONTAL SINUS DISEASE

**Moderator:** Andrew H. Murr, MD, San Francisco, CA  
**Panelists:** Prof. Dr. Med. Wolfgang Draf, Fulda, Germany  
Andrew N. Goldberg, MD\*, San Francisco, CA  
Pete S. Batra, MD, Cleveland, OH  
Thomas A. Tami, MD\*, Cincinnati, OH

#### 12:10 Adjourn

#### 12:30 Golf Outing - Pre-registration Required - Steele Canyon Golf Course

**SATURDAY, FEBRUARY 4, 2006**

**7:00 - Registration - Foyer**  
**12:30**

**7:00 - Speaker Ready Room - Avignon**  
**5:00**

**7:00 - BUSINESS MEETING (MEMBERS ONLY) -**  
**7:45 WESTERN SECTION - CANNES/ANTIBES**

**7:00 - BUSINESS MEETING (MEMBERS ONLY) -**  
**7:45 MIDDLE SECTION - TOULON/MARSEILLE**

**7:00 - Exhibit Hall Open - St. Tropez C&D**  
**1:00**

**7:00 - Continental Breakfast with Exhibitors - St. Tropez C&D**  
**7:50**

**8:00 - Spouse Hospitality - Monaco**  
**11:00**

**8:00 - SCIENTIFIC SESSIONS - ST. TROPEZ A&B**  
**2:30**

**8:00 Announcements**  
Paul J. Donald, MD\*, Sacramento, CA and David E. Schuller, MD\*, Columbus, OH

**MODERATORS: DOUGLAS MASSICK, MD, COLUMBUS, OH**  
**MARK S. COUREY, MD\*, SAN FRANCISCO, CA**

**8:05 Impact of Duty Hour Restrictions on Otolaryngology Training: Resident and Faculty Perspectives**  
Joseph D. Brunworth, BA, St. Louis, MO  
Raj Sindwani, MD FRCS, St. Louis, MO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the impact of the ACGME workweek restrictions on otolaryngology residency programs throughout the nation, as well as compare faculty and resident perspectives on the changes.

**OBJECTIVES:** In 2003, the ACGME passed a controversial mandate limiting resident work hours. We sought to examine the impact of these restrictions on otolaryngology programs and to explore faculty and resident perspectives. **STUDY DESIGN:** Online survey. **METHODS:** Faculty and residents of all 102 ACGME accredited otolaryngology residency programs were invited to participate in an anonymous survey. **RESULTS:** The study population consisted of 460 respondents: 275 residents and 184 faculty (including 41 program directors) representing 57 otolaryngology programs. Sixty-five percent of programs implemented at least one change specifically to comply with duty hour restrictions. Strategies included tracking work hours electronically (35.7%), utilization of "home call" (33.1%), and hiring additional health care professionals (23.1%). When asked if the restrictions have had a negative effect on patient care, 61% of respondents said no, but a surprising 33% said yes. Sixty-nine percent of faculty believe the restrictions have actually had a negative effect on resident training, compared to only 31% of residents ( $p < 0.001$ ). Thirty-nine percent of participants felt resident workload was excessive prior to the restrictions. Opinions on whether duty hour limits had fostered improvements in resident education, research, or exam scores varied; however most agreed that resident mental health had improved (67%). **CONCLUSIONS:** Otolaryngology programs have successfully restricted resident duty hours through significant infrastructural changes. Of concern the majority of residents surveyed appeared to be in favor of the ACGME restrictions, while most program directors and faculty were opposed. Further studies are needed to establish whether limited work hours will enhance or hinder the residency training experience.

**8:13 Continuous Intraoperative Facial Nerve Monitoring in Predicting Postoperative Injury During Parotidectomy**  
Jason D. Meier, MD, Chicago, IL (*Resident Travel Award*)  
Barry L. Wenig, MD MPH\*, Evanston, IL  
Ernest C. Manders, MD, Evanston, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to question the efficacy of continuous intraoperative facial nerve monitoring during parotidectomy.

**OBJECTIVES:** To assess continuous intraoperative facial nerve monitoring in predicting postoperative facial nerve paralysis during parotidectomy and analysis of the incidence and predisposing factors for facial nerve injury. **STUDY DESIGN:** A retrospective analysis. **METHODS:** Forty-five consecutive parotidectomies were performed using an EMG based intraoperative facial nerve monitor. Of those, thirty-seven had complete data for analysis. Intraoperative findings and final interpretation of the electromyographs were analyzed by a senior neurologist and neurophysiologist. All patients were analyzed including those with preoperative weakness and facial nerve sacrifice. **RESULTS:** The overall incidence of facial paralysis ( $HB > 1$ ) was 43% for temporary and 22% for permanent deficits. This includes an 11% incidence of preoperative weakness and 8% with intraoperative sacrifice. An abnormal EMG occurred in only 16% of cases and was not significantly associated with permanent or temporary facial nerve paralysis ( $X^2 p < 1.0$ ; fisher exact test  $p < 0.68$ ). Out of the 8 patients with permanent paralysis, only 2 had abnormalities on the facial nerve monitor. Also, only 1 of 5 patients with intraoperative sacrifice of the facial nerve had an abnormal EMG. Factors significantly associated with the incidence of permanent and temporary facial paralysis include malignancy, extent of parotidectomy, and dissection beyond the parotid gland ( $X^2$  and fisher  $p < 0.01$ ). Advancing age was significantly associated with permanent facial paralysis ( $X^2$  and fisher  $p < 0.05$ ). **CONCLUSIONS:** The results suggest that abnormalities on the intraoperative continuous facial nerve monitor during parotidectomy do not predict facial nerve injury.

**8:21 ~~withdawn~~**  
**Persistent Pharyngitis in Some Cases of Chronic Suppurative Otitis Media: Bacteriological Explanation**  
Alaa Ali Abou-Bieh, MD, Mansoura, Dakahlia Egypt  
Mona Foda Ibrahim, MD, Mansoura, Dakahlia Egypt

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize that bacterial pharyngitis in patients with chronically infect-

ed middle ear cleft may be attributed to the same organism invaded the middle ear mucosa.

**OBJECTIVES:** Some patients whom suffering from infected middle ear cleft may show persistent or recurrent bacterial pharyngitis. The aim of the present study is to correlate between the causative organism of the middle ear infection and that who infected the pharyngeal mucosa utilizing the advanced bacteriological identification and genotyping techniques. **STUDY DESIGN:** Prospective study. Including both clinical and laboratory aspects. **METHODS:** Thirty-seven chronic suppurative otitis media cases with otorrhea and perforation, whom complaining of recurrent or persistent sore throat were included in this study. Bacteriological swabs were obtained from both the ears and the pharynx. Then isolation and identification of the microorganisms were done. This included examination of a direct Gram film, inoculation of different samples onto blood agar and MacConkey's agar with incubation at 37°C for 24-48 hrs aerobically. Organisms proved to be Gram negative bacilli were subjected to further identification in the form of differentiation between lactose fermenters and nonfermenters, Oxidase test, IMVC reaction and API (analytical profile index). Then antimicrobial susceptibility testing (antibiotyping) was done. The isolates from the same patient (ear and pharyngeal swabs) which showed the same antibiotype were suspected to be related to the same strain and were subjected to further identification for confirmation. This was done by the genotyping using the pulsed field gel electrophoresis technique. **RESULTS:** Both phenotypically and genotypically isolates from the same patient (ear and pharynx) were detected in six cases (16%). All isolates were gram negative organisms. Four of them were pseudomonas aeruginosa, one was proteus sp., and one was escherichia coli. All of these three species are not known to be among the primary organisms which may cause pharyngitis. **CONCLUSIONS:** Bacterial pharyngitis in patients with chronically infected middle ear cleft may be attributed to the same organism invaded the middle ear mucosa. Also this study highlights some organisms as pharyngeal invaders although they are not among the previously documented causatives of bacterial pharyngitis. But the study does not confirm the method of spread of these organisms and whether this was directly via the eustachian tube.

#### 8:29 Lost to Follow-Up After Polysomnography: The Forgotten Group

Giancarlo F. Zuliani, MD, Detroit, MI (*Resident Travel Award*)  
Esmal H. Amjad, MD, Detroit, MI  
Abishek S. Prasad, MD, Detroit, MI  
James A. Rowley, MD, Detroit, MI  
Safwan M. Badr, MD, Detroit, MI  
Ho-Sheng Lin, MD, Detroit, MI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize that a large proportion of obstructive sleep apnea (OSA) patients who require treatment with continuous positive airway pressure (CPAP) may be lost to follow-up following initial polysomnogram (PSG) and CPAP titration. Further, participants should recognize that the majority of these patients who are lost to follow-up are not being adequately treated using CPAP. Therefore, physicians need to be more vigilant of this group of patients in order to improve OSA treatment outcome.

**OBJECTIVES:** Studies on CPAP compliance typically focused only on patients who actually followed-up with their physicians. In this study, we examine patients who failed to follow-up after their initial PSG and CPAP titration to determine their treatment status in terms of CPAP usage and reasons for failure to follow-up. **STUDY DESIGN:** Retrospective chart review. **METHODS:** Medical records of 197 patients who underwent PSG and CPAP titration between 1999 and 2003 were reviewed. Fifty-seven patients (29%) were identified who, based on PSG and symptoms, require the use of CPAP but failed to follow-up after CPAP titration. Twenty-five of these patients were successfully contacted and agreed to an interview. **RESULTS:** Nine patients are still using CPAP, 9 have tried but are not currently using CPAP, and 7 have never tried CPAP. Of the 9 patients still using CPAP, only 7 patients are using it on a regular basis. The remaining 18 patients who are either using CPAP on a less than optimal (n=2) or not using CPAP (n=16) all report symptoms of daytime somnolence. The main reasons for not following up include insurance issues, inability to take time off, and poor tolerance of CPAP titration in the laboratory. **CONCLUSIONS:** A significant proportion of OSA patients who require treatment with CPAP are lost to follow-up after polysomnography. This group of patients has previously been ignored in the literature. We showed in this study that a majority (72%) of these patients are not being treated adequately for OSA. We need to improve follow-up in this group of patients in order to improve OSA treatment.

#### 8:37 Clinical Evaluation of Parkinson's Related Dysphonia

Gregory K. Sewall, MD, Madison, WI  
Charles N. Ford, MD\*, Madison, WI  
Jack J. Jiang, MD PhD, Madison, WI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize the features of Parkinson's related dysphonia (PRD), understand specific clinically available acoustical and aerodynamic characteristics of patients with PRD, and recognize the benefits of vocal fold collagen injection on the vocal features of PRD.

**OBJECTIVES:** Nearly one-third of patients with Idiopathic Parkinson's Disease (IPD) cite dysphonia, characterized subjectively as causing a harsh and breathy voice, as their most debilitating deficit. The purpose of this study is two-fold: 1) verify voice improvement following the injection of collagen with the use of both a standardized voice questionnaire (VHI) and perceptual voice analyses; and 2) attempt to ascribe this improvement in voice to several clinically available acoustic and aerodynamic voice measurement parameters. **STUDY DESIGN:** Prospective clinical evaluation of patients with Parkinson's related dysphonia. **METHODS:** Six patients with PRD were evaluated at baseline for the presence of dysphonia and glottal gap. At the initial clinic visit, and 10-14 days following vocal fold collagen injection, patients were asked to complete a standardized voice handicap index (VHI). Subsequently, patients underwent acoustic [frequency/loudness range, maximal phonation time (MPT)], aerodynamic [phonation threshold pressure (PTP)], and perceptual voice analysis testing in the otolaryngology voice clinic laboratory. **RESULTS:** All subjects tolerated transoral vocal fold collagen injection using topical anesthesia in the otolaryngology clinic without any adverse effects. Five of six subjects had self-perceived improvements in voice, as determined by the VHI (range +8 to -24). All five subjects who completed testing demonstrated decreased PTP (range -1.3 to -2.7, p=0.002). Five of six subjects demonstrated statistically significant improvements in MPT (range -2 to 16 secs, p=0.05). Five of six subjects had improved pitch range (-26 to 343 Hz), while 6/6 subjects had increased intensity range (0.6 to 23 db) following injection. **CONCLUSIONS:** Transoral collagen injection in patients with PRD is safe, well tolerated, and an effective method of subjectively improving voice and speech. Reduction of glottal gap with collagen improves vocal efficiency, which may reduce vocal fatigue and provide a useful adjunct to voice therapy for PRD.

#### 8:45 Evaluation of Appropriate Culture and Antibiotic Use in Patients With Pharyngitis

Justin B. Rufener, MD, Detroit, MI  
Kathleen L. Yaremchuk, MD\*, Detroit, MI  
Spencer C. Payne, MD, Detroit, MI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss practice patterns regarding the treatment of pharyngitis.

**OBJECTIVES:** To evaluate practice patterns for treatment of patients with pharyngitis with regard to testing for group A streptococcal infection, frequency of antibiotic use, and appropriate choice of antibiotics. **STUDY DESIGN:** Retrospective review of billing data for 10,482 office visits for pharyngitis. **METHODS:** The 2004 billing database was queried for all outpatient visits with ICD-9 codes indicating pharyngitis or tonsillitis as well as CPT codes for group A streptococcus tests (GAST). Records of antibiotic prescriptions filled within 7 days of the outpatient visit were also obtained. Patients were separated by age group and provider specialty. Analysis included proportion of patients that received group A strep testing and proportion prescribed an antibiotic. Antibiotic prescriptions were analyzed to determine whether they were appropriate for treatment of group A streptococcus. **RESULTS:** Of all patients seen, 68.7% were tested for group A strep. 84.9% of patients seen in the pediatric department were tested. Of patients that received an antibiotic, 63.4% of patients received a GAST. For pediatric patients, 82% received GAST and 77.9% of pediatric

patients that received an antibiotic were tested. 47% of adult patients and 45% of pediatric patients received an antibiotic. 73%, 81%, 77% and 89% of patients seen by emergency medicine, family practice, internal medicine and pediatrics, respectively, received recommended antibiotics. **CONCLUSIONS:** Most patients seen for pharyngitis were tested for group A streptococcus. Patients seen in the pediatrics department were tested more frequently. Most antibiotics prescribed for pharyngitis were appropriate based on current recommendations.

#### 8:53 Discussion

#### 9:00 - PANEL: TONSILLECTOMY—IS THERE A BEST TECHNIQUE?

9:55 **Moderator:** Craig W. Senders, MD, Davis, CA

**Panelists:** Peter J. Koltai, MD, Palo Alto, CA

Microdebrider Tonsillectomy

Anna Messner, MD, Stanford, CA

Cold Steel Tonsillectomy

Nina Shapiro, MD, Los Angeles, CA

Coblation Tonsillectomy

Daniela Carvalho, MD, San Diego, CA

Snare Tonsillectomy

Randall Michel, MD, Lompoc, CA

Starion Tonsillectomy

#### 9:55 Break/Visit with Exhibitors/View Posters - Foyer & St. Tropez C&D

**MODERATORS: RUSSELL B. SMITH, MD, IOWA CITY, IA  
JAMES COHEN, MD PhD, PORTLAND, OR**

#### 10:25 Advanced Stage at Presentation of Head and Neck Cancer Patients to a Tertiary Care County Hospital

Urjeet A. Patel, MD, Chicago, IL

Alastair G. Lynn-Macrae, MD, Chicago, IL

Fred R. Rosen, MD, Chicago, IL

Nathaniel O. Holloway, MD, Chicago, IL

Robert C. Kern, MD\*, Chicago, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand socioeconomic factors related to presentation of head and neck cancer patients, compare characteristics of underinsured cancer patients to the general cancer population, and discuss possible future interventions that may improve outcomes for this underserved group.

**OBJECTIVES:** Public hospitals provide health care for uninsured and medically underserved patients in a given area. Outcomes for head and neck cancer patients within this population are suspected of being worse than outcomes for the general population due to advanced stage at presentation. This study assesses the initial cancer stage in patients with head and neck carcinoma presenting to an urban tertiary care county hospital, compared to data for the general population. **STUDY DESIGN:** Retrospective chart review of 209 consecutive patients, newly diagnosed with head and neck cancer by the division of otolaryngology - head and neck surgery from October, 2003, to April, 2005. **METHODS:** Clinical, pathological, and demographic information was extracted from medical records. Staging analysis was performed on 186 patients with squamous cell carcinoma. Normative data was obtained from the National Cancer Database. **RESULTS:** The mean age was 55 with a 4:1 male to female ratio. Over 95% of patients reported being unemployed. The racial composition was: white 27%, black 52%, Hispanic 11%, Asian 7%, and 3% "other". Staging revealed that 68% of patients were stage IV and 85% would be considered "advanced" disease at presentation (stage III/IV). This is significantly worse than what national data demonstrates, where 39% are stage IV and 55% have advanced stage of disease. **CONCLUSIONS:** While the perceived poor outcome of uninsured and underserved cancer patients is multifactorial, advanced stage at presentation is a critical factor. These statistics demonstrate the need for increased patient education and screening for this growing underserved population as an initial step to improve outcome.

#### 10:33 Everolimus (RAD) Inhibits in vivo Growth of Murine Squamous Cell Carcinoma (SCC VII)

Samir S. Khariwala, MD, Cleveland, OH

Jorgen J. Kjaergaard, PhD, Cleveland, OH

Robert Lorenz, MD, Cleveland, OH

Frederick Van Lente, PhD, Cleveland, OH

Suyu Shu, PhD, Cleveland, OH

Marshall Strome, MD\*, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to explain the effects of everolimus on squamous cell carcinoma, compare everolimus with other immunosuppressives with regard to tumor generating potential, discuss the implications of this data for future transplantation.

**OBJECTIVES:** Everolimus (RAD) is an mTOR inhibitor closely related to rapamycin. A potent immunosuppressive agent, it has also shown evidence of antineoplastic properties. SCC VII is a spontaneously arising murine squamous cell carcinoma line. This study examines the effect of everolimus on SCC VII proliferation. The data may provide support for the use of everolimus in transplant recipients with a history of malignancy. **STUDY DESIGN:** A dose efficacy study employing a murine model of 1) intradermal tumor growth, and 2) pulmonary metastases. **METHODS:** The development of intradermal tumors and pulmonary metastases were studied. Of 80 total mice, 40 received intradermal injection of  $1 \times 10^5$  SCC VII cells and 40 received intravenous (IV) injection of  $1 \times 10^5$  cells to establish pulmonary metastases. Within each group, animals were subdivided into 4 subgroups that received 1) everolimus 1 mg/kg/bid, 2) everolimus 0.5 mg/kg/bid, 3) cyclosporine 7.5 mg/kg/day, and 4) no treatment. Intradermal tumors were measured 3 times per week. Animals receiving IV tumor injection were sacrificed after 17 days and pulmonary metastases were quantified. Medication trough levels were measured in all treated animals. **RESULTS:** Everolimus showed statistically significant tumor inhibition at 1.0 mg/kg/bid and 0.5 mg/kg/bid when compared to animals treated with cyclosporine and to untreated animals ( $P < 0.0001$ ). Tumor inhibition was evident in both models studied (intradermal tumors and pulmonary metastasis generation). **CONCLUSIONS:** Everolimus provides potent tumor inhibition in animals inoculated with SCC VII cells. Inhibition of both local and distant spread of disease is evident. While most immunosuppressives are known to potentiate neoplastic disease, this study supports the use of everolimus immunosuppression in the face of prior malignancy. This data has significant implication for laryngeal transplantation following laryngectomy.

#### 10:41 Perioperative Parathyroid Hormone Levels in Thyroid Surgery

Bobak A. Ghaheri, MD, Portland, OR

Sarah L. Liebler, PA-C, Portland, OR

Peter E. Andersen, MD, Portland, OR

Kathryn G. Schuff, MD, Portland, OR

Mary H. Samuels, MD, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to determine the relative risk of hypocalcemia using PTH data from this study.

**OBJECTIVES:** While postoperative hypocalcemia after total thyroidectomy is relatively uncommon, current management involves hospital admission of all patients to monitor for this complication. If perioperative parathyroid hormone (PTH) levels could accurately predict postoperative hypocalcemia, more optimum resource utilization would be possible. The purpose of this study was to determine whether PTH criteria for predicting hypocalcemia exist. **STUDY DESIGN:** Retrospective chart review. **METHODS:** Following thyroid related surgery felt to place overall parathyroid gland function at risk, PTH values were obtained approximately 10 minutes after excision and in the recovery room and correlated with serial postoperative ionized calcium levels. The data were evaluated using chi squared analysis. A receiver operator characteristic (ROC) curve was also constructed using these data to evaluate the overall performance of PTH levels as a diagnostic test. **RESULTS:** Eighty patients were identified meeting the study criteria; fourteen (17.5%) experienced temporary hypocalcemia. While patients who became hypocalcemic during their hospitalization were more likely to have a PTH level below 15 pg/mL ( $p < 0.01$ ), and patients with a PTH level  $< 15$  pg/mL were more likely to develop hypocalcemia ( $p < 0.01$ ), these values were not absolute. Recovery room levels were more accurate. The area under the curve (AUC) for the immediate and recovery room PTH ROC curves were 0.76 and 0.86 respectively, confirming their utility in helping the surgeon determine the relative risk of hypocalcemia. **CONCLUSIONS:** Perioperative PTH levels can be used to predict the relative but not the absolute risk of hypocalcemia in patients undergoing thyroid related surgery that places parathyroid gland function at risk.

#### 10:49 Modern Management of Laryngotracheal Stenosis

Heather C. Herrington, BA, Portland, OR  
Stephen M. Weber, MD PhD, Portland, OR  
Peter E. Andersen, MD, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to explain that management of laryngotracheal stenosis with sequential dilation will likely require multiple procedures. However, in current form, laryngotracheal reconstructive procedures are well tolerated and robust treatment modalities for definitive management of laryngotracheal stenosis.

**OBJECTIVES:** Laryngotracheal stenosis is a complex problem resulting most often from intubation, trauma or autoimmune disease. Management options include sequential dilation or major reconstructive surgeries including laryngotracheoplasty (LTP) and cricotracheal resection (CTR). We describe our experience with the management of this difficult problem. **STUDY DESIGN:** Retrospective chart review of patients who underwent treatment for laryngotracheal stenosis between January 1995 and July 2005 at an academic, tertiary referral center. **METHODS:** A total of 130 patients were treated during the study period. Patients were followed and hospital records were reviewed. **RESULTS:** There were 39 male and 91 female patients with an average age of 55.5 years treated for laryngotracheal stenosis resulting from intubation (65), idiopathic disease (26), autoimmune disease (18), radiation (10), prior surgery (5), trauma (4) and relapsing polychondritis (2). Thirty-three percent were treated for grade I stenosis, 43% grade II, 18% grade III and 4% grade IV. Sixty-seven percent of patients undergoing initial dilation required sequential dilation (2 procedures, on average). LTP or CTR was performed in 43%, 48%, 71% and 100% of patients with grade I through IV stenosis, respectively. Among 74 patients undergoing LTP or CTR 26 required another intervention. However, among 37 patients treated with primary LTP or CTR only 8 required further therapy. Twenty-five of 35 tracheostomy dependent patients were ultimately decannulated. Two patients died in the immediate postoperative period. **CONCLUSIONS:** Patients undergoing dilation for laryngotracheal stenosis require multiple procedures. However, major reconstructive procedures are well tolerated and currently represent a viable primary treatment for laryngotracheal stenosis.

#### 10:57 Discussion

#### 11:05 PANEL: SURGERY IS NOT INDICATED FOR THE TREATMENT OF ADVANCED STAGE UPPER DIGESTIVE TRACT DISORDERS

**Moderator:** David E. Schuller, MD\*, Columbus, OH  
**Panelists:** Amit Agrawal, MD, Columbus, OH  
Danny Enepekides, MD, Sacramento, CA  
Ernest A. Weymuller Jr, MD\*, Seattle, WA  
Gregory T. Wolf, MD, Ann Arbor, MI

#### 12:00 Break/Box lunches - St. Tropez C&D

#### MODERATORS: TBN

#### 12:45 Middle Section Walter Work Resident Research Award for Basic Science

##### Reconstruction of Motor Nerve Defects With Sensory Nerve Grafts Inhibits Nerve Regeneration in a Rodent Model

Michael J. Brenner, MD, St. Louis, MO (*Resident Travel Award*)  
Jason R. Hess, MD, St. Louis, MO  
Ayato Hayashi, MD, St. Louis, MO  
Daniel A. Hunter, St. Louis, MO  
Susan E. Mackinnon, MD, St. Louis, MO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to: 1) understand the physiological and structural differences between motor and sensory nerve grafts; 2) recognize that differences between motor and sensory pathways may have implications for the success of regeneration and functional recovery following nerve reconstruction; and 3) be able to critically evaluate data from a small animal model on motor versus sensory grafting and recognize its potential relevance to clinical nerve reconstruction.

**OBJECTIVES:** Sensory nerve grafts are frequently used to reconstruct motor defects, for example when performing sural nerve grafting after facial nerve sacrifice. However, the consequences of such motor/sensory mismatches have not been well studied. Because sensory nerves differ from motor nerves in extracellular matrix substrate and Schwann cell physiology, sensory pathways represent a potentially inhospitable environment for regenerating motor neurons. We hypothesized that sensory grafts impair motor target reinnervation, thereby contributing to suboptimal outcomes. This study investigated the effect of motor versus sensory grafts on nerve regeneration and functional recovery. **STUDY DESIGN:** Prospective, randomized controlled animal study. **METHODS:** Fifty-six Lewis rats were randomized to 7 groups of 8 animals each. Five millimeter tibial nerve defects were reconstructed with motor or sensory nerve grafts comprised of single, double, or quadruple cables. Tibial nerve autografts served as positive controls. This experimental design addressed the potentially confounding effects of differing graft caliber or graft fiber count. Three weeks after reconstruction, nerves were harvested for histological examination and quantitative histomorphometric analysis. Wet muscle masses provided an index of functional recovery. **RESULTS:** Nerve regeneration was significantly greater across motor versus sensory nerve grafts independent of cross-sectional area or cable number. Motor grafts demonstrated increased nerve density, percent nerve, and total fiber number ( $p < 0.05$ ). Normalized wet muscle masses trended towards improved reinnervation in motor versus sensory groups. **CONCLUSIONS:** Nerve regeneration is enhanced across grafts of motor versus sensory origin. Preferential nerve regeneration through motor grafts and associated enhanced functional recovery has potential implications for clinical nerve reconstruction.

## 12:53 Management of the Radial Forearm Free Flap Donor Site With the Vacuum Assisted Closure (V.A.C.) System

Brian T. Andrews, MD, Iowa City, IA  
Russell B. Smith, MD, Iowa City, IA  
Kristi E. Chang, MD, Iowa City, IA  
Joseph Scharpf, MD, Cleveland, OH  
David P. Goldstein, MD, Toronto, ON Canada  
Gerry F. Funk, MD, Iowa City, IA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to explain the feasibility of using the vacuum assisted closure system as a bolster dressing at the radial forearm free flap donor site.

**OBJECTIVES:** The radial forearm free flap has become a “workhorse” flap in head and neck reconstructive surgery. Partial loss of the split thickness skin graft (STSG) at the donor site is not uncommon and frequently results in tendon exposure. The vacuum assisted closure (V.A.C.) system device is a topical negative pressure dressing that has been utilized to manage complex wounds on the torso and extremities and improve skin graft viability in a variety of clinical settings. In this study, we investigated the feasibility of using the V.A.C. as a bolster dressing over a split thickness skin graft (STSG) at the radial forearm free flap donor site. **STUDY DESIGN:** A retrospective chart review. **METHODS:** A retrospective chart review was performed on all subjects who underwent a radial forearm free flap and used the vacuum assisted closure (V.A.C., Kinetic Concepts Inc., San Antonio, Texas, USA) system at the forearm donor site from January 1, 2003, through March 2005. **RESULTS:** Thirty-four consecutive patients who underwent radial forearm free flap reconstruction had the V.A.C. system utilized as a bolster dressing for the STSG at the forearm donor site. Complete viability of the STSG was noted in all patients after initial removal of the V.A.C. system. On long-term follow-up, exposed tendons were present in 0 of 5 (0%) subjects who used V.A.C. for 6 days, and 0 of 9 (0%) who employed V.A.C. for 7 days. Eleven of the 20 (55%) subjects who used the bolster for 5 days demonstrated tendon exposure on follow-up exam and necessitate on average 4 weeks of local wound care prior to tendon coverage. Four patients with exposed tendons at the donor site required V.A.C. therapy to facilitate granulation tissue formation over these structures. The V.A.C. reduced wound healing time, simplified wound care, and eliminated further surgical procedures in all four patients. **CONCLUSIONS:** This study demonstrates that the V.A.C. system is a feasible alternative to conventional bolster dressing in the management of the radial forearm free flap skin grafted donor site. It eliminated tendon exposure when used for 6 to 7 days. It can also be used to facilitate granulation tissue coverage over exposed tendons when STSG healing at the donor site fails.

## 1:01 The Effect of Cigarette Smoke Condensate on Collagen Density in Organotypic Skin Models

Nguyen S. Pham, BS, Irvine, CA  
Chung Ho Sun, PhD, Irvine, CA  
Alissa Yamazaki, BS, Irvine, CA  
Brian J.F. Wong, MD PhD, Irvine, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to have a greater understanding of the pathophysiology of skin wrinkling. The study will demonstrate how cigarette smoke condensate can induce collagen change in the skin model. The multiple mechanisms of skin damage and premature aging secondary to cigarette smoke will be discussed, as will the technique for studying skin damage using the organotypic skin model.

**OBJECTIVES:** Tobacco smoke has long been implicated as an etiologic agent in the premature aging of skin. However, the mechanisms of action remain unclear. Topical and systemic effects of tobacco smoke byproducts are thought to contribute to this acceleration of aging. The present study examined the effect of cigarette smoke condensate (CSC) on collagen physiology in organotypic tissue engineered artificial skin models (RAFTs). Multiphoton microscopy (MPM), depth dependent decay (DDD), and average collagen signal intensity (ACSI) will be used to assess changes in collagen in RAFTs. **STUDY DESIGN:** Experimental study. **METHODS:** Fibroblasts and keratinocytes were isolated from neonatal foreskin and used to construct RAFTs. Cigarette smoke was collected onto filter paper using a smoking apparatus drawing metered volumes of smoke. Cigarette smoke condensate was then eluted into growth medium. After stratification for 7 days, different concentrations of CSC (0, 10, 25, and 50 µg/mL) were added to the growth media. Multiphoton microscopy (MPM) was performed on each RAFT after 0, 7, and 14 days to image collagen structure and calculate depth dependent decay and average collagen signal intensity. RAFT dimensions were measured at day 0 and 14 in order to calculate contraction. **RESULTS:** Rafts exposed to CSC showed a significant increase in average collagen signal intensity (ACSI) when compared to controls at experimental day 14 ( $p < .01$  paired t-tests). Depth dependent decay values in experimental groups trend upwards versus controls. Statistically significant differences in contraction rates were not seen between control and experimental groups eliminating contraction as a cause for the difference in collagen levels. **CONCLUSIONS:** RAFT organotypic skin models exposed to cigarette smoke showed an increase in collagen density suggesting a direct mechanism of cigarette smoke induced collagen generation.

## 1:09 Role of Free Tissue Transfer in Skull Base Reconstruction

Stephen M. Weber, MD PhD, Portland, OR (*Resident Travel Award*)  
Heather C. Herrington, BA, Portland, OR  
Jason H. Kim, MD, Los Angeles, CA  
Mark K. Wax, MD, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the benefits of and indications for free tissue transfer in skull base reconstruction.

**OBJECTIVES:** Reconstruction of the skull base after craniofacial trauma or skull base surgery requires a watertight seal to prevent CSF leakage as well as donor tissue tailored to the individual defect. Large defects and those occurring in heavily pretreated operative fields require more soft tissue coverage than provided by local or pedicled flaps. Free tissue transfer has been used to reconstruct these defects. **STUDY DESIGN:** Retrospective chart review of patients who underwent free tissue transfer for reconstruction of the skull base between November 1995 and July 2005 at an academic, tertiary referral center. **METHODS:** Forty-three consecutive patients underwent free tissue transfer to the skull base. Patients were followed and electronic hospital records were reviewed. **RESULTS:** There were 26 male and 17 female patients with an average age of 58.4 (range, 22–85 years) with skull base defects resulting from oncologic resection (31), head trauma (6), prior surgery (3), cholesteatoma (1), inverting papilloma (1) or meningoencephalocele (1). Flaps were placed in the anterior (33), middle (4) or posterior (6) cranial fossa. Donor sites included the radial forearm (24), rectus abdominis (11), anterolateral thigh (2), latissimus dorsi (2), fibula, scapula, serratus anterior and ulna (1 each). Five patients required a second free tissue transfer indicated for flap death, partial flap necrosis, persistent pneumocephalus, recalcitrant osteoradionecrosis or recurrent disease. Two patients died in the immediate postoperative period. All patients had adequate soft tissue coverage. **CONCLUSIONS:** Free tissue transfer is a robust option in the repair of postsurgical and post-traumatic skull base defects.

## 1:17 Cartilage Regeneration in the Rabbit Nasal Septum

Meghann L. Kaiser, BS, Irvine, CA  
Amir M. Karamzadeh, MD, Orange, CA  
Chao Li, Irvine, CA  
Ryan J. Wright, BS, Irvine, CA  
Lih-huei L. Liaw, MS, Irvine, CA  
Brian J.F. Wong, MD PhD, Irvine, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand how cartilage can regenerate in the rabbit, and applications of this finding in surgery to regenerate cartilage using tissue engineering approaches.

**OBJECTIVES:** Rhinoplasty frequently includes harvesting of nasal septal cartilage in the reshaping process. The objective of this study is to determine whether cartilage can regenerate following submucosal resection (SMR) of the nasal septum in the rabbit. Neocartilage formation has not heretofore been described in this model. **STUDY DESIGN:** Prospective basic investigation. **METHODS:** Via lateral rhinotomy, SMR was performed on seventeen rabbits followed by reapproximation of the perichondrium. After seven months, septi were fixed, sectioned and examined histologically. Findings were photographed and data tabulated according to location and extent. **RESULTS:** Sites of matrix secreting isogenous chondrocyte clusters were identified between the perichondrial flaps, principally in the anterior inferior septum. Regenerated cartilage measured 100—800  $\mu$ m in coronal section, however, occasional areas as large as 3 mm in vertical diameter (greater than 50% the SMR defect) were found. The newly formed cartilage consisted of chondrocytes within chondrins and was comparable in shape and structure to native septal cartilage. **CONCLUSIONS:** Following SMR, rabbit cartilage tissue can regenerate and form matrix within the potential space created by surgery. The surrounding stem cell rich perichondrium may be the site of origin for these chondrocytes. These findings suggest that following SMR of the human nasal septum, as often occurs during the process of rhinoplasty, it may be possible for new cartilage tissue to develop, provided the mucosa is well approximated. This biologic effect may be enhanced by insertion of cytokine rich tissue scaffolds that exploit the native ability of septal perichondrium to regenerate and repair cartilage tissue.

**1:25 Western Section Shirley Baron Resident Research Award  
Compression Biomechanical Properties of Human Nasal Septal Cartilage**

Jeremy D. Richmon, MD, La Jolla, CA (*Resident Travel Award*)  
August B. Sage, BS, San Diego, CA  
Van W. Wong, BS, San Deigo, CA  
Albert C. Chen, PhD, San Diego, CA  
Robert L. Sah, MD ScD, San Diego, CA  
Deborah C. Watson, MD, San Diego, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the rationale behind biomechanical testing of cartilage and its role in tissue engineering.

**OBJECTIVES:** Nasal septal cartilage is frequently used in nasal reconstruction and is a common source of chondrocytes for cartilage tissue engineering. The biomechanical properties of septal cartilage have yet to be fully defined and this limits our ability to compare it to the various alternative tissue implant materials or tissue engineered neocartilage. Given the unique structure and orientation of the septum within the nose, we sought to investigate anisotropic behaviors of septal cartilage in compression and correlate this to the concentration of glycosaminoglycans (GAG) and collagen within the cartilage. **STUDY DESIGN:** Laboratory research. **METHODS:** Human nasal septal cartilage specimens were tested twice in confined compression: in a medial (M) orientation before a vertical (V) or caudal-cephalic (C) orientation, or in a M orientation after a V or C orientation. The equilibrium confined compression (aggregate) modulus, HA0, and the permeability, kp, were obtained for each compression test. After compression, the cartilage samples were digested and the concentration of GAG and collagen were obtained. **RESULTS:** Forty-nine compression tests (24 M, 12 V, 13 C) were run on cartilage specimens obtained from 21 patients. There was a significant effect of orientation on compression modulus, HA0, with the V ( $0.71 \pm 0.12$  MPa) and C ( $0.66 \pm 0.01$  MPa) orientations being significantly stiffer ( $p=0.05$ ) than the M orientation ( $0.44 \pm 0.04$  MPa). There was almost an effect of orientation on kp at 15% offset compression ( $p=0.12$ ) and a borderline significant effect of orientation on kp at 30% offset compression ( $p=0.05$ ), demonstrating the M orientation to be more permeable than both the V and C orientations. Both univariate and multivariate analysis failed to demonstrate a significant effect of order of compression, age, gender, thickness, dry/wet weight, GAG or collagen on either HA0, or kp values ( $p > 0.05$ ). **CONCLUSIONS:** To date, this is the first study evaluating the compressive properties of septal cartilage along different axes of compression. Our results demonstrate that human septal cartilage is anisotropic; compression in the V and C orientations is stiffer than when compressed in the M orientation. Additionally, the medial orientation tends to have the greatest permeability. The data obtained in this study provide a reference by which various craniofacial reconstruction materials and tissue engineered neocartilage should be compared.

**1:33 Discussion**

**1:40 - PANEL: EUTHANASIA IS AN APPROPRIATE METHOD OF MANAGING**

**2:40 END OF LIFE PROBLEMS WITH PATIENTS SUFFERING FROM TERMINAL DISEASE INVOLVING THE HEAD AND NECK**

**Moderator:** Paul J. Donald, MD\*, Sacramento, CA  
**Panelists:** Prof. Egbert Huizing, MD, Utrecht, Netherlands  
C. Ronald Koons, MD, Irvine, CA  
James Cohen, MD, Portland, OR  
Kevin Murphy, PhD, Orange, CA

**2:40 Announcements/Adjourn**

**3:15 Resident Training Program Volleyball Tournament - sign up at registration**

**6:00 - MEET THE AUTHORS POSTER RECEPTION - FOYER**

**7:30**

7:00 - Registration - Foyer  
11:00

7:00 - Speaker Ready Room - Avignon  
11:00

7:00 - BUSINESS MEETING (MEMBERS ONLY) -  
7:50 MIDDLE SECTION - CANNES/ANTIBES

7:00 - Exhibit Hall Open - St. Tropez C&D  
10:15

7:00 - Continental Breakfast with Exhibitors - St. Tropez C&D  
7:50

8:00 - Spouse Hospitality - Monaco  
10:00

8:00 - SCIENTIFIC SESSIONS - ST. TROPEZ A&B  
11:15

8:00 Announcements  
Recognition of Poster Award Winners  
Paul J. Donald, MD\*, Sacramento, CA, and David E. Schuller, MD\*, Columbus, OH

**MODERATORS: SEAN MCMENOMEY, MD, PORTLAND, OR  
DANIEL CHOO, MD, CINCINNATI, OH**

8:05 *Middle Section Walter Work Resident Research Award - Third Place*  
**Ginkgo Biloba Extract (EGb 761) Protects Against Cisplatin Ototoxicity in Rats**  
Xinyan Huang, MD PhD, Springfield, IL (*Resident Travel Award*)  
Craig A. Whitworth, MA, Springfield, IL  
Leonard P. Rybak, MD PhD\*, Springfield, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand that a natural product, ginkgo biloba extract (EGb 761), reduces cisplatin ototoxicity.

**OBJECTIVES:** Ototoxicity is a major dose limiting side effect of cisplatin chemotherapy. Cisplatin ototoxicity correlates with depletion of cochlear antioxidant systems and increased lipid peroxidation. A standardized ginkgo biloba extract, EGb 761, is a potent free radical scavenger. The purpose of this study was to investigate the effect of EGb 761 on cisplatin ototoxicity in rats. **STUDY DESIGN:** Prospective, randomized controlled experimental study in rat. **METHODS:** Male Wistar rats comprised 4 groups as follows, 1) vehicle control; 2) cisplatin (13 mg/kg, ip); 3) EGb 761 (200mg/kg, ip); 4) EGb 761 plus cisplatin. Auditory brainstem response (ABR) thresholds were determined pre- and 72 hours post-treatment. Endocochlear potential (EP) was also recorded 72 hours post-treatment. Cochleae were processed for scanning electron microscopy (SEM) following completion of ABRs. **RESULTS:** Cisplatin treated rats showed significant ABR threshold shifts across all frequencies (clicks, and 2, 4, 8, 16 and 32 kHz tones) compared to other groups ( $p < 0.001$ ). Rats treated with EGb 761 plus cisplatin showed no significant ABR threshold shifts ( $p > 0.05$ ). EPs of cisplatin treated rats were decreased about 50% in comparison to the other groups ( $p < 0.001$ ), whereas rats pretreated with EGb 761 followed by cisplatin had EPs similar to vehicle controls or the EGb 761 only group ( $p > 0.05$ ). SEM revealed severe outer hair cell loss in the basal turn of cochleae of cisplatin treated rats, whereas outer hair cells were intact in rats treated with EGb 761 plus cisplatin. **CONCLUSIONS:** EGb 761 protects against cisplatin ototoxicity.

8:13 **Surgical Treatment of Pediatric Cholesteatomas**  
Mobeen A. Shirazi, MD, Maywood, IL (*Resident Travel Award*)  
Kamil Muzaffar, 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 determine when canal wall up or canal wall down mastoidectomy is indicated in the treatment of acquired and congenital cholesteatomas.

**OBJECTIVES:** To review our experience in the surgical treatment of cholesteatomas in children. **STUDY DESIGN:** Retrospective case series. **METHODS:** A total of 124 mastoidectomies were performed in children 16 years old and younger from 1988-2004. Eighty-four percent (104/124) of children had the procedure for an acquired cholesteatoma. Median age was 9 years. Sixteen percent (20/124) of patients, with a median age of 6 years, had surgery for a congenital cholesteatoma. Mean follow-up period was 7 years. Hearing outcomes, cholesteatoma recidivism, and dry mastoid cavity were main outcomes measures. **RESULTS:** Of the 104 acquired cholesteatomas, 64 underwent canal wall down (CWD) mastoidectomy and 40 underwent canal wall up (CWU) mastoidectomy. Rates of cholesteatoma recurrence for CWU and CWD groups were similar (7.5% vs. 5%). Eighty-five percent (34/40) of patients treated with CWU mastoidectomy had hearing threshold less than 25 dB as compared to 41% (26/64) of patients who underwent a CWD procedure ( $p < 0.05$ ). Thirty-three percent (21/64) of patients who had a CWD mastoidectomy had stapes superstructure erosion as compared to 18% (7/40) of patients in the CWU group ( $p < 0.05$ ). Among patients with congenital cholesteatomas, 75% (15/20) had a CWU mastoidectomy and 25% (5/20) underwent a CWD mastoidectomy. Rate of cholesteatoma recurrence did not statistically differ between in the CWU and CWD groups (13% vs. 20%), but was higher compared to patients with acquired cholesteatoma. The percentage of patients with hearing threshold less than 25 dB was the same in both groups (60%). Ninety-nine percent (123/124) of subjects studied had a dry mastoid cavity at the time the study was completed. Ossiculoplasty was staged in the majority of patients. Worse hearing outcomes correlated with stapes superstructure erosion. **CONCLUSIONS:** The CWU procedure is an adequate surgical option for treating acquired and congenital cholesteatomas, preventing disease recurrence, and maintaining good hearing outcomes. Among patients with acquired cholesteatomas, hearing outcomes were worse in patients treated with CWD mastoidectomy. This finding was found to be related to high percentage of patients with stapes superstructure erosion and more extensive disease. The treatment of pediatric cholesteatomas should be individualized with CWD mastoidectomy chosen for patients with more extensive disease.

8:21 **Cochlear Gene Expression in Murine Acute and Chronic Otitis Media**  
Bobak A. Ghaheri, MD, Portland, OR (*Resident Travel Award*)  
J. Beth Kempton, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the role of the murine inner ear in gene expression of inflammatory cytokines that may explain the development of sensorineural hearing loss.

**OBJECTIVES:** Recurrent acute otitis media (AOM) and chronic otitis media (COM) can cause sensorineural hearing loss (SNHL), but the mechanisms are unknown. It is widely accepted that inflammatory cytokines diffuse across the round window membrane to exert cytotoxic effects. This study will address whether inner ear cells are capable of expressing genes for inflammatory cytokines. **STUDY DESIGN:** Prospective animal study. **METHODS:** BALB/c mice underwent transtympanic injection of heat killed Haemophilus influenzae to create an acute inflammatory response. These mice were compared to a control group in addition to a group of uninjected mice found to have otomicroscopic changes consistent with COM. The cochleas of these mice were obtained, their RNA harvested, and analyzed using prefabricated gene arrays. X-ray images of the arrays were obtained and digitized to determine relative cytokine gene expression. **RESULTS:** Four groups of mice (control, 3-day post-injection, 7-day post-injection and mice with COM) with 5 mice in each group were analyzed. Numerous classes of genes were found to be upregulated or downregulated by more than 2-fold; some genes differed by more than 10-fold. These genes included numerous fibroblast growth factors, interleukins, tumor necrosis factors, and colony stimulating factors. **CONCLUSIONS:** The genes of numerous inflammatory cytokines are either up- or downregulated by murine inner ear cells in response to either acute or chronic inflammation of the middle ear. This study provides evidence for production of cytokines that may be responsible for SNHL from otitis media.

#### **8:29 Evolving Treatment for Migraine Associated Dizziness—Preliminary Experience With Topiramate, Venlafaxine and Newer Agents**

Judith A. White, MD, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to identify evidence based choices in migraine prevention and discuss preliminary experience with these newer agents in migraine associated dizziness.

**OBJECTIVES:** This retrospective case series reports preliminary experience with newer classes of migraine therapeutic agents in patients who meet ICHD-II criteria for migraine and Neuhauser criteria for migrainous vertigo. Evidence based guidelines have recently been released by the American Academy of Neurology which suggest several new agents for migraine prophylaxis, including topiramate, which is an anti-epileptic agent. Several other newer agents have also demonstrated efficacy and are being considered for inclusion in the guidelines, including venlafaxine (an antidepressant) and zonisamide (an anti-epileptic related to topiramate). **STUDY DESIGN:** Patients presenting to a tertiary vestibular center who met criteria for migraine associated dizziness were retrospectively reviewed to determine the course of treatment selected and outcome. Patients were treated in consultation with a tertiary headache center in some cases. **METHODS:** Thirty patients were included in the initial cohort seen between 2003-2005. Data was available on all patients and abstracted. **RESULTS:** Fifty percent of the patients received one of the newer anti-epileptic therapies for migraine prophylaxis (topiramate or zonisamide). The remaining patients received other agents (most commonly venlafaxine), or chose to follow conservative measures including vitamin B2, magnesium, lifestyle and dietary modifications. Follow-up ranges from six to seventeen months. Improvement in headaches and dizziness was seen in 29/30 patients, with one patient failing zonisamide due to the overuse of over the counter preparations. Treatment was eventually successful in that case after over the counter medications were removed and zonisamide continued. No significant side effects resulted in discontinuing treatment. **CONCLUSIONS:** Preliminary experience with newer classes of anti-epileptic and antidepressant therapeutic agents for migraine (including topiramate, zonisamide and venlafaxine) appears promising in this retrospective case series of patients presenting with migraine associated dizziness.

#### **8:37 Intratympanic Dexamethasone Perfusion in Meniere's Disease: Seven Year Results**

Mohamed A. Hamid, MD PhD, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss and apply intratympanic dexamethasone perfusion in the management of Meniere's disease patients.

**OBJECTIVES:** Present seven year follow-up results for an ongoing protocol of intratympanic dexamethasone perfusion for Meniere's disease. **STUDY DESIGN:** Retrospective case review of an ongoing protocol (1997-2000) followed by a prospective, open label case study of the same protocol (2001-2004). **METHODS:** Patients: The study included 137 patients according to the 1995 AAO-HNS guidelines for reporting the diagnosis and treatment results of Meniere's disease. Intervention: Intratympanic injection of dexamethasone 24mg/ml once weekly for a maximum of three treatments. Pre- and post-treatment tests of auditory and vestibular function. Follow-up every three months for the first year, then annually. Main Outcome Measures: Short-term (one year) and long-term (seven year) results are compared for pre- and post-treatment hearing (pure tone average and word recognition score), vertigo frequency and functional levels, and subjective changes in tinnitus and aural fullness. **RESULTS:** Vertigo was significantly reduced in frequency and intensity in 95% of patients. Vestibular functional levels improved from level 4-6 to level 1-2 in 90% of patients. Word recognition score increased by 35% in 90% of patients. Pure tone average improved by 20db in 60% of patients. Aural fullness and tinnitus subsided significantly in 90% and 60% of patients, respectively. No significant adverse reactions were reported by patients. Short and long-term results were comparable and early treatment was associated with more positive responses. **CONCLUSIONS:** Dexamethasone 24mg/ml intratympanic perfusion is an effective treatment for Meniere's disease. The treatment is associated with significant recovery or preservation of hearing and vertigo control in the short and long term.

#### **8:45 Discussion**

#### **8:53 Safety Study of the Cochlear Nucleus 24 Device With Internal Magnet in the 1.5 Tesla MRI Scanner**

Samuel P. Gubbels, MD, Portland, OR  
Sean O. McMenomey, MD, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to 1) discuss the relevant literature regarding MRI use in patients with cochlear implants; 2) compare the potential advantages of MRI scanning using the 1.5 Tesla magnet with the cochlear implant magnet in place versus surgical removal and replacement; 3) discuss the potential application of external, compressive dressings to enable the use of the 1.5 Tesla MRI scanner in patients with the Cochlear Nucleus 24 device with its internal magnet in place; and 4) discuss the effect of the 1.5 Tesla MRI on the strength of Cochlear Nucleus 24 internal magnet with potential clinical repercussions.

**OBJECTIVES:** To evaluate the effect of the 1.5 Tesla MRI scanner on the Cochlear Nucleus 24 device without removing the internal magnet. To determine whether device fixation using a compression dressing could prevent any internal magnet displacement in the MRI scanner and potentially obviate the need for surgical removal of the internal magnet. **STUDY DESIGN:** Prospective cadaveric study. **METHODS:** Four cadaver heads were implanted bilaterally with the Nucleus device with the internal magnet in place and placed into the 1.5 Tesla MRI scanner. The devices were then explanted after interaction with the MRI and evaluated for displacement of the internal magnet. Conditions tested include device fixation with a commercially available compression dressing and no fixation (worst case scenario). Magnet strength was measured before and after each of the test conditions. **RESULTS:** Moderate to severe displacement of the magnet from the internal device occurred in 14/16 (87%) of implants when no compression dressing was placed. No displacement occurred 18/18 (0%) of implants when the compression dressing was applied. No decrease in the strength of the implant magnet was found with the initial or subsequent MRI, implant interactions. **CONCLUSIONS:** Use of the 1.5 Tesla MRI on subjects with Cochlear Nucleus 24 implants did not result in any significant demagnetization of the internal magnet and did not cause displacement of the magnet when a high compression external dressing was applied prior to the scan. Surgical removal of the internal magnet prior to scanning with the 1.5 Tesla MRI may not be necessary if a high compression dressing is applied.

**9:01 An Evaluation of the Risk of Cerebrospinal Fluid Leakage as a Function of the Surgical Approach to the Cochlear Nerve**

Brian T. Miller, MD, Salt Lake City, UT (*Resident Travel Award*)  
Todd Hillman, MD, Salt Lake City, UT

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand both the utility of microelectrode implantable arrays as potential auditory assist devices as well as the attendant risk of generating a cerebrospinal fluid leak when one surgical approach, compatible with the configuration, is employed.

**OBJECTIVES:** To assess the risk of generating a cerebrospinal fluid leak while employing a surgical approach to the cochlear nerve for the implantation of a microelectrode array. The approach demands the development of an extended facial recess, a cochleostomy, and a modiolar drill-out. **STUDY DESIGN:** Within 4 to 36 hours from the time of death, five fresh cadavers were obtained for dissection. Using dyed normal saline as an indicator, the central nervous system was pressured to physiologic parameters. Surgical approaches to the cochlear nerve were initiated, with each side considered a separate approach. Leakage of indicator fluid for each approach was quantitatively and qualitatively assessed. **METHODS:** Generation of indicator dye in the surgical field was considered a CSF breach. All leaks were observed for 10 minutes while maintaining physiologic pressures. Indicator fluid was collected and quantified during this period. All leaks were sealed prior to initiating any contralateral approach. **RESULTS:** 80% of the surgical approaches caused quantifiable leaks with rates ranging from 0.1 cc/minute to 6 cc/minute. **CONCLUSIONS:** For directly implantable microarrays, the utilization of a modified facial recess approach with cochleostomy and modiolar drill-out carries significant risk for generating a CSF leak during the procedure.

**9:09 Surgical Outcomes for Chronic Ear Disease Complicated by Labyrinthine Fistula**

Frank M. Warren, MD, Nashville, TN  
David M. Kaylie, MD, Nashville, TN  
Marc L. Bennett, MD, Nashville, TN  
C. Gary Jackson, MD\*, Nashville, TN

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the incidence, clinical features and management of labyrinthine fistulae associated with chronic ear disease.

**OBJECTIVES:** To analyze surgical outcomes of chronic ear disease complicated by labyrinthine fistula. **STUDY DESIGN:** Retrospective review. **METHODS:** Of 7,398 patients undergoing surgery for chronic ear disease from 1971-2003, 179 patients developed labyrinthine fistulae. Diagnosis, surgical strategy, and outcomes were recorded. **RESULTS:** One hundred and seventy-nine patients were identified for an incidence of 2.42%. The mean age was 43 years (range 5-78y.) Fourteen of the cases involved pediatric patients. There were four superior semicircular canal (SCC) fistula, one hundred and fifty-three lateral SCC fistula, one in the vestibule, one with both lateral and superior SCC fistulae, three internal auditory canal fistulae, and seventeen fistulae into the cochlea or oval window, two of which also had an SCC fistula. One hundred and fifty-four cases were revisions and forty-eight were primary. A total of two hundred and two procedures were performed. Patient demographics, preoperative signs and symptoms as well as imaging results are reviewed to elucidate populations in which suspicion should be raised for this complication. The management of the fistula and procedures performed will be discussed in detail. Additionally surgical outcomes, hearing results and recurrence rates will be presented. **CONCLUSIONS:** Labyrinthine fistula is an uncommon complication of chronic ear disease, which can occur in primary cholesteatoma surgery, but is more commonly seen in adults with longstanding disease and/or the recidivistic ear. This complication rarely results in profound sensorineural hearing loss when properly diagnosed and managed.

**9:17 Histopathology of the Spiral Ligament in Meniere's Disease**

Jose N. Fayad, MD, Los Angeles, CA  
Boris G. Naraev, MD, Los Angeles, CA  
Fred H. Linthicum, Jr., MD\*, Los Angeles, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to describe the histopathology of the spiral ligament and stria vascularis in Meniere's disease.

**OBJECTIVES:** To examine whether spiral ligament abnormalities play a role in the pathogenesis of Meniere's disease as the modern theory of potassium recycling via inner ear fibrocytes might suggest. **STUDY DESIGN:** We evaluated 23 temporal bones with Meniere's disease and 18 temporal bones from individuals with no clinical history of ear disease. In 7 patients with unilateral Meniere's disease, the non-hydrops ears were also used in a paired comparison. **METHODS:** Cellular densities of the five spiral ligament fibrocyte types in five segments of the cochleae and percent remaining stria vascularis and hair cells for three cochlear sections were determined. Spiral ganglion cells were counted. Severity of hydrops was computed, and volume of the endolymphatic sac was measured when available. **RESULTS:** Stria vascularis, hair cells, peripheral processes, ganglion cells and endolymphatic sac volume were all significantly negatively correlated to severity of hydrops. However, hydrops severity showed few significant correlations to spiral ligament cell density, correlating only with two cell types in one area (posterior middle). Spiral ligament fibrocyte density differed between Meniere's and control ears in only 2 of the 25 comparisons, with mean density higher in the Meniere's ears in one of these. **CONCLUSIONS:** Our study showed few differences in the number of spiral ligament fibrocytes in hydrops ears compared to normal controls. Although functional alterations of the spiral ligament in the pathogenesis of Meniere's disease cannot be excluded, we found little evidence to support a major role of spiral ligament abnormalities in Meniere's.

**9:25 Delayed Extrusion of Hydroxyapatite Following Transpetrosal Reconstruction**

Myles L. Pensak, MD\*, Cincinnati, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to appreciate the variables associated with, and complications related to closure of skull base defects following extirpation of lesions via transpetrosal routes.

**OBJECTIVES:** To review the long-term results of employing hydroxyapatite in the closure of transpetrosal defects following skull base tumor resection. **STUDY DESIGN:** Retrospective chart review. **METHODS:** 274 patients were followed for greater than five years. Following tumor removal via transpetrosal routes, hydroxyapatite, was employed following medial wound closure with abdominal fat and prior to a three layered lateral soft tissue closure. **RESULTS:** Amongst this group of patients three CSF leaks were encountered. None of these required reoperation. Delayed extrusion of hydroxyapatite, resulting in superficial wound infections have occurred in seven patients to date. All required operative reintervention. **CONCLUSIONS:** Hydroxyapatite has proven to be an effective adjunctive resource to be employed in the closure of skull base defects in an attempt to minimize the incidence of perioperative CSF leaks. Nevertheless, delayed extrusion of this agent can occur, resulting in the potential for significant morbidity and the need for operative reintervention.

**9:33 Middle Section Walter Work Resident Research Award for Clinical Research**

**Divergence of Fine and Gross Motor Skills in Pre-Lingually Deaf Children: Implications for Pediatric Cochlear Implantation**

David L. Horn, MD, Indianapolis, IN (*Resident Travel Award*)  
David B. Pisoni, PhD, Bloomington, IN  
Richard T. Miyamoto, MD\*, Indianapolis, IN

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the relations between specific aspects of motor development and spoken language processing skills in pediatric CI users.

**OBJECTIVES:** To assess relations between specific aspects of motor development and spoken language processing skills in pediatric CI users. **STUDY DESIGN:** A retrospective analysis of longitudinal data. **METHODS:** Pre-lingually deaf children who received a cochlear implant prior to age 5 years old and had no known developmental delay or cognitive impairments were included in the study. Fine and gross motor development were assessed prior to implantation using a standardized parental report of adaptive behavior. Fine and gross motor scores reflected a given child's motor functioning with respect to a normative sample of typically developing, normal hearing children. Relations between these preimplant scores and post-implant spoken language outcomes were assessed. **RESULTS:** In general, gross motor scores tended to be positively related to chronological age whereas the opposite trend was noted for fine motor scores. Fine motor scores tended to be related to post-implant spoken language outcome measures. Gross motor scores, in contrast, did not appear to be closely related to spoken language outcomes in these children. **CONCLUSIONS:** Our findings suggest a disassociation between fine and gross motor development in pre-lingually deaf children: fine motor skills, in contrast to gross motor skills, tend to be delayed as the pre-lingually deaf children get older. This finding is in contrast to earlier studies that have reported more generalized motor impairments in deaf children. An interpretation of these results is that pre-lingual deafness leads to atypical development of cortical structures that underlie certain fine motor abilities such as sequencing, perceptual motor integration, and speech processing/production.

**9:41 Discussion**

**9:49 Break/Visit with Exhibitors/View Posters - Foyer & St. Tropez C&D**

**10:10 - PANEL: OTOLOGIC CONTROVERSIES**

**11:05 Moderator: D. Bradley Welling, MD PhD\*, Columbus, OH**

**Panelists: C. Phillip Daspit, MD\*, Phoenix, AZ**  
**Clough Shelton, MD\*, Salt Lake City, UT**  
**P. Ashley Wackym, MD\*, Milwaukee, WI**  
**Bruce J. Gantz, MD\*, Iowa City, IA**

**11:05 Introduction of Vice President-Elect, Derald E. Brackmann, MD\*, Los Angeles, CA**  
Richard J. Wiet, MD\*, Hinsdale, IL

**11:10 Adjourn**

## POSTERS

### 1. **withdrawn**

#### **Endoscopic Anatomy of the Anterior Epitympanum**

Alaa Ali Abou-Bieh, MD, Mansoura, Dakahlia Egypt  
Thomas J. Haberkamp, MD\*, Chicago, IL  
Shawky Mahmoud El-Morsy, MD, Mansoura, Dakahlia Egypt

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss endoscopic anatomy of the different types of the anterior epitympanum.

**OBJECTIVES:** Early studies reported detailed microscopic anatomy of the anterior epitympanum, yet non described its endoscopic anatomy and approaches. This study was designed to study both surgical and endoscopic anatomy of the anterior epitympanum. Also it was conducted to review the added value of intraoperative use of otoendoscopes to approach the different areas of the anterior epitympanic region. **STUDY DESIGN:** Prospective cadaveric study. **METHODS:** Thirty-five temporal bones were dissected and the anatomic details were studied utilizing an operating microscope and otoendoscopes with 0o, 30o and 70o angles and 2.7 and 3mm diameters. **RESULTS:** Marked variation in the size and shape of the anterior epitympanum was observed. The recess was found in all of the 35 bones with its three different types. In type A (43%), when the main cavity was above the tensor tympanic fold, it was best approached via the posterior transmastoid approach. But in type B (49%), because the recess was divided into two cavities by the tensor tympanic fold, it necessitated both the transmastoid and the transcanal routes to approach it. While in type C (8%), it was mainly approached via the transcanal approach, as the recess was contiguous with the eustachian tube. **CONCLUSIONS:** The shape of the anterior epitympanum is influenced by the relation between the cavities above and below the tensor tympanic fold. The incorporation of otoendoscopes during the middle ear surgery helps in more exposure of its different types with less aggressive approaches.

### 2. **Trauma Profile and Electrode Positioning in Two Newly Designed Cochlear Implants**

Mir J. Ali, MD, San Francisco, CA  
Kalpesh T. Vakharia, MS, San Francisco, CA  
Steven J. Rebscher, MS, San Francisco, CA  
Lawrence R. Lustig, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to compare two newly designed cochlear implants, the Neurobiosys and Contour Advance model, in terms of the physical properties of their electrode design and correlate this information with electrode positioning and observed insertion trauma.

**OBJECTIVES:** To use positioning and trauma data from two different cochlear implants to explore methods to optimize future designs. **STUDY DESIGN:** Laboratory study using human cadaveric temporal bones. **METHODS:** A mastoidectomy and facial recess approach to the round window was performed on each of the cadaveric specimens. Insertions of the cochlear implants were performed by two experienced cochlear implant surgeons. Following insertion, the specimens were embedded in acrylic resin and cut in radial sections with a diamond saw. Trauma was assessed in each cross section using both transmitted and reflected illumination. Scala tympani dimensions and measurement of the proximity of electrodes to Rosenthal's Canal were made using digital imaging software. **RESULTS:** The Neurobiosys device was observed in the scala tympani in all specimens (n=6) with a mean depth of insertion of 360 degrees. The Contour Advance model electrode was observed in the scala tympani in three of four specimens. The remaining Contour Advance electrode was observed in the scala vestibuli. Mean depth of electrode insertion for this electrode was 367 degrees. **CONCLUSIONS:** Preliminary data suggest that the Neurobiosys device provided minimal trauma. Insertion depths were similar to those of the Contour Advance device. The Contour Advance device had a similar trauma profile to the previous Contour Array model. This study is a work in progress.

### 3. **Perioperative Management of Massive Thyroid Goiter**

Todd A. Anderson, MD, Minneapolis, MN  
Markus Gapany, MD, Minneapolis, MN  
Rick M. Odland, MD, Minneapolis, MN

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to assess the risk of induction of anesthesia and assure optimal airway management.

**OBJECTIVES:** To review management of anesthesia in patients with massive thyroid goiter. **STUDY DESIGN:** Retrospective case review and literature review. **METHODS:** Patients with massive goiter undergoing anesthesia for thyroidectomy or other procedures were reviewed. A review of the literature regarding airway management was conducted. **RESULTS:** Four patients were reviewed. Three patients were to have thyroidectomy and one was to have an unrelated surgical procedure. Two patients underwent awake fiberoptic intubation without difficulty. Two patients underwent induction of anesthesia with paralysis. Upon induction of paralysis, the patients could not be intubated, although the glottis was visualized. One patient was recovered without injury, and one patient suffered a myocardial infarction and died. **CONCLUSIONS:** Massive goiter can result in deviation of the trachea. Active contraction of strap muscles, which are known to be accessory muscles of respiration, probably maintains the midline position of the larynx and trachea. In cases of massive goiter, the strap muscles prevent marked deviation and angulation of the trachea. With paralysis, loss of strap muscle contraction may allow deviation of the trachea and resultant collapse of the airway. Careful preoperative planning and communication with the anesthesia is advised.

### 4. **Useful External Landmarks in Performing an Arytenoid Adduction and Laryngeal Reinnervation**

Bob B. Armin, BS, Los Angeles, CA  
Gerald S. Berke, MD\*, Los Angeles, CA  
Dinesh K. Chhetri, MD, Los Angeles, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to competently use external landmarks to perform an arytenoid adduction with reinnervation surgery successfully.

**OBJECTIVES:** Knowledge of the location of the muscular process of the arytenoid cartilage and the recurrent laryngeal nerve is essential to performing a successful arytenoid adduction and laryngeal reinnervation surgery. We describe external landmarks useful in locating these structures. **STUDY DESIGN:** Cadaveric laryngeal dissection. **METHODS:** Posterior laryngeal dissection was performed in ten human larynges. The position of the muscular process of the arytenoid was measured bilaterally relative to the inferior and superior borders of the thyroid lamina. The recurrent laryngeal nerve was followed distally from slightly below the level of the cricothyroid joint to its genu where its vertical course changes to an oblique intralaryngeal course. **RESULTS:** The muscular process of the arytenoid was always found halfway between the roots of the superior and inferior cornu of the thyroid lamina. The recurrent laryngeal nerve was found just deep to the cricothyroid joint and lateral to the posterior cricoarytenoid muscle. There were no other nerves in this area. **CONCLUSIONS:** This study finds that the superior and inferior roots of the thyroid lamina are useful intraoperative landmarks to locate the muscular process of the arytenoid. The cricothyroid joint provides a good starting point to locate the recurrent laryngeal nerve, which can be identified slightly deeper between it and the posterior cricoarytenoid muscle.

## 5. Correlation of Physical Examination and Rotation Chair Testing

Michelle G. Arnold, MD, San Diego, CA (*Resident Travel Award*)  
Derin C. Wester, PhD, San Diego, CA  
Ben J. Balough, MD, San Diego, CA  
Michael E. Hoffer, MD\*, San Diego, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to use a battery of vestibular physical examination tests to evaluate dizziness and determine when additional formal vestibular testing is needed.

**OBJECTIVES:** Often dizzy patients are evaluated with a variety of electrophysiological tests. These tests require expensive equipment, trained staff, and can be time consuming and uncomfortable for the patient. During the physical exam, numerous simple procedures can be easily performed with minimal equipment or discomfort to the patient. The correlation between these physical exam findings and vestibular testing remains uncertain. Our objective is to evaluate the reliability and predictive value of a standardized vestibular physical exam in comparison to objective rotational chair vestibular testing. Another goal of this study is to help examiners determine when formal vestibular testing is needed. **STUDY DESIGN:** A retrospective chart review of patients with the complaint of dizziness that underwent physical examination and rotation chair testing by the second author over a two year period from January 2001 to December 2002 was performed. **METHODS:** All patients had been initially evaluated by either an otolaryngology staff or resident and were subsequently referred to the vestibular clinic for formal rotation chair testing. A battery of five physical examination tests was selected as the "standard set" of tests to be reviewed and compared against the rotation chair test results. The physical exam test battery consisted of: 1) Yaw-Axis Halmagyi head thrust, 2) Frenzel Goggle Gaze, 3) Frenzel Goggle Headshake, 4) the Fukuda Stepping test and 5) the Challenge Gait test. Of 703 charts reviewed, 105 charts were found to have all five physical examination tests performed and were therefore included in the study. Rotation chair testing was completed using the Micromedical System 2000 variable yaw axis computerized rotation chair, which had the ISCAN inferred eye tracking system. The results of the physical examination were then compared to the outcome of the rotation chair. **RESULTS:** Patients were broken down into three groups by age where natural breaks in the data were seen. Group 1 was age 18-35, group 2 ages 35-60, and group 3 ages 60-81. In general we found there was an increasing incidence of abnormal physical exam test results with increasing age groups which was significant at  $p < 0.002$  (table 1). The difference of abnormal test results between males and females was not significant. When comparing the rotation chair to the five tests as a set, the positive predictive value (PPV) and negative predictive value (NPV) of normal chair results to normal physical exam results are 89% and 69% respectively. The sensitivity and specificity were 77% and 85% respectively with a p-value of  $<0.05$ . When the tests were broken down individually and compared with the rotation chair, the PPV ranged between 87%-100%. The PPV, NPV, sensitivity, specificity, and p-values were calculated for the peripheral, right, left, and central rotation chair results compared with physical exam results (Table 1). **CONCLUSIONS:** We present our data in terms of sensitivity and specificity. In doing so, we assumed the rotation chair to be the "gold standard" and assumed its diagnosis to be true. We are not claiming that the rotation chair is or should be considered the test of choice, but are only using this as the basis upon which the clinical exam is tested. The results of this study demonstrated excellent positive predictive value with good specificity but poor to fair sensitivity between the physical exam test and rotation chair testing. History and physical examination continue to be essential in the diagnosis of dizziness. A variety of physical examination techniques are available and are subject to inter-evaluator discrepancy within and across clinics. We have found that a test battery of five physical examination tests demonstrates excellent PPV at 89% with good sensitivity and specificity when tested against the rotation chair at 77% and 85% respectively. While rotation chair testing adds information when the diagnosis remains equivocal, a physical examination utilizing the above mentioned tests could help determine the need for further testing.

## 6. The Forgotten Flap: The Deltopectoral Flap in Reconstruction of Cutaneous Defects of the Head and Neck

Lucy J. Barr, MD, Salt Lake City, UT  
Pramod K. Sharma, MD, Salt Lake City, UT

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the surgical technique and appropriate application of the deltopectoral flap. Participants will be able to discuss and compare surgical reconstructive options for large cutaneous defect of the head and neck region.

**OBJECTIVES:** The study goal is to show that the deltopectoral regional fasciocutaneous flap is a viable reconstructive option for large sized cutaneous defects in the head and neck region. **STUDY DESIGN:** Prospective case series. **METHODS:** The charts of all patients who underwent a deltopectoral flap by the senior author for reconstruction of cutaneous defects of the head and neck at our institution from 2002 to 2005 were reviewed. There were 9 men and 3 women with a mean age of 56 (range 1-81). The mean defect size was 71 cm<sup>2</sup> (range 27.5-143 cm<sup>2</sup>). The flap size was measured in terms of degree of lateral and posterior extension over the deltoid. Postoperative photographs are reviewed. **RESULTS:** Primary closure of the donor site defect was accomplished in 46% (6 of 13 patients), with the remainder requiring a split thickness skin graft. There were no major complications resulting from elevation or inset of the flap. There were no cases requiring a return visit to the OR. The minor surgical complication rate was 33% (4/12). The overall flap survival rate was 100% with 2 cases of mild distal ischemia treated with local wound care. **CONCLUSIONS:** The deltopectoral flap is a relatively simple and effective technique for the reconstruction of large cutaneous defects in the head and neck region and should remain a useful option in the head and neck surgeon's versatile reconstructive armamentarium.

## 7. The Use of Indermil® in Head and Neck Surgery

Amol M. Bhatki, MD, San Francisco, CA  
Karsten Munck, MD, San Francisco, CA  
David W. Eisele, MD\*, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to explain Indermil's properties as a tissue adhesive and discuss the advantages of tissue adhesive closures.

**OBJECTIVES:** N-butyl-2-cyanoacrylate (Indermil®; Tyco Health, Inc., Dublin, Ireland) is a liquid adhesive being used with increasing frequency in the closure of traumatic lacerations and surgical incisions. When properly applied, clinical studies have shown Indermil® to provide excellent cosmetic results with a low risk of complications such as wound infections, skin reactions, and wound dehiscence. The purpose of this study is to confirm that Indermil® is safe and efficacious when used in the head and neck. **STUDY DESIGN:** Retrospective review. **METHODS:** Records of 24 consecutive patients with Indermil® closure after parotidectomy, laryngoplasty, thyroidectomy, parathyroidectomy, and neck lymphadenectomy were retrospectively reviewed. Mean follow-up was 58.5 days. The length of incision, operative procedure, evidence of wound dehiscence, and suspected infection with or without confirmatory cultures were recorded. **RESULTS:** Of the 24 patients, 4 underwent neck dissection, 5 thyroidectomy with neck dissection, 10 thyroidectomy or parathyroidectomy, 4 laryngoplasty, and 1 total laryngectomy with unilateral neck dissection. One patient developed postoperative cellulitis following chylous fistula. No patient developed a wound dehiscence or a draining wound. **CONCLUSIONS:** The use of Indermil® for closure of surgical wounds in the head and neck is safe with only 1 out of 24 patients developing a mild wound infection.

## 8. Complete Traumatic Scalp Avulsion: An Evidence Based Treatment Algorithm

John B. Bitner, MD PhD, Rochester, MN  
Eric J. Moore, MD, Rochester, MN  
Michael Y. Byun, MD, Northbrook, IL

**EDUCATIONAL OBJECTIVE:** We present a case of a young adult female factory worker whose ponytail was caught in a machine at work, resulting in a complete scalp avulsion. Through this case and a review of the literature, we have developed a treatment algorithm for scalp deformities with loss of tissue for best reconstructive results. We will primarily discuss traumatic loss, but the principles may be applied to tissue loss of the scalp from other causes. A comparison of treatment approaches will be

made.

**OBJECTIVES:** Understand treatment of traumatic tissue loss of the scalp through development of an evidence based algorithm. **STUDY DESIGN:** Case presentation and literature review. **METHODS:** Literature review. **RESULTS:** Methods in treating traumatic tissue loss of the scalp include vascular reanastomosis, free graft, local and regional rotational flaps, full and split thickness skin grafts and healing by secondary intent. Tissue expanders may also be useful in this surgical challenge. **CONCLUSIONS:** There are a number a treatment modalities when approaching traumatic tissue loss of the scalp. Degree of loss, remnant tissue both brought in by the patient as well as tissue still attached to the bone are important considerations. Evidence supports use of vascular reanastomosis as the first and most effective option. When not possible a number of less successful options exist. A complete algorithm will be presented.

#### 9. The Effects of Dust Mite Allergies on the Phonation Subsystem

Michael A. Carron, MD, Detroit, MI  
Robert J. Stachler, MD, Detroit, MI  
James P. Dworkin, PhD, Detroit, MI  
John H. Krouse, MD PhD\*, Detroit, MI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to better understand the effects of perennial allergies on the form and function of the larynx. Specifically, readers will be exposed to the role of skin prick allergy testing and voice laboratory analyses in analyzing the phonation subsystem in allergic and nonallergic patients.

**OBJECTIVES:** The primary purpose of this study is to compare laryngeal form and function of patients with dust mite allergies with that of a matched group of nonallergic individuals. Skin prick testing and voice laboratory analyses are used. Data will be used to design effective treatment models to reduce the primary and secondary phonation subsystem manifestations of perennial allergy. **STUDY DESIGN:** Prospective, blinded case control study. **METHODS:** Forty patients were recruited in accordance with IRB at our institution. All patients underwent skin prick testing for the perennial allergen *D. pteronyssinus*. Those testing positive became experimental subjects and those negative became control subjects, provided they satisfied all other inclusion/exclusion criteria. All subjects underwent voice laboratory analyses with recordings of normal speech, acoustic analysis of voice, speech aerodynamic testing, videostroboscopy, voice handicap index and allergy symptoms questionnaire. Results between the two groups were compared by blinded referees and statistically analyzed for significance. **RESULTS:** Both quantity of mucous and viscosity of mucous were increased in allergic patients compared to nonallergics. Otherwise there were no significant differences between the two groups. **CONCLUSIONS:** The phonation subsystem is affected in persons with perennial allergies, like those allergic to *D. pteronyssinus*. This is demonstrated by an increased production and viscosity of mucous. Interestingly, other measures of clinical voice analysis remain unaffected.

#### 10. Long-Term In Vivo Analysis of a Novel Hyaluronan Biomaterial for Cartilage Tissue Engineering

James K. Chan, MD, Cleveland, OH  
Daniel S. Alam, MD, Cleveland, OH  
Aniq B. Darr, BS, Cleveland, OH  
Anthony C. Calabro, PhD, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the present limitations of cartilage tissue engineering research, compare a novel approach for developing a cartilage-like material with existing models, and to discuss the relevance of a novel hyaluronan for cartilage tissue engineering as well as for use as a soft tissue injectable.

**OBJECTIVES:** To evaluate histologically in an immunocompetent animal model the long-term results of a novel cross-linked hyaluronan biomaterial that has potential to be used as bioengineered cartilage or a soft tissue injectable. **STUDY DESIGN:** In vivo analysis in an immunocompetent rat animal model. **METHODS:** A novel hyaluronan biomaterial was evaluated in vivo in an immunocompetent rat animal model. Standardized hydrogel plugs at concentrations of 6.25mg/ml, 12.5mg/ml, 25mg/ml, 50mg/ml, and 100mg/ml were implanted subcutaneously into three different sites on the back of Sprague-Dawley rats. They were surgically harvested and evaluated grossly and histologically at 6 and 12 months. The specimens were paraffin embedded, sectioned on a microtome, and stained with hematoxylin and eosin. By varying the concentration of the biomaterial, we evaluated whether it could be molded into complex anatomic shapes such as an ear or passed through a syringe for use as a soft tissue injectable. **RESULTS:** Gross and histologic analysis revealed the presence of the novel hyaluronan biomaterial at 12 months. Furthermore, histologic analysis demonstrated no evidence of rejection or inflammatory infiltrate. Additionally, this material can be molded into complex anatomic shapes such as an auricle or can be passed through a syringe for use as an injectable. **CONCLUSIONS:** Utilizing novel tyramine cross-linking chemistry, a stable hyaluronan biomaterial can be created with the potential to be used as bioengineered cartilage or as an injectable soft tissue filler. In vivo and histologic analysis in an immunocompetent animal model demonstrates the persistence of this material in various concentrations at 12 months. Depending on the particular concentration, this material has the versatility to be used as a cartilage-like graft or a soft tissue injectable.

#### 11. Magnetic Resonance Imaging Quantifies Schwannoma Xenografts in Immunocompromised Mice

Long-Sheng Chang, PhD, Columbus, OH  
Abraham Jacob, MD, Columbus, OH (*Presenter*)  
Mark Lorenz, MD, Ann Arbor, MI  
Jonathan Rock, BS, Columbus, OH  
Elena M. Akhmeteyeva, MD PhD, Columbus, OH  
Georgeta Mihai, MS, Columbus, OH  
Brian A. Neff, MD, Rochester, MN

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the limitations of currently available vestibular schwannoma animal models, comprehend the relevance of xenograft models to translational research, and discuss the utility of high field MRI in the noninvasive assessment and quantification of vestibular schwannoma xenografts in immunocompromised mice.

**OBJECTIVES:** Vestibular schwannomas (VS) are posterior fossa 8th nerve tumors caused by inactivation of the neurofibromatosis type 2 (NF2) gene. Transgenic and knockout mice with NF2 mutations have developed malignant appearing schwannomas in various locations but have not engendered tumors on their vestibulocochlear nerves. Human VS xenografts may be more suitable in vivo models for translational research. Our goal was to establish a noninvasive, quantifiable VS xenograft model in mice. **STUDY DESIGN:** Animal study. **METHODS:** KE-F11 and RT-4 malignant rat schwannoma cells were implanted into the thighs of severe combined immunodeficiency (SCID) mice (4 each). These mice were imaged 2 weeks later using a 4.7-tesla MRI. Human VS tissues were also implanted in 8 SCID mice, and MRI images were obtained over 1, 2, 3, and 6 months. Three dimensional tumor volumes were calculated for all human VS implants. Histopathological examination was performed on tumor bearing mice. **RESULTS:** Both KE-F11 and RT-4 generated grossly visible tumors within 2 weeks. MRI and histology found solid tumors in all KE-F11 mice and cystic schwannomas in all RT-4 mice. MRI successfully detected human VS implants in 8 of 8 mice over 6 months. Tumor volumes demonstrated significant variance, but 2 of the mice imaged at 6 months grew significantly. In a subset of 5 mice imaged over 3 months, variance was more limited. **CONCLUSIONS:** The 4.7-tesla MRI provides valuable normative data on expected variance in the growth and survival of vestibular schwannoma xenografts. Deviations from this expected variance may be used to evaluate the effects of potential chemotherapeutic interventions.

## 12. Pediatric Coin Ingestion Injuries: Recommendations for Prevention

Xiao Chen, MS, Oakbrook, IL  
Daniel K. Stool, BA, Oakbrook, IL (*Presenter*)  
Scott M. Milkovich, PhD, Oakbrook, IL  
Gene D. Rider, BS, Oakbrook, IL  
James S. Reilly, MD, Wilmington, DE

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the approaches towards effective injury prevention from foreign body injuries involving coins among children.

**OBJECTIVES:** Coin ingestion is the most common pediatric foreign body (FB) injury in the US. The objective is to determine if a relationship exists between the type of coins in circulation, the ages of children at risk, and the occurrences and severity of the injury. Prevention strategies are most effective when directed to the benefits of the highest risk population. **STUDY DESIGN:** A ten year (1994-2003) review of the US Consumer Product Safety Commission (CPSC) data was conducted to understand coin related injuries occurring to children under fifteen. **METHODS:** Logistic regression and classification and regression trees (C&RT) were applied for statistical analyses. **RESULTS:** An average of 25,000 children is evaluated for coin related injuries each year by emergency departments (ED). Over 70% of these injuries occurred to children under five. The most frequent injuries (almost one-half) involved pennies, which are also the most common coin in circulation. Larger size denominations of coin appeared less frequently and primarily among older children. Quarters are more likely to result in hospitalization injuries than other coins. An average of 2 deaths is reported each year from coins, and these are generally among infants under one. **CONCLUSIONS:** Coins continue to cause significant morbidity to children. The most important risk factor accounting for injury occurrences is the exposure rate determined by quantity of a particular coin in circulation. In comparison, sizes of coins are critical to determine the severity of FB injuries and the ages at highest risk. The mortality of coin related FB events remains uncommon.

## 13. Mini-Trephination as an Adjunctive Measure in the Endoscopic Management of Complex Frontal Sinus Disease

Alen N. Cohen, MD, Los Angeles, CA (*Resident Travel Award*)  
Marilene B. Wang, MD\*, Los Angeles, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the rationale for frontal sinus mini-trephination with endoscopic frontal sinus exploration, a technique that is particularly useful for treating complex frontal sinus disease with minimal morbidity and excellent symptomatic relief for patients.

**OBJECTIVES:** This study was performed to evaluate the safety and efficacy of frontal sinus mini-trephination in combination with endoscopic frontal sinus exploration for management of complex frontal sinus disease. **STUDY DESIGN:** Retrospective review. **METHODS:** A retrospective review was performed of the medical records of 11 patients treated with mini-trephination, in conjunction with endoscopic frontal sinus exploration, between July 2004 and July 2005. **RESULTS:** Eight men and 3 women with an age range of 15 to 73 years (median, 43 years) with diagnoses of chronic sinusitis (n=8), nasal polyposis (n=3), frontal mucocele (n=2), allergic fungal sinusitis (n=2) and inverting papilloma (n=1) underwent either unilateral (n=8) or bilateral (n=3) frontal sinus mini-trephination as an adjunctive measure during primary or revision functional endoscopic sinus surgery (FESS) in the management of their frontal sinus disease. The procedure was particularly effective in patients with thick, inspissated mucous or fungal debris in the frontal sinus, as it allowed thorough irrigation of the contents from above. Median follow-up was 7.3 months after surgery. There were no complications attributed to the procedure, and all patients had improvement of their sinus symptoms at last follow-up, with no evidence of recurrence of their frontal sinus disease. **CONCLUSIONS:** Mini-trephination is a safe and effective adjunct in the management of complex frontal sinus disease, as it allows identification of the frontal recess and vigorous irrigation of the sinus, without causing undue surgical trauma to the nasofrontal duct region. The procedure, in conjunction with FESS, is especially useful for allergic fungal sinusitis and frontal sinus mucoceles.

## 14. Detection of Immunoreactive IL-6 in Chronic Rhinosinusitis (CRS)

David B. Conley, MD, Chicago, IL  
Brian P. Tancowny, BSC, Chicago, IL  
Lydia Suh, BS, Chicago, IL  
Robert C. Kern, MD\*, Chicago, IL  
Robert P. Schleimer, PhD, Chicago, IL  
Leslie C. Grammer, MD, Chicago, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to have knowledge about the levels of the proinflammatory cytokine IL-6 and SEB in CRS both with and without polyps.

**OBJECTIVES:** Chronic rhinosinusitis (CRS) is an inflammatory disease manifesting at least two phenotypes: CRS with nasal polyps (CRSwNP) and without nasal polyps (CRSsNP). The superantigen hypothesis for CRS proposes that staphylococcus aureus exotoxins play a role in the inflammation observed. IL-6 is a proinflammatory cytokine produced by many cell types. The objective of this study is to assess tissue IL-6 levels and staphylococcus aureus exotoxin B (SEB) in CRSwNP, CRSsNP, and normal paranasal sinus tissue. **STUDY DESIGN:** Subjects were accrued prospectively prior to undergoing endoscopic sinus surgery (ESS). All met the Allergy and Sinus Health Partnership definition of CRS and failed to respond to medical therapy. **METHODS:** Paranasal sinus tissue and nasal mucus was acquired at the time of ESS. IL-6 protein levels were measured in extracts of tissue by cytokine bead array and SEB was measured by ELISA. Data are reported as pg per mg of total protein. **RESULTS:** Mean IL-6 levels +/-S.E.M. were: CRSwNP 39+/-22 pg/mg, CRSsNP 3+/-1 pg/mg, control tissue 3+/-1 pg/mg. SEB was detected (in mucus or tissue): CRSwNP 4/11 (37%), CRSsNP 1/6 (17%), and control tissue 0/4 (0%). There is a trend towards higher levels of IL-6 and SEB in CRSwNP compared to CRSsNP and control sinus mucosa. **CONCLUSIONS:** This study demonstrates a trend toward increased IL-6 in CRSwNP. Further studies are ongoing to expand the data set and clarify the influence of phenotype of CRS on the inflammatory response. With the data to date, it is not possible to associate levels of SEB with levels of IL-6.

## 15. The Use of Three Dimensional Computed Tomography Imaging Preoperatively to Optimize Placement of Titanium Implants for Implant Supported Auricular Prosthesis

David A. Denman, MD, Omaha, NE  
Gorden K. Mahanna, DDS, Omaha, NE  
David P. Poage, MD, Omaha, NE  
Joshua J. Espelund, BA, Omaha, NE  
Gary F. Moore, MD\*, Omaha, NE

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss our technique of using three dimensional computed tomography imaging preoperatively to determine the optimal location of titanium implants in patients requiring implant supported auricular prosthesis.

**OBJECTIVES:** The purpose is to describe our method of using three dimensional (3-D) computed tomography (CT) imaging preoperatively to determine the optimal location of titanium implants in patients requiring implant supported auricular prosthesis. **STUDY DESIGN:** This is a retrospective case series review of 4 subjects undergoing placement of osseointegrated titanium implants for support of auricular prosthesis. **METHODS:** Based on a moulage of the contralateral ear, a template of the prosthetic ear is reproduced in clear acrylic. Proposed implant sites are chosen, drilled out and filled with a radio opaque material. After securing the template to the patient, we

perform 3-D CT scanning of the temporal bone to determine bone thickness at the proposed implant sites. Modifications are performed as needed based on the imaging results and a surgical splint is created to precisely guide implant location at the time of surgery. **RESULTS:** All subjects were successfully fitted with auricular prostheses. The goal of implanting 3 titanium implants at the preoperatively chosen sites was met in 3 of the 4 subjects. In one case, the cortical bone over the most inferior implant site was too thin and the subject was fitted with only 2 implants. **CONCLUSIONS:** Implant supported auricular prostheses are frequently utilized in with auricular deformities. Preoperative determination of anatomic variations of cortical bone thickness is critical for choosing the appropriate implant site for successful surgery. The utilization of 3-D CT imaging in placement of osseointegrated implants provides the surgeon with a precise anatomic roadmap of the temporal bone, assisting in optimal placement.

**16. Frontal Sinus Cranialization Using the Pericranial Flap: An Added Layer of Protection**

Alexander S. Donath, MD, St. Louis, MO (*Resident Travel Award*)  
Raj Sindwani, MD FRCS, St. Louis, MO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss use of the pericranial flap for frontal sinus cranialization, including the indications, technique, and associated complications, and should be able to compare this technique to alternative methods of frontal sinus cranialization.

**OBJECTIVES:** Extensive fractures involving the anterior and posterior tables of the frontal sinus are treated by frontal sinus cranialization. During this procedure, the disrupted posterior wall of the frontal sinus is removed, the sinus mucosa is drilled away, and the brain and dura are permitted to rest against the repaired anterior wall and sinus floor. Conventionally, the area originally occupied by the frontal sinus is left as dead space or filled with nonvascular free adipose tissue or alloplastic material. We describe a method of cranialization utilizing a pericranial flap and report our experience with this technique. **STUDY DESIGN:** Retrospective study. **METHODS:** The medical records of patients who underwent frontal sinus cranialization using the pericranial flap at our institution were reviewed. Demographics, indications for cranialization, complications, and perioperative outcomes were examined. **RESULTS:** A total of 19 patients underwent (bilateral) frontal sinus cranialization with the pericranial flap between 1997 and 2005. Indications included extensive frontal sinus fractures involving the posterior table (78.9%), mucocele (10.5%), frontal bone osteomyelitis (5.3%), and arteriovenous malformation (5.3%). There were no intraoperative complications. A delayed postoperative CSF leak occurred in one patient with extensive skull base injuries and was repaired endoscopically. Follow-up ranged from 9 months to 4.8 years. **CONCLUSIONS:** The pericranial flap is easily harvested and versatile. Utilizing this vascularized tissue during cranialization affords added protection by providing an extra barrier between the intracranial cavity and the frontal bone and sinonasal tract. This technique is inexpensive, safe, and effective and should be considered when cranialization of the frontal sinus is performed.

**17. Cochlear Implant Facial Nerve Stimulation Treated With Botulinum Toxin**

Karen J. Doyle, MD PhD\*, Sacramento, CA  
Jonathan M. Sykes, MD, Sacramento, CA  
Stuart G. Gherini, MD, Sacramento, CA  
David A. Sheaffer, MA, Sacramento, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the application of botulinum toxin injection for treatment of unwanted facial nerve stimulation by the cochlear implant.

**OBJECTIVES:** Sometimes cochlear implant usage can be limited by unwanted electrical stimulation of the facial nerve resulting in uncomfortable facial spasm. This condition is usually treated by deprogramming the offending electrode channels, however, reducing the number of stimuable channels may result in suboptimal speech understanding. In this paper we present a case of a patient with electrical stimulation of his facial nerve, which was successfully treated with periodic botulinum toxin injections. **STUDY DESIGN:** Single retrospective case study. **METHODS:** Single retrospective case study. **RESULTS:** Botulinum toxin injection of the right orbicularis oculi at six month intervals permitted programming of five additional cochlear implant channels and subsequent improved word discrimination. **CONCLUSIONS:** Botulinum toxin injection of facial muscles stimulated by the cochlear implant can permit stimulation of previously unusable electrode channels.

**18. Endolymphatic Duct Violation During Middle Fossa Dissection of the Internal Auditory Canal: A Human Temporal Bone Radiographic Study**

Brian R. Drew, MD, Cleveland, OH  
Maroun T. Semaan, MD, Cleveland, OH  
Daniel P. Hsu, MD, Cleveland, OH  
Cliff A. Megerian, MD\*, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the risk of endolymphatic duct violation during acoustic neuroma surgery and discuss why the middle fossa approach may offer advantages over the retrosigmoid approach with regards to hearing preservation.

**OBJECTIVES:** Successful hearing preservation after acoustic neuroma resection is sometimes complicated by delayed hearing deterioration. The middle fossa approach appears to offer superior long-term hearing results when compared to the retrosigmoid surgical approach. The goal of this study is to investigate the hypothesis that internal auditory canal (IAC) drilling during middle fossa acoustic neuroma removal is associated with a lower incidence of endolymphatic duct (ELD) injury, a potential cause of delayed hearing loss known to accompany retrosigmoid hearing preservation dissection techniques. **STUDY DESIGN:** A human temporal bone anatomic and radiographic study complemented with a literature review. **METHODS:** Twenty human temporal bones were analyzed with high resolution multislice computed tomography (HRMCT) and subjected to standard extended middle fossa IAC dissection with labyrinthine preservation and follow-up HRMCT for analyses of the ELD. **RESULTS:** Zero of 20 (0%) temporal bones were found to have violation of the ELD with preservation of the labyrinthine structures and the endolymphatic sac. Reviews of human and animal studies indicate that injury to the ELD may create endolymphatic hydrops, a known cause of hearing deterioration. **CONCLUSIONS:** The ELD is not vulnerable to injury during IAC dissection using the middle fossa approach. A previous radiographic study has shown that the ELD is violated in 24% of temporal bones during retrosigmoid dissection of the IAC. These findings support and may help explain other outcome studies that show that long-term hearing results are superior with the use of the middle fossa approach when compared to results following retrosigmoid dissection.

**19. The Use of Ultrasound Guided Botulinum Toxin Injection to Treat Sialorrhea**

Kristin K. Egan, MD, San Francisco, CA  
Susan Langmore, PhD, San Francisco, CA  
Lisa A. Orloff, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** After hearing this presentation, the participant will be able to describe the technique and benefits of ultrasound guided botulinum toxin injection to treat sialorrhea.

**OBJECTIVES:** This study served to determine the feasibility and efficiency of treating sialorrhea with ultrasound guided injections of botulinum toxin. **STUDY DESIGN:** Prospective observational study. **METHODS:** Patients with sialorrhea due to amyotrophic lateral sclerosis were seen and evaluated. They then underwent botulinum toxin injections into their major salivary glands via ultrasound guidance. Guidelines for determining the dosage and target of injection were developed. **RESULTS:** The patients demonstrated subjective improvement in their sialorrhea after botulinum toxin injections. Subjective use correlated with a decreased use of other systemic anticholinergic medications. **CONCLUSIONS:** Ultrasound guided injection of botulinum toxin into the major salivary glands of patients suffering from sialorrhea is a reliable and effective treatment.

**20. Gold Nanoparticle Quenching of Native Autofluorescence in Oral Cancer: Designing Molecular Markers for Potential In Vivo Diagnosis**

Ivan H. El-Sayed, MD, San Francisco, CA  
Xiaohua Huang, BS, Atlanta, GA  
Fima Marcharet, Los Angeles, CA  
Mostafa A. El-Sayed, PhD, Atlanta, GA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand that cancer has optical properties that allow for its spectroscopic detection and that metallic noble nanoparticles may be used to detect and destroy cancer of the upper aerodigestive tract using light based systems.

**OBJECTIVES:** Noble metallic nanoparticles have unique optical properties that may be exploitable to aid in noninvasive early detection of cancer. Metallic nanoparticles act as intense light scatterers and absorbers and can also enhance or quench fluorescence of adjacent molecules. Advances in spectroscopy demonstrate the potential for noninvasive detection of cancer based on the inherent autofluorescence of cancer using the FDA approved technique of laser induced fluorescence or the investigational techniques of confocal endoscopy and trimodal spectroscopy. The major biomolecules responsible for autofluorescence are nicotinamide adenine dinucleotide (NADH) and collagen. We hypothesize that noble metallic nanoparticles may be used to modify the fluorescent emissions of the biomolecules responsible for tissue autofluorescence. **STUDY DESIGN:** In vitro study of NADH, collagen and two oral cancer cell lines (HSC 3, HOC 313) and one benign control (HaCat). **METHODS:** The fluorescence was measured in the presence of gold nanospheres. **RESULTS:** Maximum intensity fluorescent emissions of the component fluorophores, NADH and collagen, and living whole cells were quenched by approximately 20% in a fluidic environment. **CONCLUSIONS:** Little research has been published on the optical properties of metallic nanoparticles in physiologic fluid environments. In previous reports, we demonstrated the potential use of metallic nanoparticles as light scatterers and absorbers for the selective detection and photothermal destruction of cancer. Gold nanoparticle quenching of native autofluorescence appears useful to enhance the sensitivity of fluorescent based spectroscopic techniques for the detection of cancer. The scientific basis of quenching appears to be due to photonic absorption due to proximity of the adjacent fluorophores.

**21. Adjunctive Use of a Fibrin Sealant for the Management of Intraoperative Chyle Fistula**

Samuel H. Engel, MD MPH, St. Louis, MO  
Brian Nussenbaum, MD\*, St. Louis, MO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the utility of the adjunctive use of a fibrin sealant system in the management of an intraoperative chyle fistula.

**OBJECTIVES:** The optimal treatment for postoperative chyle fistula is prevention by prompt identification and effective management intraoperatively. There are many described methods for treating intraoperative chyle leaks, but the success of any specific technique has not been reported. We evaluated the success of a technique that utilizes fibrin sealant as an adjunctive measure for repairing chyle leaks found during neck surgery. **STUDY DESIGN:** Case series. **METHODS:** All otolaryngology patients charged for fibrin sealant (Tisseel®) between January 1, 2001, and December 1, 2004, were retrospectively identified and charts reviewed. Cases of fibrin sealant used to treat a chyle leak initially identified during neck surgery were included. **RESULTS:** Twenty-five patients were identified. All patients were treated with fibrin sealant after placement of clips (12), suture ligatures (10), or clips and ligatures (3). The success rate was 80%. The leak was completely controlled when applying the fibrin sealant in 11 of 20 patients evaluable for this parameter but this did not impact upon the success of this technique. Prophylactic postoperative dietary modification did not affect the success either. Postoperative chyle fistula presented in 5 patients from 2 to 46 days after surgery. Three of the early postoperative chyle fistulas were successfully treated nonoperatively while the 2 patients with delayed presentation ultimately required surgical management. **CONCLUSIONS:** The adjunctive use of fibrin sealant is a successful technique for managing chyle leaks identified during neck surgery. This improves upon the 50% success rate previously suggested from anecdotal experience. When this technique fails, presentation of a postoperative chyle fistula can be delayed.

**22. Morphology of Intracochlear Schwannomas—Study of Seven Temporal Bones**

Jose N. Fayad, MD, Los Angeles, CA  
Boris G. Naraev, MD, Los Angeles, CA  
Fred H. Linthicum, Jr., MD\*, Los Angeles, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to describe histopathological characteristics of intracochlear schwannomas.

**OBJECTIVES:** Review histopathological characteristics of intracochlear schwannomas. **STUDY DESIGN:** Morphologic evaluation of seven temporal bones from six patients in which intracochlear schwannomas were unexpectedly found. **METHODS:** The medical records of six patients with unexpected intracochlear tumors were reviewed. Morphologic studies of the seven temporal bones were performed. The medical records of patients diagnosed with intracochlear schwannomas were also reviewed. **RESULTS:** Small isolated solitary intracochlear schwannomas were found and described in seven temporal bones obtained from six patients. Clinically one out of 12 patients diagnosed with an intracochlear schwannoma went on to have surgery for disabling vertigo. **CONCLUSIONS:** Intracochlear schwannomas are rare tumors. A small number will grow into the internal auditory canal and will require resection.

**23. Orbital Prosthetics: An Introduction for the Otolaryngologist—Head and Neck Surgeon**

Steven M. Feinberg, MD, Orange, CA (*Resident Travel Award*)  
Ryan P. Camilon, Anaheim Hills, CA  
Terry Y. Shibuya, MD\*, Irvine, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should have a greater understanding of the process involved in the fabrication, fitting, and retention of an orbital prosthesis. Guidelines for optimizing orbital exenteration defects so that they may be optimally rehabilitated with orbital prosthetics are provided.

**OBJECTIVES:** To review the history, surgical considerations, psychosocial aspects, retention options, and methods involved in the fabrication of orbital prosthetics. **STUDY DESIGN:** A review of the literature was performed and orbital prosthetics are reviewed. Measurements were made of several stock eyes and custom eyes used in the fabrication of orbital prosthetics. Guidelines for minimum defect volume following orbital exenteration are extrapolated. **METHODS:** A Medline search was performed via PubMed with the search criteria of orbital prosthetics. Measurements were made of stock of prosthetic eyes used in the fabrication of orbital prosthetics. Guidelines are extrapolated regarding the minimum volume of an orbital exenteration defect necessary for fitting of an orbital prosthetic. **RESULTS:** Both stock and custom eyes are available as templates for the fabrication of an orbital prosthetic. Stock eyes are available in a range of sizes, with an average thickness of 13 mm, width of 27 mm, and height of 23 mm. In addition, custom eyes are fashioned and in general are smaller in dimensions than stock eyes. From these measurements, the minimum dimensions of an exenteration defect following surgical reconstruction are estimated. **CONCLUSIONS:** The fashioning of an orbital prosthetic is an integral part of the rehabilitation of patients with orbital exenteration defects. Many surgeons are unfamiliar with the process used to fit and fashion a prosthesis. For this reason inadequate defect volume often remains after surgical reconstruction so that fitting a prosthesis becomes difficult. These guidelines should aid the surgeon with this important aspect of reconstruction and provide a useful review of the topic.

**24. Assessment of Cervical Air Following Facial Trauma**

Carrie E. Flanagan, MD, Minneapolis, MN  
Rick Odland, MD PhD, Minneapolis, MN

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to assess the cause of cervical air and decide on appropriate evaluation and management.

**OBJECTIVES:** Subcutaneous air following facial trauma can be due to perforation of the trachea or upper aerodigestive tract. Thus, routine rigid endoscopy is frequently performed. However, cervical air may come from other sources, including the mediastinum. Pneumomediastinum can be a frequent result of even minor trauma. We report a series of cases in which patients with facial trauma and cervical emphysema did not have a viscus injury. **STUDY DESIGN:** Retrospective case review and literature review. **METHODS:** Cases of facial trauma and subcutaneous air were reviewed. A literature review of reports of cervical air and pneumomediastinum was conducted. **RESULTS:** Patients did have significant cervical subcutaneous emphysema in both anterior and posterior fascial planes. Careful review of the mechanism of injury and physical examination was necessary. CT imaging, contrast swallow studies, and fiberoptic evaluations of the trachea were carefully analyzed and did not show evidence of occult upper aerodigestive tract injuries. Pneumomediastinum was a frequent finding. All patients went on to heal uneventfully with conservative management. **CONCLUSIONS:** Rupture of pulmonary alveoli after a sudden increase in intraalveolar pressure is a common cause of pneumomediastinum. Air may then ascend into the neck. This has been shown to occur spontaneously, secondary to trauma, mechanical ventilation, hyperbaric oxygen therapy, and diving. It is known that approximately 10% of SCUBA divers develop pneumomediastinum. Imaging and careful observation may be sufficient management of cervical air after facial trauma, thereby avoiding the cost and risks of rigid endoscopy in the setting of polytrauma and potential cervical spine injury.

**25. Rheumatologic Pachymeningitis Presenting as Gradenigo's Syndrome**

Theresa A. Gurney, MD, San Francisco, CA  
Lawrence R. Lustig, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize pachymeningitis as a rheumatologic etiology presenting as Gradenigo's syndrome.

**OBJECTIVES:** To recognize pachymeningitis as a rheumatologic etiology presenting as Gradenigo's syndrome. **STUDY DESIGN:** Case report. **METHODS:** Chart review. **RESULTS:** Gradenigo's syndrome is characterized by ipsilateral paralysis of the abducens nerve (cranial nerve six), retro-orbital facial pain and otorrhea. Here we present a case report in which a 45 year old woman presents with headaches, diplopia due to a left abducens palsy, decreased sensation in a left cranial V1 distribution, hearing loss and otorrhea. An MRI demonstrated diffuse thickening of the dura with abnormal enhancement in the left petrous apex consistent with pachymeningitis. An extensive infectious work-up was negative. Laboratory studies were notable for an elevated pANCA and ESR, though rheumatoid factor was within normal limits. An incidentally noted lung nodule was biopsied and found to be consistent with rheumatoid disease. She ultimately was diagnosed with pachymeningitis and petrositis secondary to systemic rheumatoid arthritis. Her symptoms improved with treatment including corticosteroids and methotrexate. **CONCLUSIONS:** Rheumatologic pachymeningitis can present as Gradenigo's syndrome. This case report adds another rare etiology to the literature which includes reports of intracranial plasmacytoma, myeloma and intracranial aneurysm as rare etiologies of Gradenigo's syndrome.

**26. Transforming Growth Factor <sup>2</sup> Type II Receptor (TGF<sup>2</sup>RII) Deletion in Head and Neck Epithelia Results in Metastatic Head and Neck Squamous Cell Carcinoma**

Heather C. Herrington, BA, Portland, OR  
Stephen M. Weber, MD PhD, Portland, OR  
Douglas D. Reh, MD, Portland, OR  
Shi-Long Lu, MD PhD, Portland, OR  
Xiao-Jing Wang, MD PhD, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be aware of a novel mouse model of human head and neck squamous cell carcinoma and understand that transforming growth factor <sup>2</sup> type II receptor (TGF<sup>2</sup>RII) deletion likely plays a role in head and neck cancer progression.

**OBJECTIVES:** The lack of an animal model recapitulating the invasive nature of head and neck squamous cell carcinoma (HNSCC) has hindered pathogenesis studies. Screening for common genetic alterations by quantitative RT-PCR and immunohistochemistry revealed that 60% of HNSCC specimens exhibited a loss of the type II receptor for transforming growth factor <sup>2</sup> (TGF<sup>2</sup>RII). **STUDY DESIGN:** A keratinocyte specific knockout mouse deficient in TGF<sup>2</sup>RII expression in head and neck epithelia was developed as a mouse model of human HNSCC. **METHODS:** We generated and characterized a keratinocyte specific knockout mouse model in which TGF<sup>2</sup>RII can be inducibly deleted in head and neck epithelia. **RESULTS:** Deletion of TGF<sup>2</sup>RII did not result in any spontaneous histologic alterations. However, when DMBA, an inducer of ras mutations, was applied to the oral cavity, mice with homozygous deletion of TGF<sup>2</sup>RII (TGF<sup>2</sup>RII<sup>-/-</sup>) exhibited significant epithelial hyperplasia in the tongue, buccal mucosa, esophagus and forestomach, while mice with wildtype (+/+) or hemizygous (+/-) TGF<sup>2</sup>RII showed no change. Ten weeks after DMBA treatment, TGF<sup>2</sup>RII<sup>-/-</sup> mice developed HNSCC, while TGF<sup>2</sup>RII<sup>+/+</sup> mice remained tumor-free for greater than one year. Similar to human HNSCC tumors, this mouse model exhibited aberrant differentiation, enlarged nuclei, massive mitosis, and perineural invasion. About 30% of these tumors metastasized to jugular lymph nodes. **CONCLUSIONS:** Our study suggests that loss of TGF<sup>2</sup>RII in head and neck epithelia does not initiate HNSCC formation but promotes HNSCC progression. This animal model will also allow further study of molecular mechanisms of HNSCC pathogenesis and for testing novel therapeutic approaches in the future.

**27. Aberrant Methylation of the HRPT2 Gene in Parathyroid Carcinoma**

Kimberly M. Hewitt, MD, Salt Lake City, UT  
Pramod K. Sharma, MD, Salt Lake City, UT  
Wade S. Samowitz, MD, Salt Lake City, UT  
Maurine R. Hobbs, PhD, Salt Lake City, UT

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the current concepts related to parathyroid carcinogenesis.

**OBJECTIVES:** Parathyroid carcinoma is a rare entity. Hyperparathyroidism Jaw Tumor syndrome (HPT-JT) is one of several familial primary hyperparathyroid syndromes. The rate of parathyroid carcinoma in HPT-JT is reported as high as 15%. HPT-JT is linked to a tumor suppressor gene termed HRPT2 on chromosome 1(1q25-q32). Recent studies have reported a link between HRPT2 mutations and sporadic parathyroid carcinoma. Promoter region Cytosine Guanine (CG) islands are typically nonmethylated in actively transcribed genes. Aberrant methylation of promoter CpG sites will often silence or inactivate a gene. Inactivation of tumor suppressor genes is an important early event during carcinogenesis. We hypothesized that hypermethylation is one mechanism of HRPT2 gene inactivation in parathyroid carcinomas. **STUDY DESIGN:** Historical (experimental work done on previously obtained tissue). **METHODS:** This method used bisulfite modified DNA obtained from paraffin embedded samples of 11 parathyroid carcinomas and 37 parathyroid adenoma samples. This results in conversion of unmethylated cytosine, but not methylated cytosine, into thymine within PCR amplified CpG sequences. The modified DNA was evaluated for PCR amplification with cytosine versus thymine containing primers. **RESULTS:** 2 of 11 (18%) parathyroid carcinomas showed amplification patterns consistent with methylation, compared to 0 of 37 sporadic parathyroid adenomas, and 1 of 6 (16%) parathyroid tumor samples from 3 HPT-JT patients. These results were confirmed by sequencing multiple clones from each of these samples. **CONCLUSIONS:** There is increasing evidence that loss of HRPT2 gene expression is strongly associated with parathyroid carcinomas. Our data indicate that methylation of the HRPT2

promoter may be another mechanism by which HRPT2 gene inactivation gives rise to parathyroid carcinomas.

- 28. Western Section Vice President's Resident Research Award**  
**Histopathologic Evidence of an Inner Ear Conductive Hearing Loss With a Large Vestibular Aqueduct**  
Paul K. Holden, MD, Orange, CA (*Resident Travel Award*)  
Fred H. Linthicum, Jr., MD\*, Los Angeles, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to explain the mechanism and histopathology associated with large vestibular aqueduct and inner ear conductive hearing loss.

**OBJECTIVES:** To select, analyze and present histopathologic findings in a case with a large vestibular aqueduct (VA) and inner ear conductive hearing loss. **STUDY DESIGN:** A retrospective case review from the temporal bone bank of a nonprofit research institute. **METHODS:** A database of approximately 1,300 temporal bones was searched for patients with inner ear conductive hearing loss and a large VA. One patient with matching histological and clinical data was located. Measurements were then compared to the temporal bones of ten patients with documented normal hearing. **RESULTS:** The VA, including the duct, was enlarged with a volume measurement of 267 cubic mm from the vestibule to the operculum. The endolymphatic sac was also dilated. The cochlea demonstrated an incomplete interscalar septum type of Mondini dysplasia. **CONCLUSIONS:** The case presented is the first histopathologic examination of a patient with an apparent inner ear conductive hearing loss related to an enlarged VA. The authors discuss a mechanism by which this relationship may be causal.

- 29. Power Rhinoplasty: The Impact on Resident Training**  
Paul K. Holden, MD, Orange, CA  
Amir M. Karamzadeh, MD, Irvine, CA  
Timothy F. Kelley, MD, Irvine, CA  
Roger L. Crumley, MD MBA\*, Irvine, CA  
Brian J.F. Wong, MD, Irvine, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the use of power instrumentation in rhinoplasty as part of the resident training process. Participants should also be able to explain the suggested use of instruments for this procedure and discuss the advantages and disadvantages over manual osteotome/rasp techniques.

**OBJECTIVES:** Evaluate the use of power instrumentation for dorsal contour refinement during rhinoplasty as a more controlled method for resident training over manual osteotome/rasp techniques. **STUDY DESIGN:** A retrospective study over a two year period of elective open or closed rhinoplasty using rotary microburrs and/or oscillatory rasps for dorsal hump reduction. **METHODS:** Patients undergoing aesthetic nasal surgery using power instrumentation over the two year period were assessed for appropriate hump reduction and complications (if any) related to the use of power instrumentation. The residents performing these procedures were also surveyed and asked to comment on the ease of use, control, and level of comfort with powered instrumentation vs. classic osteotome/rasp techniques. **RESULTS:** A total of twenty cases were evaluated, all of which revealed a satisfactory contour with adequate hump reduction. No complications (such as subcutaneous scar, dorsal irregularities, or skin atrophy) were identified. According to resident surveys, the ability of a graduated, sequential reduction of the dorsum was the most valuable feature of this approach. Each felt that this would be an approach they would use in the future as it extended upon their experience with paranasal sinus surgery. Criticisms of the use of power instruments were focused on the difficulty of placing and removing the burrs/rasps into the subperiosteal pocket in closed approaches and the effect of suction. **CONCLUSIONS:** Power instrumentation in aesthetic nasal surgery for refinement of dorsal contour is a useful method for novice resident training over manual osteotomes/rasps to control over- or under-correction without increasing the rate of complications.

- 30. The Mechanism of Loss of Smell Associated With Intranasal Zinc Gluconate**  
Bruce W. Jafek, MD\*, Denver, CO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss mechanism of the loss of smell due to the use of intranasal zinc gluconate gel.

**OBJECTIVES:** To consider the mechanism of loss of smell with the use of intranasal zinc as the zinc gluconate gel product. **STUDY DESIGN:** Descriptive study and analytical experimental studies with comparison of results to historical controls. **METHODS:** Two different hypotheses were tested: 1) That zinc gluconate gel squirted into the human nose reaches the olfactory cleft. Clinical endoscopic observations evaluated the pathway from the external nasal opening to the olfactory cleft. Cadaver studies were then undertaken to see if the gel reached the olfactory cleft. 2) Protein precipitate studies (albumin) tested the hypothesis that zinc ions from the gluconate salt produced pharmacodynamic changes in the same manner that other zinc salts did. **RESULTS:** 1) The endoscopic studies showed that there is a straight pathway from the nasal sill to the olfactory cleft in most adults. Cadaver studies showed that the gel product is deposited on the olfactory cleft in a volume sufficient to cause toxicity. 2) Protein studies showed precipitation of the protein (albumin) in the same manner produced by zinc sulfate and other zinc salts, with a clear dose-response relationship. This precipitation is in contrast to other salts tested. A comparison of amounts of zinc ion per cm<sup>2</sup> verified the olfactotoxic ED50 of the zinc gluconate, as compared to historical controls. **CONCLUSIONS:** Zinc gluconate gel, applied to the human nose in available doses, produces permanent loss of smell in some patients by the same mechanism as that of zinc sulfate.

- 31. Topical Distribution of Intranasal Gel**  
Bruce W. Jafek, MD\*, Denver, CO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the distribution of nasal gel in the nose, as compared to the distribution of other topical nasal drug delivery systems (e.g., douche, nebulizer).

**OBJECTIVES:** The objective of this study was to assess the nasal anatomical distribution of a topical liquid nasal gel, as compared to other topical nasal drug delivery systems, applying standard rhinologic investigational techniques. **STUDY DESIGN:** Descriptive study. **METHODS:** The hypothesis to be tested is that nasal gel is able to reach the olfactory cleft in the human. Further, because of its viscosity, the gel is deposited there. The Francke-Proetz experimental model (sagittally sectioned cadaver head with glass clamped into place to observe flows in the internal nasal cavity) was adapted to observe the path of liquid nasal gel, with methylene blue tracking dye, pumped into the nose according to contained directions. The spray pathway was documented photographically with and without the glass in place in two unfixed cadavers. **RESULTS:** Preliminary clinical studies showed that there is a clear, straight anatomic pathway from the external opening of the nose to the olfactory cleft, location of the olfactory epithelium, in most adults. In these two non-embalmed cadavers, using the Francke-Proetz experimental model, liquid nasal gel routinely crossed the inferior, middle, and superior turbinates to lodge in the olfactory cleft in a fan shaped distribution, covering the region of the olfactory epithelium. **CONCLUSIONS:** Zinc gluconate gel, applied to the human nose in available doses, according to available instructions, is deposited in the olfactory cleft.

- 32. Lower Eyelid Splinting: An Alternative to the Frost Suture**  
Sumana Jothi, MD, San Diego, CA  
Kristen S. Moe, MD, San Diego, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to describe a new method of postoperative eyelid suspension used for the prevention of eyelid malposition encountered in orbital surgery.

**OBJECTIVES:** The purpose of this article is to describe a new method of postoperative eyelid suspension and an outcome study of its efficacy. The method currently used for this (the "Frost stitch") has numerous disadvantages including complete closure of the eyelid while it is in place. **STUDY DESIGN:** Outcome study of 10 consecutive patients who would potentially need postoperative eyelid suspension were entered into the study. Candidates included patients with entropion, cicatricial ectropion, or severe orbital fractures requiring extended access approaches for repair. Patients were photographed pre- and postoperatively and followed for at least 6 months to monitor for signs of eyelid malposition. **METHODS:** At the conclusion of the surgical procedure, a sheet of Xeroform® gauze was folded into 6 overlapping layers and cut to conform to the shape of the inferior orbital rim from the medial to lateral canthi. The margins were sutured to the lower eyelid using interrupted 4-0 nylon suture. Sutures were placed at the medial and lateral canthi to raise the eyelid above the inferior limbus and at the inferior orbital rim. Pupillary function was checked after surgery and before discharge from the recovery room. The splint was removed on postoperative day 7. **RESULTS:** There were no perioperative complications related to the surgery or placement of the eyelid splint. No cutaneous marks persisted after healing. There were no postoperative complications such as shifting of the splint, ocular damage, or recurrent lower eyelid malposition. One patient had restriction of lower eyelid elevation on upward gaze but was asymptomatic. **CONCLUSIONS:** The lower eyelid splint appears to be efficacious in maintaining lower eyelid position in this series of patients. There were no complications with its use, and the splint was tolerated well. Benefits over the Frost suture include less risk of corneal abrasion, ability to check visual function, and patients' ability to use the eye.

### 33. Outcomes of Reduced Postoperative Stay Following Outpatient Pediatric Adenotonsillectomy

Nader Kalantar, BS, Los Angeles, CA  
Christopher Takehana, BS, Chicago, IL  
Nina L. Shapiro, MD, Los Angeles, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize potential benefits and absence of risks of reduced postoperative stays following outpatient pediatric adenotonsillectomy.

**OBJECTIVES:** To assess outcomes of reduced postoperative recovery room observation times and associated complication rates following outpatient pediatric adenotonsillectomy at a tertiary care medical center outpatient facility over a 7.5 year period. **STUDY DESIGN:** Retrospective chart review. **METHODS:** Charts from all outpatient pediatric adenotonsillectomies performed by one surgeon from January 1998 through June 2005 at a tertiary care center were reviewed. **RESULTS:** 798 charts had sufficient documentation to be included in this study. Mean patient age was 6.8 years (median 5.5 years, range 1.9 to 21 years). There were 53 patients under 3 years old (6.64%), 656 patients ages 3 to 12 years (82.21%), and 89 patients ages 12 to 21 years (11.15%). Mean postoperative recovery room observation time prior to discharge was 1.47 hours (median 1.3 hours, range 0.3 to 7.25 hours). Primary (<24 hours postoperative) complication rate was 0.0075%, and secondary (>24 hours postoperative) complication rate was 0.0050%. There were no significant differences in duration of postoperative recovery room observation or postoperative complications between the three age groups (p=0.10). **CONCLUSIONS:** Very brief postoperative observation periods following outpatient pediatric adenotonsillectomy may be considered safe, with no added risk nor increased short-term or long-term complications. While individual cases may merit prolonged postoperative observation periods, the majority of study patients had no postoperative complications despite shorter recovery room stays than described in prior reports. These data support safety and efficacy of reduced postoperative stays. Our data should be considered in order to increase the efficiency and cost effectiveness of outpatient surgery centers where such procedures are performed.

### 34. A Comparison of Nasal Tip Rotation Indices

David W. Kim, MD, San Francisco, CA  
Kristin K. Egan, MD, San Francisco, CA (*Presenter*)  
Jason A. Biller, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand three different methods used to assess nasal tip rotation from lateral photographs of subjects. The participant will also be able to identify certain nasal and facial features that are not related to nasal tip position which may affect the value of these measurements.

**OBJECTIVES:** The nasolabial angle is currently the most accepted metric to assess the degree of nasal tip rotation. This measurement, however, does not always accurately reflect true nasal tip position. The present study aimed to determine the degree of correlation of three different methods of measuring nasal tip rotation in healthy volunteers. The study also aimed to identify any nasal or facial features unrelated to tip position which consistently altered these indices. **STUDY DESIGN:** Prospective observational study (see methods). **METHODS:** Lateral photographs in the Frankford horizontal plane were taken of one hundred healthy volunteers. Measurements of tip rotation were then calculated for each model using three different methods: nasolabial angle, nostril axis, and "columellar-facial angle". Basic demographic information was recorded for each model. Data was analyzed for degree of correlation of the three values for all models. Nasal and facial features in those subjects with low correlation between measurement methods were analyzed. **RESULTS:** The three values for each measurement method were found to closely correlate to one another in the majority of subjects. In a minority of models, these values showed poor correlation. Premaxillary deficiency, premaxillary excess, nasal tip over-projection, and vertical malpositions of the columella were found to be features associated with poor correlation between measurement methods. **CONCLUSIONS:** No one method of measurement of nasal tip rotation is reliable for all patients. Certain nasal and facial features are more likely to alter these values.

### 35. Full Thickness Skin Graft From the Groin for Coverage of the Radial Forearm Free Flap Donor Site

Theresa B. Kim, MD, San Francisco, CA (*Resident Travel Award*)  
Steven J. Wang, MD, San Francisco, CA  
Kris S. Moe, MD, San Diego, CA  
Lisa A. Orloff, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the use of full thickness skin grafts harvested from the groin for coverage of the radial forearm free flap donor site.

**OBJECTIVES:** To discuss a technique of full thickness skin graft harvested from the groin for closure of the radial forearm free flap donor site. **STUDY DESIGN:** Prospective, nonrandomized case series. **METHODS:** Thirteen patients underwent radial forearm free flap reconstruction for a variety of head and neck defects. All 13 patients had their radial forearm free flap donor sites closed with a full thickness skin graft harvested from the groin, centered over the inguinal crease. **RESULTS:** There were no long-term forearm donor site complications. There were two minor wound dehiscences with minor loss of skin graft. The groin wound healed satisfactorily in all cases. Since the groin wound was hidden in the inguinal crease and closed primarily, postoperative pain related to the skin graft donor site was decreased and cosmesis improved compared to traditional split thickness skin graft techniques. **CONCLUSIONS:** Full thickness skin grafts harvested from the groin can be utilized to cover virtually any radial forearm free flap donor site defect and offer advantages including improved cosmesis and decreased postoperative pain related to the skin graft donor site. Full thickness skin graft closure of the radial forearm defect also provides improved coverage of tendons, better patient mobilization, and superior cosmesis of the forearm wound.

### 36. A Murine Model of Chronic Sinusitis

James J. Klemens, MD, Chicago, IL  
Kenneth Thompson, PhD, Chicago, IL

Alexander J. Langerman, MD, Chicago, IL  
Robert M. Naclerio, MD\*, Chicago, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the characteristics of a chronic sinusitis model.

**OBJECTIVES:** To develop a murine model of chronic sinusitis. **STUDY DESIGN:** Randomized, controlled. **METHODS:** Mice were intranasally inoculated with Sendai virus (SeV) or UV inactivated virus. On days 3 and 10 post-infection, nasal lavage fluid was obtained for viral culture. On days 4, 10 and 38 post-infection, sinus mucosa was harvested and analyzed by flow cytometry for CD3, CD4, CD8, CD25, CD11b, CCR3, and GR1 positive cells. Nasal hyperreactivity to histamine challenge was measured on days 8 and 36 postinoculation. **RESULTS:** On day 3, viral cultures were positive from all SEV inoculated mice, but none of the UV inactivated mice (pd0.0039). There was no growth of virus from either group on day 10. On day 4, flow cytometry on Sendai infected sinus cells showed a significant increase in macrophages (pd0.03) and neutrophils (pd0.02) compared to controls. This inflammation resolved by day 10. On day 38, mice inoculated with SeV had significantly more CD8+ (pd0.044) and CD4+CD25+ (pd0.017) cells than controls. On day 8, there was a significant increase in both sneezing (pd0.002) and nasal rubbing (pd0.002) in the Sendai infected group to histamine challenge compared to controls. This difference continued to day 36. **CONCLUSIONS:** Inoculation with SeV results in an acute infection which resolves spontaneously within 10 days. Infected mice develop a significant increase in T suppressor and T regulatory cells after resolution of the acute infection which persists for at least 38 days. The persistence of these T cells is associated with hyperreactivity to histamine. This model should allow us to clarify the pathophysiology of chronic sinusitis following a viral infection.

**37. Sudden Sensorineural Hearing Loss (SSHL) Etiology, Referral Patterns and Treatment: A Consultant Survey and Our Experience With Heparin Induced Extracorporeal Lipo Phoresis (HELP)**

Christopher G. Larsen, MD, Kansas City, KS  
Gregory A. Ator, MD, Kansas City, KS  
Adam A. Morgan, MD, St. Louis, MO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the referral patterns, etiology, diagnosis and treatment of patients with SSLH. Special emphasis will be placed on a novel rheostatic (blood viscosity altering) therapy (HELP).

**OBJECTIVES:** Discuss the etiology, referral patterns, and treatment of sudden sensorineural hearing loss (SSHL) amongst members of the American Neurotology Society. Review our experience treating this condition with heparin induced extracorporeal lipo phoresis (HELP). **STUDY DESIGN:** An anonymous survey was sent via e-mail to all members of the American Neurotology Society (ANS). A retrospective chart review was conducted to review our experience. **METHODS:** The survey and retrospective chart review were conducted, after obtaining IRB approval, at a tertiary referral center. The primary objective of this study was to characterize ANS members' views of the etiology, diagnostic evaluation, referral patterns, and treatment of SSLH. Our experience in treating 79 patients with this condition since HELP therapy became available was also reviewed. Ten patients were treated with HELP. These patients' audiograms and word discrimination scores were reviewed pre- and post-treatment (1, 3, and 6 weeks post-therapy). **RESULTS:** Responses were obtained from 156 of 517 ANS members (30.2%). The average number of patients treated per month with this condition was 3.6 (range 0-25, median 2.5). The suspected etiology is "viral" or "vascular" in most cases. Eighty-two percent of these patients (survey respondent estimates) present for specialist evaluation and treatment greater than two weeks after onset (outside the reported "therapeutic window"). Almost all panelists (99%) utilize steroids for an average duration of 12.9 days and 60% utilize antiviral therapy for an average duration of 9 days. Inappropriate initial therapy (Valsalva, cerumen drops/irrigation, etc.) was reportedly given to approximately half of patients seen by the panelists. Eight of ten patients given HELP therapy had improvement in speech discrimination with significant, sustained improvement in patients with hypertriglyceridemia and hypercholesterolemia. This therapy shows the most benefit when initiated within 2 weeks of the acute event. **CONCLUSIONS:** Most neurotologists treat SSLH with variable doses and duration of steroids and antiviral medications. The majority of specialists feel that primary care providers are failing to recognize and treat this disease process appropriately and delaying referral. SSLH is an otologic emergency. We need to communicate with referring physicians regarding the differential diagnosis of acute onset hearing loss. HELP may play a role in treatment of patients seen early in the disease course, especially if they have underlying dyslipidemia.

**38. The Risk of Barotrauma in Wegener's Granulomatosis Patients Receiving Jet Ventilation**

Robert R. Lorenz, MD, Cleveland, OH  
Aaron D. Friedman, MD, Cleveland, OH (Presenter)  
Isaac Eliachar, MD\*, Cleveland, OH  
Carol A. Langford, MD MHS FACP, Cleveland, OH  
Atul C. Mehta, MD, Cleveland, OH  
Gary S. Hoffman, MD, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to compare the risks of jet ventilation in patients with Wegener's granulomatosis and subglottic stenosis versus non-Wegener's patients.

**OBJECTIVES:** To determine the relative risk of barotrauma from jet ventilation (JV) in Wegener's granulomatosis (WG) patients with subglottic stenosis (SGS) versus non-WG patients. **STUDY DESIGN:** Retrospective chart review. **METHODS:** The medical records of all patients who were treated at our institution over the last 10.5 years and diagnosed with both WG and SGS were screened. Those patients requiring surgical correction of SGS with intraoperative JV were analyzed. **RESULTS:** 31 patients were identified, ranging from 15 to 65 years old, and 70% were female. 95 surgical procedures were performed using JV, including: intralesional corticosteroid injection (95%), dilation of SGS (97%), and/or topical mitomycin C application (58%). Two patients (2.11% of procedures) suffered iatrogenic pneumothoraces (versus rates of 0.11—0.58% reported in the literature for all-comers receiving JV). Both study patients had undergone multiple prior uneventful SGS procedures with JV. One presented with a cavitary pulmonary mass on chest CT scan and underwent subsequent lung biopsy at an outside institution prior to her pneumothorax, while the other demonstrated stenosis of the distal trachea and proximal main stem bronchi on pre-pneumothorax chest CT. The pneumothoraces resolved with tube thoracotomy or partial pneumonectomy. Subsequent JV was employed in both patients at 2 months and 3 years later, respectively. **CONCLUSIONS:** WG patients with SGS who receive JV are more susceptible to barotrauma than patients without WG. JV remains relatively safe and can still be used in this population. Nevertheless, vigilance for iatrogenic barotrauma should be heightened, especially in patients with WG related lesions of the trachea, bronchi or pulmonary parenchyma.

**39. Patients Undergoing Sinus Surgery: Constructing a Demographic Profile**

Timothy J. Martin, MD, Milwaukee, WI  
Jennifer S. Yauck, MS, Milwaukee, WI  
Timothy L. Smith, MD MPH\*, Milwaukee, WI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to use the demographic profile created for patients undergoing sinus surgery to create a representative patient population in the study of the outcomes of sinus surgery. Additionally, the participants should be able to understand the importance of reliable demographic data in the planning of large outcome based studies and to realize how incomplete data collection impacts the construction of a representative demographic profile for patients enrolling in research studies.

**OBJECTIVES:** The objective of this study is to construct an accurate and representative demographic profile of patients undergoing sinus surgery for chronic rhinosinusitis (CRS). This will enable future studies to enroll representative samples so that results can be more easily compared across studies and generalized to the US popula-

tion. **STUDY DESIGN:** Database interrogation with statistical correction. **METHODS:** The investigators interrogated the databases of the National Survey of Ambulatory Surgery (NSAS) to gather demographic data. Wherever the NSAS provided incomplete characterization, deficiencies were corrected utilizing state level data provided by the Healthcare Cost and Utilization Project (HCUP). The constructed profile was compared to available profiles of patients with CRS and demographic data provided by the Census Bureau of the United States. **RESULTS:** The demographic profile of patients undergoing sinus surgery is 52.7% female, with a mean age of 38.5 years. 93.5% of surgery is performed on an outpatient basis with 78.8% of patients having private insurance sources. No significant difference in occurrence of surgery was found between months of the year or between regions of the country. The constructed race profile is 85.7% white, 5% black, 1.2% Asian/Pacific Islander, 0.2% Native American and 7.8% other. **CONCLUSIONS:** A novel integration of national and state databases can be used to create a demographic profile of patients undergoing surgery for CRS. The creation of this profile enables further study of representative populations of patients with CRS and enables thoughtful analysis of the existing literature. The difficulty in creating the profile highlights the need for complete and accurate healthcare information collection by national and state agencies.

#### 40. Hearing Benefits of the Bone Anchored Cochlear Stimulator

Sam J. Marzo, MD, Maywood, IL  
Suzanne Jeter, CCC-A, Maywood, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand hearing benefits of the bone anchored cochlear stimulator.

**OBJECTIVES:** To discuss hearing benefits of the bone anchored cochlear stimulator BAHA. **STUDY DESIGN:** Retrospective case review. **METHODS:** Between September 2003 and July 2005, 48 patients underwent implantation of a BAHA for rehabilitation of a unilateral conductive or sensorineural hearing loss. The charts of these patients were reviewed. Patients completed the abbreviated profile of hearing aid benefit before and after implantation of their BAHA. This profile has 24 items including ease of communication, background noise, reverberation, and aversiveness. The results of these profiles were tabulated and analyzed. **RESULTS:** The greatest improvement for patients was in ease of communication. Patients also demonstrated improvements in hearing with background noise and with reverberation. The patients also reported good satisfaction with the device. **CONCLUSIONS:** Patients in this series perceived that the BAHA improved their quality of life with respect to ease of communication, background noise, and reverberation. Patients were very satisfied with the BAHA.

#### 41. Expression of KIT in Adenoid Cystic Carcinoma

Becky L. Massey, MD, Nashville, TN  
Joseph Holden, MD, Salt Lake City, UT  
Pramod K. Sharma, MD, Salt Lake City, UT

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to explain what KIT/c-kit are. Additionally participants should be able to describe the relationship of the expression of the protein KIT and mutations of the gene c-kit in adenoid cystic carcinoma of the head and neck.

**OBJECTIVES:** To evaluate the expression of KIT and mutations of c-kit in adenoid cystic carcinoma of the head and neck and correlate it to clinical behavior. **STUDY DESIGN:** A review of patients with adenoid cystic carcinoma of the head and neck region who underwent surgical resection from 1996-2004. **METHODS:** Clinical findings including initial stage and location of tumor, surgical margin status, recurrence and current disease status of the patients were recorded. Tissue samples were obtained from original paraffin blocks and examined by immunohistochemistry for expression of KIT and c-kit. Gene amplification was determined by monoplex polymerase chain reaction. **RESULTS:** There were 21 patients identified with adenoid cystic carcinoma of the head and neck. Three patients had diffuse overexpression of KIT identified by immunohistochemistry. In those patients with diffuse KIT overexpression, there was no evidence of c-kit gene amplification determined by monoplex polymerase chain reaction. Clinical behavior in the positive group varied with 2 patients dying of metastatic disease and the third having no evidence of disease now 8 years postoperative. **CONCLUSIONS:** In this study, there was a low rate of overexpression of KIT in adenoid cystic carcinoma. There were no c-kit mutations identified in those patients overexpressing KIT. The results of this study do not support the use of tyrosine kinase inhibitors for adenoid cystic carcinoma. Further studies are necessary prior to considering the use of tyrosine kinase inhibitors for patients with adenoid cystic carcinoma of the head and neck.

#### 42. Contemporary Recognition and Management of Ectopic Intrathyroid Parathyroid Adenoma

Laura A. Matka, BA, Cincinnati, OH  
David L. Steward, MD\*, Cincinnati, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss new techniques which facilitate recognition and confirmation of intrathyroid parathyroid adenoma.

**OBJECTIVES:** To review new techniques and strategies for preoperative recognition and management of ectopic intrathyroid parathyroid adenomas which can lessen overall surgical time and exploration. **STUDY DESIGN:** Retrospective case series. **METHODS:** Chart and database review were performed to identify cases of surgically confirmed intrathyroid parathyroid adenomas at a single institution within a three year period. Out of 100 parathyroidectomies performed during this interval, 7 cases of surgically and histopathologically confirmed ectopic intrathyroid parathyroid adenoma were found. **RESULTS:** All seven patients underwent hemithyroidectomy at the time of parathyroid exploration with resolution of hypercalcemia and hyperparathyroidism. In 57% of patients an intrathyroid parathyroid adenoma was suspected on SPECT Sestamibi and/or cervical ultrasound and confirmed with preoperative or intraoperative needle aspiration for cytology or parathormone level, avoiding need for bilateral exploration. The other 43% underwent standard bilateral exploration with identification of three normal parathyroid glands, extensive searching of other ectopic locations on the side of the missing gland, and finally hemithyroidectomy. In one of these cases preoperative ultrasound suggested intrathyroid location of the adenoma. **CONCLUSIONS:** Preoperative SPECT Sestamibi and ultrasound suggested ectopic intrathyroid parathyroid adenoma in 71% of cases. Use of preoperative or intraoperative needle aspiration allowed for confirmation with less operative time and unilateral exploration in 57% of cases. Parathormone level was more helpful than cytology in aspirate evaluation and is routinely recommended in cases of suspected ectopic intrathyroid parathyroid adenomas.

#### 43. Middle Section Walter Work Resident Research Award - Second Place In Vitro and In Vivo Characterization of Bone Marrow Derived Stem Cells in the Cochlea

Akihiro J. Matsuoka, MD PhD, Indianapolis, IN (Resident Travel Award)  
Richard T. Miyamoto, MD\*, Indianapolis, IN  
Eri Hashino, PhD, Indianapolis, IN

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand what kind of stem cells are currently used for the transplantation into the cochlea, to compare specific features on different kinds of stem cells, and finally to explain potential applications of the stem cell transplantation in the cochlea to possibly cure deafness.

**OBJECTIVES:** It has been estimated that approximately one in every 1,000 live births suffers from profound sensorineural hearing loss in the world. The loss of spiral ganglion neurons (SGNs) is one of the major causes for profound sensorineural hearing loss. Stem cell replacement therapy, which is still in its infancy, has the potential to treat or cure more than 100 million Americans who suffer from an array of illnesses and degenerative neurological disorders, including sensorineural deafness. However, little is known about the potentials of bone marrow derived pluripotent stem cells (MSCs) and their ability to take on properties of SGNs. The main purpose of this study is to elucidate the survival of mouse MSCs transplanted into the gerbil cochlea. **STUDY DESIGN:** Four Mongolian gerbils at the age of 3-4 month old were

used as subjects for the transplantation. **METHODS:** Under anesthesia, the animals received an intra-perilymphatic transplantation of 25,000 GFP positive MSCs. Two to thirty days after the transplantation the survival of MSCs was evaluated by microscopic examination of frozen sections cut through the cochleae of the recipient animals. **RESULTS:** GFP positive cells were identified in the cochleae 7 days after transplantation. **CONCLUSIONS:** Our preliminary results suggest that MSCs can survive in the adult normal cochlea for at least 7 days. We are currently testing whether these transplanted MSCs can differentiate into functional neurons and make synaptic contacts with hair cells in the cochlea.

#### 44. Cricothyrotomy Approach to Excision of Posterior Glottic Scar Band

I-Fan T. Mau, MD PhD, San Francisco, CA  
Steven D. Pletcher, MD, San Francisco, CA  
Patricia W. Cavanagh, SLP, San Francisco, CA  
Andrew N. Goldberg, MD MSCE\*, San Francisco, CA  
Mark S. Courey, 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 discuss the use of the cricothyrotomy approach in selected patients for the treatment of posterior glottic scarring and arytenoid fixation.

**OBJECTIVES:** To describe a unique surgical approach to the excision of a calcified posterior glottic scar band responsible for bilateral arytenoid fixation and dysphonia. **STUDY DESIGN:** Case report. **METHODS:** A 69 year old man was evaluated for longstanding breathy dysphonia. Ten years prior, he sustained laryngeal and cervical trauma in an automobile accident and underwent tracheotomy. He has long since been decannulated but remains dysphonic. A prior attempt at direct laryngoscopy was unsuccessful due to limited neck extension and difficult intubation. Another attempt at thyroplasty was aborted after implant insertion failed to improve his voice. At the current evaluation, fiberoptic examination shows bilateral arytenoid fixation with vocal cords in abducted position, with a posterior glottic scar band bridging across the arytenoids. A CT scan shows the scar band to be calcified. **RESULTS:** The patient was taken to the operating room and ventilated via a laryngeal mask airway while the glottis was visualized with a fiberoptic laryngoscope. A Kerrison rongeur was introduced through a cricothyrotomy to excise the bony scar band. Within a few hours post-operatively the patient was speaking with a full voice. Fiberoptic examination showed both vocal cords to be fully mobile. **CONCLUSIONS:** In selected patients with posterior glottic scarring and limited neck extension precluding operative laryngoscopy, a cricothyrotomy approach may provide an alternative to laryngofissure as a means to excise the scar and preserve voice.

#### 45. Life Threatening Complications of Retropharyngeal Abscesses Caused by Community Acquired Methicillin Resistant Staphylococcus Aureus

John F. McGuire, MD, Orange, CA  
Gupreet S. Ahuja, MD, Orange, CA  
Patty Liao, MD, Orange, CA  
Jasjit Singh, MD, Orange, CA

**EDUCATIONAL OBJECTIVE:** This presentation is intended to make the clinicians: 1) understand basic bacteriologic and epidemiologic facts about otolaryngologic manifestations of community acquired methicillin resistant staphylococcus aureus (CA-MRSA); 2) understand pharmacologic properties of the primary antibiotics used to treat CA-MRSA infections; and 3) appreciate how the cases we present influence clinical strategies for treating retropharyngeal abscesses.

**OBJECTIVES:** We describe two patients with severe, life threatening complications of retropharyngeal abscesses (RPA) caused by community acquired methicillin resistant staphylococcus aureus (CA-MRSA). The case presentations are followed by a discussion of otolaryngic manifestations of CA-MRSA infections. In particular, we review the current literature regarding CA-MRSA bacteriology, epidemiology, and treatment. Clinicians should be aware of the potential for staphylococcus aureus infections of the head and neck to be due to CA-MRSA, and the severe complications which may ensue. **STUDY DESIGN:** Case presentation and literature review. **METHODS:** Case presentation and PubMed search. **RESULTS:** The first case is that of a 3 month old female presenting with seizures and altered mental status. Lab data was consistent with meningitis. Imaging studies revealed RPA and cavernous sinus thrombosis. The second case is a 14 month old male with mediastinitis that evolved shortly after RPA surgical drainage. Both patients exhibited a complicated clinical course. **CONCLUSIONS:** Infections of the head and neck are often caused by staphylococcus aureus. With the dramatic increase in CA-MRSA, empiric treatment for suspected S. aureus infections has changed. Clinicians should be aware of the potential of life threatening complications from such infections and consider use of empiric antibiotic therapy directed against CA-MRSA when dealing with severe head and neck infections.

#### 46. Prognostic Factors in the Treatment of Anterior Skull Base Malignancies

Shawn P. McKay, MD, Detroit, MI  
Terry Y. Shibuya, MD\*, Orange, CA  
William B. Armstrong, MD\*, Orange, CA  
Hau S. Wong, MD, Orange, CA  
Apraham M. Panossian, MD, Orange, CA  
Robert H. Mathog, MD\*, Detroit, MI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss factors that may predict the survival of patients with malignant anterior skullbase tumors and consider parameters that may help in the treatment of these patients.

**OBJECTIVES:** The objectives of this study are to retrospectively evaluate a number of factors that may predict the survival of patients with malignant anterior skullbase tumors and to extract parameters that may help in the treatment of these patients. **STUDY DESIGN:** A multi-institution retrospective review of anterior skull base malignancies. **METHODS:** A multi-institution chart review of patients with the diagnosis of malignancies in the frontal, ethmoid, or sphenoid sinuses during the period 1989-2002 was performed. Data collected included histopathology, extent of tumor, and treatments rendered. Kaplan-Meier and Cox proportional hazards regression analysis were performed. **RESULTS:** Of seventy-three patients with anterior skull base malignancies, squamous cell carcinoma (SCC) was the most prevalent (41%), followed by esthesioneuroblastoma (14%), and adenoid cystic carcinoma (12%). Fifty-four patients (74%) underwent surgery, 46, radiation (63%) and/or 32, chemotherapy (44%). Most tumors were advanced accounting for a relatively poor survival. A Cox regression demonstrated that SCC ( $p=0.0308$ ) and advanced age ( $p=0.0172$ ) were independent determinants of a poor outcome. A Kaplan Meier analysis demonstrated extension into dura or the retromaxillary/pterygomaxillary space was associated with a decreased median survival. Tumor in the sphenoid sinus or orbit had no prognostic value. **CONCLUSIONS:** Pathology and age were important factors in predicting clinical outcome from our multi-institution analysis of anterior skull base malignancies.

#### 47. Sellar Floor Repair With a Nasal Mucosal Flap After Endoscopic Endonasal Transsphenoidal Surgery for Pituitary Tumors

Vikas A. Mehta, BS, Orange, CA  
Behrooz A. Torkian, MD, Orange, CA  
Steven M. Daines, BA, Orange, CA  
Ali A. Sepehr, MD, Orange, CA  
Timothy F. Kelley, MD, Orange, CA

**EDUCATIONAL OBJECTIVE:** We will present a novel approach to repair skull base defects after endoscopic transsphenoidal pituitary surgery. At the conclusion of this pres-

entation, the participants should be able to understand the vascular anatomy of the nasal mucosa and the steps necessary to perform the procedure.

**OBJECTIVES:** Endoscopic transsphenoidal surgery has become the preferred approach for pituitary tumors. Several grafting and packing techniques are utilized to repair the defect created to enter the sella via the sphenoid sinus. To our knowledge, no other author has described a pedicled septal mucosal flap. We describe a nasal septal mucosal flap based on a branch of the sphenopalatine artery to cover the iatrogenic defect. **STUDY DESIGN:** A retrospective chart review was performed on patients at our institution who had endoscopic transsphenoidal approach to pituitary surgery by the senior author from 2001 to 2005. **METHODS:** The charts of five patients who received the nasal septal mucosal flap and seven patients treated with fat, mucosa, or fascia grafts were reviewed for length of hospitalization, CSF leakage, need for lumbar drain, and complications including anosmia, bleeding, and synechiae. The average follow-up was nine months. **RESULTS:** Of the five patients with the septal mucosal flap, two had intraoperative CSF leak requiring lumbar drainage, both which were successfully controlled without postoperative lumbar drain placement. The average hospital stay was five days. All flaps were viable in postoperative examinations. Two patients developed asymptomatic synechiae, one patient had anosmia, and none of the patients had bleeding requiring postoperative treatment. **CONCLUSIONS:** The nasal septal mucosal flap is a novel method of skull base defect repair for the transsphenoidal approach. Our series demonstrates successful results with minimal complications. Our experience with this flap indicates it may be useful in anterior skull base defects resulting from trauma or other operations.

**48. Arteria Lusoria: "Red Flag" for the Preoperative Diagnosis of Nonrecurrent Inferior Laryngeal Nerve**

Dimitrios Moraitis, MD, New York, NY  
Nooshin Parhizkar, MD, New York, NY  
Dennis H. Kraus, MD\*, New York, NY  
Ashok R. Shaha, MD\*, New York, NY

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize rare anatomic variations of the inferior laryngeal nerve and use imaging to diagnose them preoperatively.

**OBJECTIVES:** To alert the head and neck surgeon about the rare anatomic variant of a nonrecurrent inferior laryngeal nerve (NRILN). This report emphasizes the association between the presence of a NRILN and an aberrant retroesophageal right subclavian artery (arteria lusoria). Preoperative radiologic demonstration of an arteria lusoria should alert the surgeon to the presence of a NRILN and help prevent nerve injury. **STUDY DESIGN:** This is a case series report of 3 patients who underwent thyroidectomy for papillary carcinoma at our institution. **METHODS:** Case series report and review of the literature. **RESULTS:** All the patients reported here had a right NRILN that was safely dissected and preserved. In all these cases, despite the efforts of the operating surgeon, the inferior laryngeal nerve was not identifiable in its usual location in the tracheoesophageal groove. With a high index of suspicion for an aberrant nerve and meticulous dissection the NRILN was identified entering the larynx at the level of Berry's ligament. The NRILN was safely dissected in a retrograde fashion and its atypical course unequivocally demonstrated. On imaging, these patients had an aberrant right subclavian artery that was seen crossing behind the trachea and esophagus. This radiologic finding alerted the operating surgeon to the presence of a NRILN. **CONCLUSIONS:** Arteria lusoria is a rare anomaly associated with an NRILN and is routinely identified on preoperative cross-sectional imaging. Meticulous surgical technique is essential as it will help recognize these anatomic variations and minimize the risk of nerve injury.

**49. Key Steps for Accurate Nasal Dorsum Reduction Rhinoplasty**

George L. Murrell, MD\*, Camp Pendleton, CA  
Barry H. Hayes, Petty Officer 3rd Class US Navy, Camp Pendleton, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to describe the key steps for accurate nasal dorsum reduction rhinoplasty.

**OBJECTIVES:** To describe the key steps for accurate nasal dorsum reduction rhinoplasty. **STUDY DESIGN:** Retrospective chart review. **METHODS:** All cases of nasal dorsum reduction rhinoplasty performed between July 2002 and June 2003 were reviewed. **RESULTS:** Twenty-five patients underwent nasal dorsum reduction rhinoplasty during the indicated period. All patients were followed for at least one year. None of the patients have required revision of the nasal profile. These cases illustrate the key steps for accurate nasal dorsum reduction. Two steps in particular will be stressed: 1) the exclusive use of sharp dissection to reduce the nasal dorsum, i.e. no rasps only scalpel and osteotomes, 2) proper intraoperative analysis of the profile after reduction through an understanding of how the nasal tip and nasofrontal area always experience more intraoperative edema than the rhinion. Remaining key steps include patient history, exam, photography, aesthetic analysis, injection, and surgical exposure. The study group consisted of 14 men and 11 women, with an age range of 15 to 41. Two of the patients had undergone prior nasal surgery elsewhere. Surgical approaches included 4 external and 21 endonasal. **CONCLUSIONS:** Nasal dorsum reduction is one of the more common procedures in rhinoplasty. A one year sample of cases from a busy nasal surgical practice is used to illustrate and stress key steps for achieving accurate results.

**50. Recovery Following Delayed Facial Nerve Decompression: Compelling Evidence of Reversible Entrapment in Some Patients**

John G. Neely, MD\*, St. Louis, MO  
John W. Rohrbaugh, PhD, St. Louis, MO  
Caroline J. Ryan, BA, St. Louis, MO  
Scott D. Drucker, Hollywood, FL  
Kathleen A. Pointer, Leawood, KS

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to 1) discuss the compelling evidence that reversible entrapment, in addition to edema and inflammation, may play a role in the pathophysiology in some cases of facial nerve paralysis, even after long duration, electrically non-responsive, complete paralysis; and 2) be stimulated by this evidence to seek improved methods of identifying these special cases and proceed with decompression surgery, where appropriate.

**OBJECTIVES:** To present evidence of unexpected reversibility of long duration, electrically unresponsive, complete facial nerve paralysis in special cases following delayed facial nerve decompression and to stimulate research in this area. **STUDY DESIGN:** Case report. Literature review. Unique study of muscle responses following recovery. **METHODS:** Detailed clinical description. Focused, systematic literature review. Surface EMG and laser vibrometry. **RESULTS:** The case describes an extracranial facial nerve lateral displacement by osteochondroma of the vaginal process of the tympanic bone and styloid process associated with a fine perineurial band compressing a discrete area of the intratemporal mastoid segment of the facial nerve to one fourth the natural diameter resulting in an initial one month period of progressive facial twitching and paresis, followed by complete facial paralysis and severe local pain for 11 months duration. Recovery following decompression was documented by assessment of facial surface movement using videotape, House-Brackmann grading scale, Sunnybrook (Toronto) Facial Grading System, Facial Analysis Computerized Evaluation (Neely-Cheung FACE) system, and subsurface muscle activity was assessed using surface electromyography and laser vibrometry. Literature review revealed eleven cases of immediate facial movement following decompression of long duration complete, electrically unresponsive, paralysis and two cases of recovery following decompression one year and fourteen months of complete paralysis. **CONCLUSIONS:** While there is insufficient evidence to employ facial nerve decompression on a wide scale, this data is compelling to suggest that a reversible entrapment component of pathophysiology, in addition to edema and inflammation, may be present in some cases and should stimulate investigation into improved patient selection.

**51. Nonsyndromic Bilateral Choanal Atresia With Interrupted Aortic Arch**

D. Cope Norcross, MD, Oklahoma City, OK

Abhaya Seshachar, MD FAAP, Oklahoma City, OK  
Christopher J. Knott-Craig, MD, Oklahoma City, OK  
Greg A. Krempl, MD, Oklahoma City, OK

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the occurrence of bilateral choanal atresia in the setting of interrupted aortic arch and explain the importance of nasopharyngoscopy in the examination of congenital heart disease patients.

**OBJECTIVES:** Bilateral choanal atresia and interrupted aortic arch are both uncommon congenital anomalies. They very rarely present together as a feature of the CHARGE association or with DiGeorge syndrome. Outside of these syndromes, no other cases of simultaneous occurrence have been described in the literature. Our objective is to present two cases and emphasize the need for nasopharyngoscopy in the examination of pediatric patients with congenital cardiac anomalies. **STUDY DESIGN:** Case report. **METHODS:** We present two cases of bilateral choanal atresia with interrupted aortic arch without other features characteristic of the CHARGE association or DiGeorge syndrome. **RESULTS:** Both patients were diagnosed with interrupted aortic arch soon after birth. The diagnosis of the choanal atresia was delayed by two weeks and complicated in both cases because of the significant cardiac anomalies. Surgical repair of the choanal atresia and the cardiac anomalies was performed successfully. We discuss the findings in these patients, their hospital and postoperative courses, and the nature of choanal atresia and interrupted aortic arch. **CONCLUSIONS:** This is the first description of bilateral choanal atresia occurring in combination with interrupted aortic arch without other features characteristic of the CHARGE association or DiGeorge syndrome. A high index of suspicion and the need for thorough head and neck examination, including nasopharyngoscopy, is vital in patients with congenital cardiac anomalies.

**52. Automatic Core Needle Biopsy: A Diagnostic Option for Head and Neck Masses**

Gurston G. Nyquist, MD, Oakland, CA  
William D. Tom, MD, Oakland, CA  
Stanley Mui, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the utility and effectiveness of manually guided core needle biopsy in the work-up of head and neck masses. We review the technique, results and safety of core needle biopsies. Lastly, we propose an algorithm for the work-up of head and neck masses.

**OBJECTIVES:** To examine the role of core needle biopsy (CNB) in the diagnosis of head and neck masses. **STUDY DESIGN:** Prospective observational study. **METHODS:** Forty consecutive patients with neck masses larger than 1.5 cm undiagnosed after fine needle aspiration biopsy received a manually guided delta cut core needle biopsy in the outpatient clinic setting. **RESULTS:** A core needle biopsy was obtained in forty patients and specimens were sufficient for diagnosis and proceeding with treatment in 36 cases (90%). A subsequent excisional biopsy or curative surgery after CNB was performed in 22 patients, and pathology confirmed the diagnosis in 19 cases (86%). Core needle biopsy was successful in diagnosing lymphoma in 12/14 patients (86%). No complications were incurred secondary to core needle biopsy. **CONCLUSIONS:** For lesions that remain undiagnosed after fine needle aspiration or if immunohistochemical staining is required, core needle biopsy is a safe, effective, time efficient and inexpensive procedure that should be considered prior to excisional biopsy. This is the first report describing the utility of CNB in the diagnosis of head and neck lymphoma. We found CNB to be an important tool in the diagnosis of lymphoma and present an algorithm for the work-up of head and neck masses.

**53. Treatment of Solitary Distant Metastasis to the Thyroid Gland From Head and Neck Squamous Cell Carcinoma**

M. Allison Ogden, MD, St. Louis, MO  
Bruce H. Haughey, MBChB MS, St. Louis, MO  
Samir K. El-Mofty, DMD PhD, St. Louis, MO  
Brian A. Nussenbaum, MD\*, St. Louis, MO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to develop a rational treatment approach for patients with distant metastatic disease to the thyroid gland from head and neck squamous cell carcinoma.

**OBJECTIVES:** Thyroid gland metastasis from head and neck squamous cell carcinoma (SCCA) is a rare clinical entity. The impact of thyroid metastasis and therapeutic approach to treating these patients is not clearly established. **STUDY DESIGN:** Retrospective chart review. **METHODS:** Three patients treated from January 1, 1999, to July 1, 2005, for a primary head and neck SCCA with histopathologically proven metastasis to the thyroid gland were identified. The medical records were reviewed to obtain information regarding demographics, clinical presentation, histology, imaging data, treatment, and survival. **RESULTS:** The median age of the identified patients was 64 years old. All patients presented with oropharyngeal carcinomas with advanced nodal disease. At the time of diagnosis, all patients were found to have solitary distant metastatic disease to the thyroid gland. These metastases were identified as incidental findings on preoperative imaging studies, and all patients were clinically asymptomatic at the thyroid site. All patients were treated with curative intent using multimodality therapy. As part of the treatment plan, thyroid surgery was performed in all 3 patients with 2 patients undergoing total thyroidectomy and the other having a hemithyroidectomy. No patients experienced recurrent disease in the thyroid region. One patient subsequently developed additional distant metastatic disease, whereas others have not developed further distant metastases with follow up of 6 months and 5 years. **CONCLUSIONS:** Patients with solitary distant metastatic disease to the thyroid gland from head and neck SCCA can obtain control of disease with multimodality therapy. Thyroidectomy is an effective treatment to control the disease at this metastatic site.

**54. A Reliable Method for Identification of the Spinal Accessory Nerve During Selective Neck Dissection**

Young S. Oh, MD, San Francisco, CA  
David W. Eisele, MD\*, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to describe the anatomic relationship of the spinal accessory nerve to the segmental supply to the sternocleidomastoid muscle and to use this relationship to safely identify the nerve while performing a selective neck dissection.

**OBJECTIVES:** The objective of this study is to describe the consistent relationship of the spinal accessory nerve to the segmental supply to the sternocleidomastoid muscle (SCM). Knowledge of this will provide the surgeon with a reliable landmark to identify this nerve during the performance of a selective neck dissection. **STUDY DESIGN:** Retrospective review. **METHODS:** This is a retrospective review of 52 patients who underwent selective neck dissection at our institution between July 2003 and June 2005. **RESULTS:** Fifty-two patients were included in the study. Thirteen patients underwent bilateral selective neck dissections and 39 patients underwent unilateral dissections for a total of 65 nerves at risk. In all cases, the spinal accessory nerve was successfully identified based on its relationship to the segmental supply to the SCM. **CONCLUSIONS:** This study demonstrates that the consistent relationship of the spinal accessory nerve to the segmental supply to the SCM provides for a safe and reliable method to identify this nerve during selective neck dissection.

**55. Carcinoid Tumor of the Mastoid: A Case Report and Review of the Literature**

Annette M. Pham, MD, Sacramento, CA  
Karen J. Doyle, MD PhD\*, Sacramento, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the clinical presentation, histopathology, and management of carcinoid tumors versus adenomas of the middle ear.

**OBJECTIVES:** Carcinoid tumor of the middle ear is a rare clinical entity. The true incidence of the tumor is unknown because it can be confused with adenomas of the middle ear. We present a case of a patient with a history of adenoma who had a recurrence of symptoms and was found to have carcinoid tumor on revision surgery. **STUDY DESIGN:** Case report. **METHODS:** This is a 50 year old female who presented with recurrent right sided ear infections and chronic otorrhea over ten years, associated with hearing loss, tinnitus, and otalgia. In 2001, she underwent a tympanomastoidectomy with pathology revealing an adenoma. With loss of follow-up secondary to insurance, she represented four years later with recurrent complaints of hearing loss, tinnitus, and otalgia. A computed tomography scan revealed a canal wall up mastoidectomy filled with soft tissue, consistent with probable recurrence. **RESULTS:** She underwent a revision tympanomastoidectomy. Pathology revealed a carcinoid tumor. It only involved the mastoid cavity but not the middle ear, ossicles, dura, or facial nerve. She did not have symptoms of carcinoid syndrome. A serum serotonin level was not elevated. An abdominal computed tomography scan was negative. On two month follow-up, the patient reported no change in hearing but improvement in otalgia and resolution of otorrhea. **CONCLUSIONS:** Carcinoid tumor is a benign, indolent tumor. Though carcinoid tumor and adenomas are similar, histopathologically, they are distinct clinical entities. Metastasis is rare and recurrence is uncommon. Management involves surgical excision.

**56. Calciphylaxis in Tertiary Hyperparathyroidism**

P. Perry Phillips, MD, Sheboygan, WI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the medical and surgical treatment of calciphylaxis associated with tertiary hyperparathyroidism. Participants will also become familiar with complications of this disorder as well as its treatment.

**OBJECTIVES:** The first objective is to familiarize otolaryngologists with this rare often fatal complication of tertiary hyperparathyroidism. The second objective is to determine and report the best treatment course for patients with this disorder via in depth review of the world literature. **STUDY DESIGN:** Multicase presentation and literature review with meta-analysis. **METHODS:** Two patients with this disorder are discussed and their treatment and clinical outcomes are reviewed. The world literature experience with this disorder is also reviewed and reported. **RESULTS:** Calciphylaxis is a severe often fatal complication arising in patients with tertiary hyperparathyroidism associated with long-term dialysis. Case experience and literature analysis supports early surgical treatment to limit the morbidity and mortality associated with this disorder. An algorithm regarding surgical management is presented. **CONCLUSIONS:** Prompt identification of calciphylaxis is paramount to prevent serious morbidity and reduce the mortality of this disorder. Patients undergoing chronic renal dialysis are at highest risk of this disorder. Early surgical intervention with subtotal parathyroidectomy or total parathyroidectomy with autotransplantation is associated with lower risk of complications and mortality. Failure to diagnose and treat promptly due to lack of awareness is associated with poorer outcomes.

**57. Subtotal Tonsillectomy Does Not Decrease Postoperative Pain Following Tonsillectomy and Adenotonsillectomy**

Matthew D. Proctor, MD, Salt Lake City, UT (*Resident Travel Award*)

Albert Park, MD, Salt Lake City, UT

Harlan Muntz, MD, Salt Lake City, UT

Marshall Smith, MD, Salt Lake City, UT

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize that a comparison between monopolar and bipolar cautery tonsillectomy techniques failed to reveal a significant difference in terms of postoperative pain, oral intake parameters, or return to normal activity. This presentation will review the techniques used, the measures utilized, and provide some possible explanations for the lack of a difference between the two test groups.

**OBJECTIVES:** To investigate whether a subtotal tonsillectomy decreases postoperative pain following adenotonsillectomy. **STUDY DESIGN:** A prospective, randomized, double blinded clinical trial at a tertiary pediatric hospital. **METHODS:** 40 otherwise healthy children, aged 2-12 years, undergoing adenotonsillectomy. Patients were randomized to receive either a subtotal or total removal of the tonsils utilizing an electrocautery technique. The main outcome measures included a visual analog scale (VAS) at rest and while eating, time to take 100 cc of fluid, throat, neck, and ear pain, quantity of liquids, activity level and incidence of emesis and retching. **RESULTS:** A repeated measures analysis using a repeated measures ANOVA failed to demonstrate a statistically significant impact with either treatment for VAS at rest or while eating ( $p=0.53$ ). A repeated measures analysis did not show either procedure significantly affecting throat, neck or ear pain, or liquid quantity. Time to take 100cc liquids and the incidence of emesis or retching were found not to be statistically significantly different between the treatment groups. **CONCLUSIONS:** Subtotal tonsillectomy via an electrocautery technique does not reduce postoperative pain or improve outcome parameters. Subtotal tonsillectomy is not recommended for this patient population.

**58. Endoscopic Laser Cricopharyngeal Myotomy in a Two Year Old**

Adam D. Ray, MD, Springfield, IL

Jeri Beth Karkos, MD, Springfield, IL

Gayle E. Woodson, MD\*, Springfield, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to 1) be aware that cricopharyngeal achalasia is a rare cause of dysphagia in infants and young children; and 2) compare the risks and benefits of endoscopic versus external cricopharyngeal myotomy.

**OBJECTIVES:** Cricopharyngeal achalasia is a rare cause of dysphagia in the pediatric population. Affected infants and children present with regurgitation, aspiration, and failure to thrive. Reported treatments include endoscopic dilation, botulinum injection, and myotomy via external approach. Recently, endoscopic CO2 laser cricopharyngeal myotomy has been reported to be safe and effective in the adult population. Based on our favorable experience in adult patients, we studied the application of this approach in a child. **STUDY DESIGN:** A two year old male presented with failure to thrive and severe dysphagia. The child had been dependent on gastrostomy feeding since infancy. Modified barium swallow revealed cricopharyngeal achalasia and severe aspiration. **METHODS:** Cricopharyngeal myotomy was performed transorally via microlaryngoscopy using a CO2 laser. Swallowing function was reevaluated postoperatively with videofluoroscopy. **RESULTS:** Postoperative swallow study showed no aspiration and significant improvement in swallowing. He now tolerates a normal diet and the gastrostomy tube has been removed. **CONCLUSIONS:** Compared to external myotomy, endoscopic myotomy is associated with reduced operative time, greatly reduced risk of laryngeal nerve injury, and faster postoperative recovery. While botulinum toxin has also been reported to be effective, the results are temporary. We conclude that endoscopic CO2 laser cricopharyngeal myotomy may be safe and effective in treating cricopharyngeal dysfunction in the pediatric population.

**59. Securing a Cochlear Implant Receiver Using Titanium Screws and Ticron Sutures**

Brynn E. Richardson, MD, Omaha, NE

Kathryn L. Swisher, BS, Omaha, NE

Gary F. Moore, MD\*, Omaha, NE

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to identify and perform a safe, easily reproducible method with a simple technique for securing a cochlear implant receiver.

**OBJECTIVES:** 1) Literature review identifying currently performed techniques with respective pros and cons for securing cochlear implant receivers; 2) describe the step-wise method of screw/suture technique for securing cochlear implant receivers; and 3) review complications associated with this novel approach. **STUDY DESIGN:** Retrospective review of results and complications associated with securing the cochlear implant receiver using titanium screws and Ticron suture. **METHODS:** 1)

Retrospective review of the results and complications in the last 15 patients undergoing this technique; 2) comparison of our results to results of previously described techniques; 3) technical description of the stepwise method for this novel technique. **RESULTS:** After utilizing titanium screws and Ticron sutures to secure the cochlear implant receiver in the last fifteen patients, the authors have noted the following: 1) a decrease in operative time; 2) more secure placement of the receiver; 3) decreased risk for operative complications associated with current techniques; and 4) ease of placement. **CONCLUSIONS:** A cochlear implant receiver can safely and easily be secured using four titanium screws and Ticron sutures. This method decreases operative risk and time. It has a simple learning curve with no apparent disadvantages.

**60. Outpatient Uvulopalatopharyngoplasty: Is it Safe?**

Jamie L. Robinson, MD, Portland, OR  
Mark K. Wax, MD, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the risks and benefits of outpatient versus inpatient uvulopalatopharyngoplasty.

**OBJECTIVES:** Historically, patients have been admitted for overnight hospitalization following uvulopalatopharyngoplasty (UPPP) for obstructive sleep apnea. More recently, the need for inpatient observation has been questioned. The objectives of this study are to evaluate the incidence of postoperative complications in an adult population who underwent UPPP for obstructive sleep apnea and to determine whether or not these patients can be managed safely as outpatients. **STUDY DESIGN:** A retrospective chart review was performed at an academic center over a three year period. **METHODS:** Twenty eight patients' charts were reviewed. The twenty-two males had a mean age of 43 years and a mean BMI of 31.3 kg/m<sup>2</sup>. The six female patients had a mean age of 37 years and a mean BMI of 35.1 kg/m<sup>2</sup>. Twenty-one percent were diagnosed with severe obstructive sleep apnea. **RESULTS:** Postoperatively, 18% of patients were admitted for observation. There were no complications during the immediate postoperative hospital stays. Ultimately, 25% of patients experienced a postoperative complication. Complications included difficulty maintaining an airway immediately following extubation, pain, dehydration, infection, an asthma exacerbation and one instance of myoglobinuria. These patients were managed safely through outpatient and emergency department visits without need for readmission or repeat surgery. **CONCLUSIONS:** In conclusion, few patients with mild to moderate obstructive sleep apnea were hospitalized after surgery however significant portion ultimately had a postoperative complication. While outpatient UPPP may be safe for patients with mild to moderate obstructive sleep apnea, the high frequency of postoperative complications may be better managed with inpatient postoperative care.

**61. Adult Presentation of an Intrathyroidal Fourth Branchial Pouch Sinus**

Jon M. Robitschek, MD, Tripler AMC, HI  
Nici E. Bothwell, MD, Tripler AMC, HI  
Guy Takahashi, MD, Tripler AMC, HI  
Joseph C. Sniezek, MD\*, Tripler AMC, HI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize a novel case of a left fourth branchial pouch sinus presenting in an adult as a recurrent deep neck abscess.

**OBJECTIVES:** A fourth branchial pouch sinus is a rare clinical entity, manifesting primarily among the pediatric population. We demonstrate a novel case of an intrathyroidal fourth branchial pouch sinus presenting in a 36 year old male. **STUDY DESIGN:** Case report with clinical, radiologic, surgical, and pathologic findings along with review of the literature. **METHODS:** The patient was referred to our service with a recent history of recurrent left sided deep neck abscess. Diagnostic evaluation per barium pharyngoesophagogram in conjunction with computerized tomographic examination revealed a sinus tract extending inferiorly from the left pyriform sinus to the left thyroid lobe. The synchronous use of both imaging modalities with shared contrast enabled us to formulate a successful surgical approach. **RESULTS:** Successful surgical excision was performed with pathologic confirmation of an epithelial lined sinus within the left lobe of the thyroid consistent with a branchial pouch derivative. A postoperative barium pharyngoesophagogram demonstrated successful closure of the sinus tract. **CONCLUSIONS:** In contrast to the handful of previously reported cases of a fourth branchial pouch sinus, the presented case report highlights a delayed clinical presentation in the adult. The case findings further broaden the differential diagnosis of recurrent deep neck abscess and thyroid cyst in the adult.

**62. Acoustic Neuroma Lurks Behind Sudden Sensorineural Hearing Loss With Audiometric Recovery**

Frederick C. Roediger, MD, San Francisco, CA  
Andrew T. Parsa, MD PhD, San Francisco, CA  
Jacob Johnson, MD, San Francisco, CA  
Wileen Chang, MS, San Francisco, CA  
Robert W. Sweetow, PhD, San Francisco, CA  
Steven W. Cheung, MD\*, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize the importance of acoustic neuroma in the differential diagnosis of sudden sensorineural hearing loss (SSNHL), discuss the role of corticosteroids in treating SSNHL, and explain the value of stacked auditory brainstem response testing.

**OBJECTIVES:** To examine clinical histories of acoustic tumor patients presenting with fully recoverable SSNHL and to assess the role of stacked ABR with intensity and frequency variations in the evaluation of SSNHL. **STUDY DESIGN:** Case series review. **METHODS:** The clinical courses for two patients were analyzed for tinnitus, vertigo, aural fullness, and facial nerve dysfunction. Audiometric patterns of SSNHL and their responses to corticosteroid therapy were analyzed. Stacked auditory brainstem response (ABR) testing with intensity and repetition rate variations was performed using the non-tumor ear as control. **RESULTS:** Both patients demonstrated pure tone threshold improvements that ranged from 20 to 60 dB in the affected frequencies following corticosteroid therapy. The timing of documented audiometric recovery ranged from 6 to 31 days. Low and high frequency patterns of SSNHL were identified. One patient developed vertigo while the other patient had concomitant facial paralysis. Other features, including differences in latencies and amplitudes of stacked ABR for the two patients will be compared and contrasted. **CONCLUSIONS:** Acoustic neuroma can present with fully recoverable SSNHL. Stacked ABR testing with intensity and frequency variations may have an important role in screening for retrocochlear pathology in patients presenting with SSNHL.

**63. Efficacy of Antiviral Therapy in Patients With Delayed Facial Paralysis Following Vestibular Schwannoma Surgery**

John M. Ryzenman, MD, Hinsdale, IL  
Richard J. Wiet, MD\*, Hinsdale, IL  
Arvind Kumar, MD\*, Hinsdale, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be familiar with delayed facial paralysis and be able to counsel patients regarding the risk of developing it following acoustic neuroma surgery; its prevention, treatment options and expected recovery outcome.

**OBJECTIVES:** To determine whether antiviral therapy can improve recovery from delayed facial paralysis (DFP) following vestibular schwannoma (VS) surgery. **STUDY DESIGN:** A retrospective case review. **METHODS:** Six patients who underwent surgical removal of a VS developed DFP. All patients were treated with valacyclovir (one gram BID for two weeks) and methylprednisolone. Patients were evaluated according to the House and Brackmann (HB) facial grading system. Serologic viral titers for herpes simplex viruses (HSV types 1 and 2) and varicella zoster virus (VZV) antibodies at the onset of DFP were obtained in two cases. **RESULTS:** Deterioration in

facial function occurred between 1 and 14 days postoperatively with a mean onset at 9.5 days. Degree of worsening varied from subtle losses (decreased lacrimation, loss of blink reflex and cheek biting) to obvious complete facial paralysis. Mean recovery time to HB grade 1 occurred 25 days after onset of DFP. Serologic assays in two patients revealed elevated titers of VZV in the first and markedly elevated titers of HSV in the second. The degree and rate of recovery was improved compared to historical controls. No adverse reactions were reported from the treatment medications. **CONCLUSIONS:** DFP is a postoperative morbidity which appears to be under-reported. Often patients fail to recognize early subtle manifestations of facial dysfunction due to inadequate counseling. Treatment at the earliest stages may limit progression to complete paralysis and prevent this morbidity. We are conducting a randomized placebo controlled trial to determine the efficacy of valacyclovir in prophylactic prevention and treatment of DFP.

**64. Pneumoparotitis: The Role of Stensen's Duct Ligation**

David M. Saito, MD, San Francisco, CA  
Andrew H. Murr, MD, San Francisco, CA  
David W. Eisele, MD\*, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discern the clinical characteristics of pneumoparotitis and discuss the available options for both diagnosing and managing these patients.

**OBJECTIVES:** We will review the clinical features of pneumoparotitis and update the diagnostic and therapeutic maneuvers available to the otolaryngologist. **STUDY DESIGN:** Case report and literature review. **METHODS:** Case report and literature review. **RESULTS:** A 44 year old male presented with a spontaneous parotid mass. Examination revealed a 2 x 3 cm tender mass in the tail of the right parotid gland, and palpation yielded frothy saliva from Stensen's duct. Evaluation with CT and MRI scans showed multiple collections of air within the parenchyma of the parotid gland. Upon needle aspiration only air was returned. The patient was diagnosed with idiopathic cystic pneumoparotitis and he went on to experience multiple exacerbations of his symptoms over the next year. His management included multiple aspirations of parotid gas pockets, doxycycline sclerotherapy, parotid duct endoscopy, and finally parotid duct ligation. A review of the literature and discussion of management options is presented. **CONCLUSIONS:** Pneumoparotitis is an extremely rare cause of parotid gland enlargement. This case report highlights the key findings that suggest pneumoparotitis, and outlines the modalities at the otolaryngologist's disposal to accurately diagnose and treat this condition. We describe and illustrate the novel approach of parotid endoscopy as a useful diagnostic option. A variety of treatments, including Stensen's duct ligation, are options in the management of the disorder.

**65. Endoscopic Resection of Frontal Sinus Inverted Papilloma**

Nathan B. Sautter, MD, Cleveland, OH  
Martin J. Citardi, MD, Cleveland, OH  
Pete S. Batra, MD, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the various treatment options available for frontal sinus inverted papilloma and compare the advantages of endoscopic versus open resection.

**OBJECTIVES:** Inverted papilloma (IP) involving or arising in the frontal sinus is rare. Surgical treatment of frontal sinus IP can be challenging given the inherent difficulties in visualization and access to this location. In this report, we present our experience with management of this difficult entity. **STUDY DESIGN:** Single institution retrospective chart review. **METHODS:** Retrospective data analysis was performed from 2003 to 2005 on all patients presenting with IP arising in the frontal sinus. **RESULTS:** A total of five patients were identified. The average age was 55 years and all patients were male. All patients were managed with a computer aided endoscopic approach as the primary modality. Frontal trephination was utilized in one case and frontal sinus drill out was required in another case in order to achieve successful tumor removal. Given extensive disease, staged resection was performed in one case. No intraoperative complications were encountered. One patient developed meningitis 5 days following surgery requiring admission for IV antibiotics. Recurrence was noted in one case requiring a second endoscopic excision. The mean follow-up period was 12 months (7-19 months). **CONCLUSIONS:** Endoscopic management of frontal IP is the preferred approach for treatment of these difficult tumors. Adjunctive and external approaches, such as an extended frontal drill out, endoscopic frontal trephination or osteoplastic flap, may be required to achieve successful tumor extirpation. Moreover, a staged endoscopic resection may be required for management extensive tumors.

**66. Massive Dilatation of the Nasolacrimal Canal Causing Epiphora and Chronic Maxillary Sinusitis**

Luke J. Schloegel, BA MSIV, Saint Louis, MO  
Raj Sindwani, MD FRCS, Saint Louis, MO

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to describe the embryological development of the nasolacrimal system, understand its anatomic relationship, and discuss its potential for sinonasal pathology.

**OBJECTIVES:** Congenital dilatation of the nasolacrimal canal (NLC) is a rare anatomic variant that is not usually clinically significant. We present the first report of a massively dilated NLC which caused epiphora and chronic maxillary sinusitis. **STUDY DESIGN:** Case report. **METHODS:** A 65 year old male was referred for evaluation of chronic sinonasal symptoms. The patient complained of a longstanding history of left cheek pressure, nasal congestion and discolored nasal drainage which did not respond to medical therapy. His past medical history was significant for left-sided epiphora which resolved after an external dacryocystorhinostomy was performed in childhood. **RESULTS:** A CT scan revealed extensive pneumatization of the left lateral nasal wall and what appeared to be a vertically partitioned maxillary sinus with mucosal thickening and an air fluid level in the lateral compartment. Closer examination revealed that the medial compartment of the left maxillary sinus was actually a massively dilated, air filled NLC. Using a combined endoscopic transnasal and Caldwell-Luc approach, the lateral wall of the dilated NLC was completely removed and the maxillary sinus was widely opened to the nasal cavity. Purulent material was cultured and evacuated from the lateral most recesses of the sinus. The patient reported a significant improvement in his symptoms and was doing well 10 months after surgery. **CONCLUSIONS:** Patients with congenital anomalies of the nasolacrimal system often present with epiphora and ocular complaints. As the nasolacrimal apparatus is housed within the lateral nasal wall, symptoms suggestive of nasolacrimal dysfunction should prompt a search for potential sinonasal pathology.

**67. Cold Knife Tonsillectomy Versus Coblation Assisted Tonsillectomy in Children**

Nina L. Shapiro, MD, Los Angeles, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand the operative and post-operative courses of children undergoing two methods of tonsillectomy and the differences between the two.

**OBJECTIVES:** To compare intraoperative and post-operative courses of children undergoing cold knife tonsillectomy (CKT) and coblation assisted tonsillectomy (CAT). **STUDY DESIGN:** Prospective, randomized, single-blind study by one surgeon at a single institution. **METHODS:** Children aged 2-16 years underwent outpatient tonsillectomy with adenoidectomy using either CKT or CAT techniques. Intraoperative measures included duration of surgery, anesthesia time, blood loss, and recovery room time. Post-operative measures consisted of a 14 day daily caregiver questionnaire, which included rating daily pain intensity using the Wong-Baker FACES pain scale, and identifying number of days until return to normal diet and activity for the child, and number of days until return to normal routine for the caregiver. Post-operative complications were also recorded. **RESULTS:** Age and gender distribution did not differ for both groups (n=47, p>0.05). Tonsillectomy time was shorter for the CAT group than the CKT group (11.0 +/- 2.9 minutes vs. 17.1 +/- 3.1 minutes, p<0.02). Intraoperative blood loss was significantly less in CAT than CKT patients (<10cc in 92% of CAT vs. 17% of CKT, p<0.0001). No differences in post-operative recovery were detected between treatment groups (p>0.05). In both groups, >50% of all chil-

dren had resumed normal diet by post-operative day 8, and were pain-free by post-operative day 11. CAT children resumed normal activity patterns sooner (day 4) than CKT children (day 10). Most (75%) caregivers had returned to normal routine by post-operative day 9. One post-operative bleed occurred in the CAT group on post-operative day 6. **CONCLUSIONS:** CKT and CAT are both safe and effective means of removing tonsils in children, demonstrating excellent recovery rates with minimal complications. CAT results in significant reduction in surgical time and intraoperative blood loss, thus providing a superior technology for tonsillar surgery.

**68. Supraclavicular Lymphadenopathy in a Patient With a History of Silicone Breast Implants: A Case Report**

Taha Z. Shipchandler, MD, Cleveland, OH  
Raymond R. Tubbs, DO, Cleveland, OH  
Robert R. Lorenz, MD, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize silicone breast implants as a potential cause for supraclavicular lymphadenopathy and identify unique fine needle aspiration and histopathologic characteristics and management options.

**OBJECTIVES:** Several case reports and case series have examined axillary lymphadenopathy in patients with silicone breast implants. The purpose of this report is to demonstrate supraclavicular lymphadenopathy in a patient with a known history of ruptured silicone breast implants and discuss unique fine needle aspiration and histopathologic features and management options. **STUDY DESIGN:** Case report: A 49 year old female with a history of ruptured silicone breast implants placed in 1985 replaced with saline implants in 1999 presents with a 1 month history of enlarged level 4 lymph nodes. Head and neck examination, laboratory workup, computed tomography and fine needle aspiration were inconclusive. Antibiotic treatments were unsuccessful. **METHODS:** A review of the literature was performed examining lymphadenopathy in patients with histories of silicone breast augmentation. **RESULTS:** Supraclavicular lymphadenopathy is a rare initial location for diagnosis of disseminated silicone from breast prosthesis. Reports supporting the utility of fine needle aspiration as the initial diagnostic modality identify vacuolization of macrophages containing homogeneous, yellow, refractile material as characteristic for silicone. Histologic findings include large amounts of microglobular, nondepolarizing foreign material scattered throughout involved lymph nodes. X-ray microanalysis confirms the presence of elemental silicon. Management strategies are conservative with local pain relief and/or lymph node excision. **CONCLUSIONS:** Supraclavicular lymphadenopathy in patients with known histories of silicone mammary prostheses can present many years after initial implantation. Fine needle aspiration is oftentimes sufficient for diagnosis. When necessary, excisional biopsy can be performed with x-ray microanalysis of the specimen. Remaining lymphadenopathy should be watched and treated conservatively for symptoms.

**69. Management of Frontal Sinus Mucoceles With Posterior Table Erosion in the Pretransplant Cystic Fibrosis Patients**

Clementino Arturo Solares, MD, Cleveland, OH  
Martin J. Citardi, MD, Cleveland, OH  
Marie Budev, MD, Cleveland, OH  
Pete S. Batra, MD, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize the impact of sinonasal disease in the pretransplant cystic fibrosis patients.

**OBJECTIVES:** Chronic rhinosinusitis has been described as a universal finding in cystic fibrosis (CF). Much of the literature has focused on management of paranasal sinus disease in the pediatric population with a relative paucity of reports on management of adult patients. With gains in life expectancy through advances in medical management and refinement in surgical transplantation techniques, treatment of sinonasal disease in adult CF patients will continue to gain further importance. In this report, we review our experience with management of frontal sinus mucoceles with posterior table (PT) erosion diagnosed by imaging in asymptomatic adult cystic fibrosis patients presenting for pretransplant evaluation. **STUDY DESIGN:** Retrospective chart analysis. **METHODS:** Adult CF patients presenting with frontal sinus mucoceles from January 2003 to July 2005 comprised the focus of the study. Charts were reviewed for age, gender, clinical presentation, culture results, complications, and outcome. **RESULTS:** Three patients presented with asymptomatic frontal sinus mucoceles with PT erosion during preoperative evaluation for lung transplantation. The average age was 28.7 years (range, 23 to 38) and male:female ratio was 1:2. Two patients were managed with computer aided endoscopic frontal sinusotomy during the pretransplant period. Intraoperative cultures grew pseudomonas aeruginosa in both cases. No intra- or postoperative complications were encountered. Endoscopic patency of the frontal sinusotomy has been confirmed at 15 and 5.5 months, respectively. Surgery was postponed in the third patient secondary to multiple medical problems; she is currently being followed clinically by serial imaging until her medical status stabilizes sufficiently for operative intervention. **CONCLUSIONS:** This preliminary report describes asymptomatic frontal sinus mucoceles with PT erosion in CF patients presenting for transplant evaluation. A high index suspicion must be maintained to avoid an inordinate delay in diagnosis given the potential risk of intracranial complications with this clinical entity.

**70. Eosinophil Recruitment in Aspergillus Mediated Allergic Rhinitis Is Partially Mediated by Mast Cells**

William C. Spanos, MD, Iowa City, IA  
Siew S. Chao, FRCS, Kent Ridge, Singapore  
Scott M. Graham, MB, Iowa City, IA  
David M. Lee, MD PhD, Boston, MA  
John H. Lee, MD, Iowa City, IA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the role of mast cells as related to eosinophil recruitment in a mouse model of allergic rhinitis.

**OBJECTIVES:** Allergic rhinitis has been associated with mold allergens including aspergillus antigens. Marked eosinophilia has been observed in clinical specimens, and mast cells have previously been implicated in the recruitment of eosinophils in response to antigen binding to IgE. To better understand the mechanisms resulting in eosinophilia in response to aspergillus antigen we have developed a mouse model of allergic rhinitis in normal and mast cell deficient mice. **STUDY DESIGN:** In vivo mouse. **METHODS:** Balb/c and mast cell deficient mice were sensitized and subsequently challenged to aspergillus antigen. The mice were sacrificed and a fluorescent stain was used to quantify eosinophils in the sinus mucosa. Chloroacetate esterase stain was used to quantify mast cells. An ELISA was used to quantify total serum IgE levels. **RESULTS:** Balb/c mice sensitized and challenged with aspergillus antigen had 15 times the eosinophils per mm<sup>2</sup> and 2.5 times the mast cells as compared to mice challenged with PBS (p<.001, p<.05). Mast cell deficient mice challenged with aspergillus exhibited 20 times the number of eosinophils as compared to PBS challenge (p<.001). Serum IgE levels were not significantly different between PBS and antigen challenge groups. **CONCLUSIONS:** Intranasal challenge with aspergillus antigen elicits a robust eosinophilia in mice. Eosinophil recruitment appears to involve mechanisms not entirely dependent on mast cells; however, mast cells are modestly increased with antigen challenge. Nasal eosinophilia in response to aspergillus antigen does not appear to be IgE dependent. This mouse model of allergic rhinitis will provide a useful tool for future in vivo research.

**71. Management of an Obstructing Dehiscent Jugular Bulb During Cochlear Implantation**

Kalpesh T. Vakharia, MS, San Francisco, CA  
Doris Lin, MD, San Francisco, CA  
Christine Glastonbury, MD, San Francisco, CA  
Colleen Polite, AuD, San Francisco, CA  
Lawrence R. Lustig, MD, San Francisco, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize a dehiscant jugular bulb and understand its surgical management during cochlear implantation surgery.

**OBJECTIVES:** During cochlear implantation a dehiscant jugular bulb may limit access to the round window (RW) and increase the overall risk of the surgery. This report details a case of a patient with this condition and its surgical management during cochlear implantation. **STUDY DESIGN:** Case report. **METHODS:** An 18 year old female patient with bilateral profound sensorineural hearing loss since birth presented for cochlear implantation. Computed tomography of the temporal bone demonstrated a large left dehiscant jugular bulb. **RESULTS:** During the facial recess/posterior tympanotomy for a cochlear implantation, the dehiscant jugular bulb was identified, obscuring the view of the RW. Steps taken to insure adequate RW exposure for a safe, complete implant insertion included removal of the incus and buttress, and the placement of gelfoam over the jugular bulb for protection and hemostasis during the cochleostomy. Following a full insertion, an additional piece of muscle was used to shield the electrode lead from the exposed bulb. Postoperatively, the patient had thresholds that were 35-50 dB HL 250 Hz to 6000 Hz. She was unable to repeat words without signing for recording SRT but her speech detection threshold was 30 dB HL and her comfortable level for conversational speech was 50 dB HL. **CONCLUSIONS:** In addition to the standard approach to cochlear implantation, removing the buttress and incus offers improved exposure of the RW in the setting of an obstructing dehiscant jugular bulb. These modifications allow for safer implantation of the electrode and may help to prevent life threatening hemorrhagic complications due to penetration of the jugular bulb.

**72. Esophagitis and Barrett's Esophagus After Head and Neck Radiotherapy**

Douglas J. Van Daele, MD, Iowa City, IA  
Henry T. Hoffman, MD, Iowa City, IA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the development of esophagitis and Barrett's esophagus after head and neck radiotherapy.

**OBJECTIVES:** Radiation to the head and neck changes the character and composition of saliva which may predispose the patients to having gastroesophageal reflux disease or even Barrett's esophagus. The objective of this study was to compare findings from esophagoscopy in patients with and without a history of radiation therapy. **STUDY DESIGN:** Retrospective case series. **METHODS:** Records were reviewed from patients with dysphagia undergoing unsedated transnasal esophagoscopy in between July 2001 and July 2003. **RESULTS:** Seventy-one patients underwent uncomplicated esophagoscopy. Forty-one of those patients had a history of radiation to the head and neck with an average dose of 67 Gy. Only two patients had the addition of chemotherapy. Three patients in the post-radiotherapy and two patients in the non-radiotherapy group complained also of pyrosis. Twenty post-radiation patients (49%) had an abnormal appearing gastroesophageal junction and an abnormal biopsy compared to seven patients (23%) without a history of radiation (Fisher's exact two-sided  $p=0.047$ ). In the non-radiotherapy group those patients with abnormal appearing gastroesophageal junction undergoing biopsy, 5 patients had esophagitis, and 2 patients had Barrett's esophagus. In the radiation group those patients with abnormal appearing gastroesophageal junction undergoing biopsy, 13 patients had esophagitis, 3 patients had Barrett's esophagus, and 1 patient had a squamous cell carcinoma. **CONCLUSIONS:** Based upon this small dataset, Barrett's esophagus and esophagitis is more common in patients with dysphagia after head and neck radiotherapy. Additional studies with a larger patient pool is necessary to better characterize the risk of developing changes in the esophagus associated with radiation treatments to the head and neck.

**73. Analysis of Tissue Engineered Calcium Alginate Patches in the Repair of Chinchilla Tympanic Perforations**

David R. Weber, MD, Cleveland, OH  
Maroun T. Semaan, MD, Cleveland, OH (*Presenter*)  
Jay K. Wasman, MD, Cleveland, OH  
Richard M. Beane, MS, Worcester, MA  
Larry J. Bonassar, PhD, Ithaca, NY  
Cliff A. Megerian, MD\*, Cleveland, OH

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the potential benefits of tissue engineered techniques for tympanic membrane repair and discuss potential indications for future usage.

**OBJECTIVES:** Chronic tympanic membrane perforations are a common problem in the United States. A high number of these cases result from placement of pressure equalization tubes. These perforations may initially be treated with paper patch techniques and while safe and well tolerated, the procedure demonstrates poor efficacy. The ideal treatment for small perforations should be rapid, minimally invasive and efficacious. Calcium alginate based tissue engineered tympanic membrane patches represent an attractive option, but in vivo data is required. **STUDY DESIGN:** A controlled prospective study of tympanic membrane perforation repair using a well known chinchilla model of chronic tympanic membrane perforation. **METHODS:** Calcium alginate based tympanic membrane patches were created using CAD (computer aided design) techniques. A previously described chinchilla model of chronic tympanic membrane perforations was employed to create stable perforations ranging from 2 to 5 millimeters. Ears with chronic perforations were divided into three groups: control (no patch), paper patch, and calcium alginate plugs. At 10 weeks postimplantation all animals were sacrificed and inspected both grossly and histologically for healing. **RESULTS:** In comparison of alginate grafts with paper patch technique and spontaneous repair (no patch) in the chinchilla model, the alginate grafts demonstrated significantly improved healing rates over both the untreated control group and the paper patch group; 9/13 healed in the alginate group vs. 2/9 healed in the paper patch group ( $p < 0.05$ ) vs. 1/11 healed in the control group ( $p < 0.05$ ). **CONCLUSIONS:** Calcium alginate tympanic membrane perforation patches offer a significant advantage in the repair of chronic perforations over traditional techniques in the chinchilla perforation model and may offer attractive opportunities in the clinical setting.

**74. DuraPrep and the Risk of Fire During Tracheostomy**

Stephen M. Weber, MD PhD, Portland, OR  
Christopher A. Hargunani, MD, Portland, OR  
Mark K. Wax, MD, Portland, OR

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize the risks of intraoperative fire associated with the use of DuraPrep and recognize contraindications to its use in certain patient populations and surgical procedures.

**OBJECTIVES:** DuraPrep is a widely used, alcohol-based surgical prep solution. Its efficacy as a skin barrier and antimicrobial agent has been well described. Also well documented is the risk of surgical fire associated with incomplete drying of this agent in the context of electrosurgical procedures. Airway fires during tracheostomy are well known. However, there have been no reports of fire during tracheostomy associated with a flammable prep agent prior to entering the airway. **STUDY DESIGN:** Case report. **METHODS:** We describe an operating room fire occurring during awake tracheostomy associated with the use of DuraPrep. **RESULTS:** Awake tracheostomy was performed in a nonemergent fashion due to progressive airway obstruction from a poorly differentiated pleomorphic sarcoma of the pharynx. A three minute delay was observed after the surgical prep. Reinspection revealed hirsute chest, shoulders and neck with the exception of the operative field that had been shaven. No visible pooling of prep solution was observed. After performing the skin incision a brief fire erupted during the first use of electrocautery resulting in second and third degree burns to the neck and shoulders. **CONCLUSIONS:** This case illustrates that DuraPrep should be avoided in the hirsute patient as body hair interferes with drying of this solution and increases the risk of fire. Another risk factor involved was the provision of supplemental oxygen by facemask rather than by nasal canula. These events illustrate that surgeons must be meticulous about controlling all elements of the fire triangle during surgery of the head and neck to minimize the risk of operating room fires.

**75. Multi-Photon Imaging of Collagen and Elastin in Fresh Ex Vivo Human, Porcine, and Rabbit Vocal Folds**

Randy L. Wei, MPhil, Irvine, CA  
Alvin T. Yeh, PhD, Austin, TX  
David E. Vokes, MBChB FRACS, Orange, CA  
Brian J. Wong, MD PhD, Irvine, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to demonstrate the utility of multi-photon imaging in characterizing the microstructure of the vocal fold microstructure.

**OBJECTIVES:** To characterize the microstructure of the fibers in human, porcine, and rabbit true vocal folds (VF) using multi-photon microscopy (MPM) in order to image fresh tissue without fixation, and thus providing accurate microstructural information on vocal fold microstructure in its native hydrated state with diffraction limited resolution. **STUDY DESIGN:** Prospective, nonrandomized experimental investigation in fresh human, porcine, and rabbit tissue. **METHODS:** Human, porcine, and rabbit VFs were sectioned coronally and imaged using a Zeiss-Meta 510 MPM. MPM collected 3 dimensional images of collagen and elastin fiber orientation, distribution, and intrinsic fiber structure from the superficial layer of the lamina propria (375-415nm and 560-715nm for collagen and elastin, respectively). Utilizing volumetric rendering, we are able to calculate the density of elastin and collagen in different locations of the VF. The images were correlated with histology. **RESULTS:** Unlike bundled compact fiber bundles seen in collagen, elastin is arranged in clusters. The fibers are coiled and intertwine with other elastin fibers. Each elastin fiber exhibits varying thickness and length. The rabbit and porcine VFs of this region show similar structure and organization as in the human. **CONCLUSIONS:** These are the first MPM images of native collagen and elastin fiber structure in fresh ex vivo human, pigs, and rabbits VFs. Greater knowledge of the microstructure and orientation of elastin and collagen in the VF lamina propria will advance our understanding of wound healing dynamics and may improve surgical outcomes in the VFs.

**76. Percutaneous Wiring Technique for Medial Canthal Ligament Resuspension: An Efficient and Effective Approach**

Hausin Wong, MD, Orange, CA  
Terry Shibuya, MD\*, Orange, CA  
Vincent Y. Chen, MD, Orange, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to utilize this surgical technique in repairing medial canthal ligament injuries in an efficient and effective manner.

**OBJECTIVES:** Determine the effectiveness of percutaneous wiring for medial canthal ligament resuspension. **STUDY DESIGN:** A retrospective review of patients with nasal orbital ethmoid fractures and medial canthal ligament detachment for skull base surgeries who underwent resuspension of both medial canthal tendons with the percutaneous intercanthal wiring technique. **METHODS:** Evaluation of the intercanthal distance in 6-10 patients through preoperative and postoperative pictures to determine the efficacy of medial canthal ligament resuspension with the percutaneous technique. In addition a discussion of the percutaneous technique to show the ease of use for medial canthal ligament resuspension. **RESULTS:** The percutaneous wiring technique for medial canthal ligament resuspension is a quick and effective means of returning intercanthal distance to patient's preinjury state. **CONCLUSIONS:** This novel percutaneous intercanthal wiring technique is useful in resuspending the medial canthal ligament in a quick and effective manner.

**77. Focal Reconstruction for Complicated Tracheotomy Site Stenosis**

Gayle E. Woodson, MD\*, Springfield, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to recognize limitations of tracheal resection for patients with complex stenosis and medical comorbidity and understand the role of conservative local flaps in reconstructing the tracheotomy site.

**OBJECTIVES:** Tracheotomy site stenosis can preclude decannulation, due to collapse of the airway after removal of the tracheotomy tube. Tracheal resection has become the preferred method for managing tracheal stenosis. However, some patients with stenosis at the tracheotomy site may not be candidates for resection, due to medical comorbidity, prior tracheal resection, prior repair of tracheoesophageal fistula, and/or concomitant glottic or distal tracheal stenosis. Conservative focal repair, similar to older "trough" techniques, can be performed under local or mask anesthesia to permit airway rehabilitation. **STUDY DESIGN:** Case series: Focal flap reconstruction was used in 6 patients with tracheotomy site stenosis, who could not be decannulated due to tracheotomy site stenosis and who were not candidates for tracheal resection. The goal was to restore tracheal airway to achieve decannulation. **METHODS:** Suprastomal stenosis was resected transtomally to create a large diameter skin lined "permanent" tracheostomy, closed with a skin flap after a several week delay. For circumferential tracheotomy site stenosis, staged local flaps were used to simultaneously close the stoma and enlarge the tracheal diameter. **RESULTS:** Procedures were accomplished under local anesthesia or mask anesthesia with spontaneous ventilation, avoiding further airway trauma or need for mechanical ventilation. All patients achieved an airway sufficient to achieve decannulation. **CONCLUSIONS:** Focal tracheoplasty is a gentle and effective means of airway restoration in selected patients with complex airway stenosis.

**78. Comparison of Operative Times for Coblation Versus Cautery Tonsillectomy and Adenoidectomy**

Kathleen L. Yaremchuk, MD\*, Detroit, MI

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to discuss the difference in operative times for tonsillectomy or tonsillectomy and adenoidectomy using coblation versus cautery.

**OBJECTIVES:** To compare the operative time involved with performing tonsillectomy or tonsillectomy and adenoidectomy using coblation versus cautery. **STUDY DESIGN:** A retrospective review of operative records from January 2001 to December 2004 for patients undergoing tonsillectomy and tonsillectomy with adenoidectomy to determine the operative time for tonsillectomy or tonsillectomy and adenoidectomy when using coblation versus use of cautery. **METHODS:** Comparisons were performed between the surgery times between tonsillectomy and tonsillectomy with adenoidectomy and the two methods, coblation and cautery. ANOVA was used to test for differences in surgery time, between the four groups defined by all possible combinations of these two factors (surgery type and method). Gender and age were included as covariates to adjust for the age and gender differences which were observed between at least two of the four combinations of the two groups being compared. **RESULTS:** Eight hundred sixty eight cases were performed. The average time for cautery tonsillectomy was 30 minutes (115 cases), the average time for cautery tonsillectomy and adenoidectomy was 35 minutes (212 cases). The average time for coblation tonsillectomy was 24 minutes (170 cases) and the average time for coblation tonsillectomy and adenoidectomy was 29 minutes (371 cases). **CONCLUSIONS:** Operative time for coblation tonsillectomy and coblation tonsillectomy and adenoidectomy were significantly shorter in duration (6.4 minutes less, on average) than cautery tonsillectomy and cautery tonsillectomy and adenoidectomy ( $p < 0.0001$ ). Age was observed to be associated with a longer surgery time.

**79. Nonsquamous Cell Malignancies of the Oral Cavity and Pharynx**

Chad A. Zender, MD, Maywood, IL  
Kamil Muzaffar, MD\*, Maywood, IL  
Guy J. Petruzzelli, MD, Maywood, IL

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation the participants should be able to discuss the heterogeneous nature of nonsquamous cell malignancies of the oral cavity/pharynx, and we will demonstrate a practical approach to these tumors.

**OBJECTIVES:** The aim of this study is to review our experience with nonsquamous cell malignancies of the upper aerodigestive tract, looking at demographics, histology, treatment modalities, recurrence rates and survival. **STUDY DESIGN:** A retrospective review. **METHODS:** A chart review looking at the medical records of patients at a tertiary care center from 1989 to 2005 whose diagnosis included a nonsquamous cell carcinoma of the oral cavity or pharynx. **RESULTS:** 58 patients from 1989 to 2005 were diagnosed with nonsquamous malignancies of the oral cavity and pharynx. There were 31 females and 27 males with a mean age of 54 (10 to 87) years. The most common location was the oral cavity (n=47) followed by the oropharynx (n=9) and the nasopharynx (n=2). The most common histological types were minor salivary gland tumors (49/58). Forty-three percent had advanced stage disease. Only 5/58 patients presented with clinically or radiographically evident neck disease, and 12 of 116 necks were treated surgically. 54/58 patients were treated with primary surgery, and 17/55 patients got postoperative radiation therapy. There was a mean (38.4 months) and median (26.81 months) follow-up reported. 77% of patients are alive with no evidence of recurrence (no stage I/II patients have died of disease). **CONCLUSIONS:** Nonsquamous cell cancers of the oral cavity and pharynx represent a very heterogeneous group of malignancies that are most commonly of minor salivary gland origin. These tumors were most commonly seen in the oral cavity, typically require a surgical approach, rarely present with neck disease and have a good outcome if treated early.

**80. Alopecia Universalis in a Child After CT Scanning**

Jonathan E. Zwart, MD, Loma Linda, CA

Mark R. Rowe, MD, Loma Linda, CA

**EDUCATIONAL OBJECTIVE:** At the conclusion of this presentation, the participants should be able to understand that the phenomenon of alopecia areata/totalis is possible after a routine head and neck CT scan.

**OBJECTIVES:** We will present a case of alopecia totalis in a child after routine CT scan. We will discuss the current hypothesis of the disease etiology, the management of the hair loss, and bring to attention this disease and how it can occur after a routine exam used by all otolaryngologists. **STUDY DESIGN:** A three year old child presented to the pediatric ear, nose and throat clinic with a 3cm neck mass since birth. It was thought to be a lymphangioma versus branchial cleft cyst. At one year of age, the child had a CT scan after which he lost all the hair on his head. The hair subsequently regrew. At three years of age, the mass suddenly enlarged, he had a repeat CT scan after which he lost all the hair on the head including his eyebrows and eyelashes. He was diagnosed with alopecia totalis. **METHODS:** N/A. **RESULTS:** Alopecia totalis, or hair loss on the entire scalp, is known to occur in the dermatology literature. Alopecia is more common in the pediatric and adolescent age group. The current literature cites psychologic versus autoimmune mechanisms as the cause. The psychiatric issues linked to both alopecia areata and totalis are depression, anxiety and acute stress. Autoimmune research suggests a T-cell mediated attack on the hair follicle. The current treatment aims at regrowth of the hair by intralesional steroid injections, topical sensitizers or chemotherapy agents. **CONCLUSIONS:** Alopecia totalis after CT scanning has not been described in the ear, nose and throat literature. We brought to attention this hair loss pattern and reviewed the current literature on disease etiology and management.