

**TRIOLOGICAL SOCIETY
2008 ANNUAL PROGRAM
MAY 1-4, 2008
JW MARRIOTT GRANDE LAKES
ORLANDO, FL**

**1st Thursday
May**

**8:00 - 12:00 SCIENTIFIC SESSION
Mediterranean Ballroom Salon 6-8**

8:00 Welcome and Remarks by President
Citizenship in Medicine: What is the Role of the Otolaryngologist?
Harold C. Pillsbury, MD*, Chapel Hill, NC

8:10 Introduction of Guest of Honor
Patrick E. Brookhouser, MD*, Omaha, NE

8:15 - Presidential Citations
8:25 Gerald S. Berke, MD*, Los Angeles, CA
Craig A. Buchman, MD*, Chapel Hill, NC
Sigsbee W. Duck, MD*, Gillette, WY
Robert H. Maisel, MD*, Minneapolis, MN
Jesus E. Medina, MD*, Oklahoma City, OK
Robert H. Ossoff, DMD MD*, Nashville, TN
Myles L. Pensak, MD*, Cincinnati, OH
Brent A. Senior, MD, Chapel Hill, NC

8:25 - Presidential Speaker
8:45 Endoscopic Skull Base Surgery
Carl H. Snyderman, MD, Pittsburgh, PA

MODERATOR
Harold C. Pillsbury, MD*, Chapel Hill NC

8:45 MOSHER AWARD PRESENTATION - TRIOLOGICAL THESIS
The Role of Extraesophageal Reflux in Otitis Media in Infants and Children
Robert C. O'Reilly, MD, Wilmington, DE

Educational Objective: At the conclusion of the presentation the audience will be able to 1) describe the pathophysiology of extraesophageal reflux; 2) understand the potential role of extraesophageal reflux in otitis media and children; and 3) understand the assays available to detect extra-gastric pepsin.

Objectives: Gastroesophageal reflux disease (GERD) is common in children, and extraesophageal reflux disease (EORD) has been implicated in the pathophysiology of otitis media. We sought to: 1) determine the incidence of pepsin/pepsinogen presence in the middle ear cleft of a large sample of pediatric patients undergoing myringotomy with tube placement for otitis media; 2) compare this to a control population of pediatric patients undergoing middle ear surgery (cochlear implantation) with no documented history of otitis media; 3) analyze potential risk factors for otitis media in children with EORD demonstrated by the presence of pepsin in the middle ear cleft; and 4) determine if pepsin positivity at the time of myringotomy with tube placement predisposes to post-tympanostomy tube otorrhea.

Study Design: Study Group: Prospective sample of 509 pediatric patients (n=893 ear samples) undergoing myringotomy with tube placement for recurrent acute otitis media and/or otitis media with effusion in a tertiary care pediatric hospital with longitudinal follow-up of post-tympanostomy tube otorrhea. Control Group: Prospective samples of 64 pediatric patients (n=74 ears) with negative history of otitis media undergoing cochlear implantation at one of three tertiary care pediatric hospitals. **Methods:** A previously validated, highly sensitive and specific modified enzymatic assay was used to detect the presence of pepsin in the middle ear aspirates of study and control patients. Risk factors for otitis media and potentially associated conditions including gastroesophageal reflux disease, allergy, and asthma were analyzed for the study group through review of the electronic medical record (EMR) and correlated to presence of pepsin in the middle ear space. Study patients were followed longitudinally postoperatively to determine the incidence of post-tympanostomy tube otorrhea. **Results:** The incidence of pepsin in the middle ear cleft of the study group was 20% of patients and 14% of ears which is significantly higher comparing with 1.4% of control patients and 1.5% of control ears (p<0.05). Study patients younger than 1 year of age had a higher rate of purulent effusions and pepsin in the middle ear cleft (p<0.05). Patients with pepsin in the middle ear cleft were more likely to have an effusion at the time of surgery than patients without pepsin in the middle ear cleft (p<0.05). There was no statistical association found between the presence of pepsin and clinical history of gastroesophageal reflux disease, allergy, asthma, or post-tympanostomy tube otorrhea. **Conclusions:** Pepsin is detectable in the middle ear cleft of 20% of pediatric patients with otitis media undergoing tympanostomy tube placement compared to 1.4% of controls; recovery of pepsin in the middle ear space of pediatric patients with otitis media is an independent risk factor for otitis media. Patients under one year of age have a higher incidence of purulent effusions and pepsin-positive effusions. Clinical history of GERD, allergy, and asthma do not appear to correlate with evidence of EORD reaching the middle ear cleft. The presence of pepsin in the middle ear space at the time of tube placement does not appear to predispose to post-tympanostomy tube otorrhea.

**8:55 FOWLER AWARD PRESENTATION (co-award) -
TRIOLOGICAL THESIS
The Basic Science of Tracheal Transplantation: Cytokine Expression in the Murine Tracheal Transplantation Model
Eric M. Genden, MD, New York, NY**

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the challenges associated with tracheal transplantation and the progress that has been made in our understanding of tracheal immunobiology.

It is our hypothesis that interleukin-6 is involved in the early phase of epithelial migration in the murine tracheal transplant model. Using one hundred and twenty-eight age matched, major histocompatibility complex (MHC) mismatched, female BALB/c (donor) and C57BL/6 recipient mice, we randomly assigned the mice into eight experimental groups. Group I received orthotopic tracheal allografts and Group II received orthotopic tracheal isografts. Both groups were randomly assigned to receive no immunosuppression or daily immunosuppression with cyclosporine A, 10 mg/kg/day (CsA). Tracheal graft segments were harvested on days 4, 7, 10, and 14 to assess the initial phase of epithelial migration from the recipient into the donor graft. Reverse transcriptase-multiplex polymerase chain reaction (RT-PCR) and Western blot analysis were performed to determine the cytokine profile during the initial phase of epithelial migration. Immunofluorescent staining was used to localize the cytokine(s) of interest, and Enzyme-Linked ImmunoSorbent Assay (ELISA) was used to determine if cytokine levels were upregulated in the peripheral circulation. Immunohistochemistry and electron microscopy were used to assess the origin and morphology of the migrating cells. We found that basal epithelial cells migrate from immunosuppressed recipients into donor tracheal allograft segments on day 4 and progressively increase in density throughout the initial 14 days following transplantation. Migrating basal cells differentiate into recipient derived ciliated columnar epithelial cells. During the initial process of epithelial migration, there was an increase in mRNA expression of IL-10, IL-6, INF-g, IL-2, IL-1?, and TNF-a when compared with the non-operated C57 control on days 4, 7, 10, and 14 (p<0.05). For all cytokines mRNA expression was significantly upregulated in allografts compared to isografts (p<0.05). Western blot analysis demonstrated a significant increase in IL-6 protein level in the immunosuppressed allografts on days 4, 7, and 10 relative to all other groups (p<0.05). Commensurate with a rise in IL-6 protein expression, there was increased IL-6 specific immunofluorescent staining that localized primarily to the neoeepithelium and to a lesser extent, the lamina propria. In conclusion, during the initial phase of epithelial migration in the murine tracheal transplant model, IL-6 protein products are upregulated suggesting that IL-6 may modulate epithelial migration in the tracheal allograft model.

**9:05 FOWLER AWARD PRESENTATION (co-award) -
TRIOLOGICAL THESIS
Effects of Erb B2 Signaling on Response of Vestibular Schwannoma Cell γ -Irradiation
Marlan R. Hansen, MD, Iowa City, IA**

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the effects of ErbB2 signaling on the radiosensitivity of cultured vestibular schwannoma cells.

Objectives: For vestibular schwannomas (VSs) that require treatment, options are limited to microsurgery or irradiation (IR). Development of alternative therapies that augment or replace microsurgery or IR would benefit patients not suitable for current therapies. This study explored the ability of ErbB2 inhibitors to modulate the effects of IR on VS cells. **Study Design:** Prospective study using primary cultures derived from human VSs. **Methods:** Primary cultures of VS cells were derived from acutely resected tumors. Cultures received single escalating doses (15-40 Gy) of γ -irradiation from a ^{137}Cs γ -irradiation source. Cell proliferation was determined by BrdU uptake and apoptosis by Terminal deoxynucleotidyl Transferase dUTP Nick End Labeling (TUNEL). Trastuzumab (Herceptin®) and PD158780 were independently used to inhibit ErbB2 signaling while neuregulin-1 β (NRG-1) was used to activate ErbB2. **Results:** IR induces VS cell cycle arrest and apoptosis in doses greater than 20 Gy, demonstrating that VS cells are relatively radioresistant. This radioresistance likely arises from their low proliferative capacity as a sublethal dose of IR (10 Gy) strongly induces DNA damage evidenced by histone H2AX phosphorylation. Inhibition of ErbB2, which decreases VS cell proliferation, protects VS cells from radiation-induced apoptosis, while NRG-1, an ErbB2 ligand and VS cell mitogen, increases radiation-induced VS cell apoptosis. **Conclusions:** Compared to many neoplastic conditions, VS cells are relatively radioresistant. The radioprotective effect of ErbB2 inhibitors implies that the sensitivity of VS cells to IR depends on their proliferative capacity. These results hold important implications for current and future treatment strategies.

9:15 HONORABLE MENTION - TRIOLOGICAL THESIS
Mitomycin C and the Endoscopic Treatment of Laryngotracheal Stenosis: Are Two Applications Better Than One?
Marshall E. Smith, MD, Salt Lake City, UT

Educational Objective: At the end of this presentation the participants should be able to understand the expected results of mitomycin-C application in the management of airway stenosis and learn a protocol for its use.

Objectives: Endoscopic treatment of laryngotracheal stenosis by airway dilation, despite short term improvement is often associated with long term relapse. Mitomycin-C (MMC) inhibits fibroblast proliferation and synthesis of extracellular matrix proteins and, thereby, modulates wound healing and scarring. MMC application at the time of endoscopic dilation and laser surgery has been suggested to improve outcomes, but this has not been studied in a rigorous manner. This study examines the hypothesis that two topical applications of MMC given 3-6 weeks apart will result in decreased scarring/restenosis of the airway, when compared to a single topical application. **Study Design:** Randomized, prospective, double blind, placebo controlled clinical trial. **Methods:** Twenty-six patients with laryngotracheal stenosis due to idiopathic subglottic stenosis, postintubation stenosis, or Wegener's granulomatosis entered a protocol to receive three endoscopic CO2 laser and dilation procedures over a three month interval. At the first procedure after radial CO2 laser incision and airway dilation, all patients received topical application of MMC (0.5 mg/ml) to the airway lesion. One month later a second endoscopic incision and dilation was performed and the patients were randomized to either a second application of mitomycin-C or to application of saline placebo. A third dilation procedure was performed two months later without MMC application. Patients were followed for up to five years for relapse of airway stenosis with clinical symptoms sufficient to require a subsequent procedure. **Results:** The relapse rates at 1, 3, and 5 years were 7%, 36%, and 69% for patients treated with two applications of MMC compared to 33%, 58%, and 70% for patients treated with one application of MMC. **Conclusions:** This prospective randomized double blind placebo controlled trial suggests that, in the endoscopic management of laryngotracheal stenosis, two applications of MMC given 3-4 weeks apart after airway radial incision and dilation reduces the restenosis rate for two to three years after treatment when compared to a single application. However, restenosis and delayed symptom recurrence continues so that at 5 years the relapse rates are the same. Thus, MMC may postpone, but does not prevent, the recurrence of symptomatic stenosis in the majority of patients.

SINUS SESSION

9:25 Empiric Treatment of "Sinus Headache" as Migraine--The Diagnostic Utility of Triptans
John M. DelGaudio, MD, Atlanta, GA*
Elina Kari, MD, Atlanta, GA (Presenter)

Educational Objective: At the conclusion of this presentation, the participants should be able to have an enhanced appreciation for the diagnostic and management challenge of patients presenting with self-described "sinus headaches". They should also understand that migraines are an under-diagnosed problem in patients who present with headache. Participants should also be able to consider the diagnostic utility of triptans in patients with what are likely to be migraine-like headaches.

Objectives: Determine the response rate to triptans in alleviating "sinus headache" in patients with endoscopy and CT-negative sinus exams. **Study Design:** Prospective clinical trial. **Methods:** Patients who presented to a tertiary care center otolaryngology department with primary complaints of facial pain, pressure, or headache localized over the area of the sinuses, and a self or physician diagnosis of "sinus headache" were enrolled. Patients underwent directed history, physical examination, rigid nasal endoscopy, a sinus CT scan, and completed a headache questionnaire. Those patients that had negative findings were treated empirically with triptans. Patients completed

a headache diary for each headache using a visual analog scale to rate the headache before and after triptan use. Response was considered as significant improvement (greater than 50% reduction of pain), partial (25-50% reduction), and no response. **Results:** 54 patients were enrolled. Thirty-seven (69%) completed followup. 62% were women. The mean age was 41 (23-70). Thirty-three (89%) had significant response of headache pain with triptan use. Seventeen patients (31%) withdrew or failed to followup, refusing to believe that their headaches may be due to migraines. **Conclusions:** This study demonstrated that the demographics of patients with self-described "sinus headaches" who did not have findings of sinusitis on endoscopy and CT scan closely reflected the demographics of patients afflicted with migraines. It also showed that 89% of these patients had a significant response to empiric treatment for migraine headaches with triptans. These findings support that "sinus headaches" represent migraines and response to triptans may aid in diagnosis.

9:32 Light Induced Microbial Reduction in Acute Sinusitis

Yosef P. Krespi, MD, New York, NY*

Cuneyt O. Kara, MD, Denizli, Turkey

Educational Objective: At the conclusion of this presentation, the participants should be able to understand a new methodology to kill microorganisms utilizing infrared lasers and photoactivated laser therapy.

Objectives: To analyze two innovative methods of light energy to reduce bacterial load in an animal model of acute rhinosinusitis. **Study Design:** Twelve rabbits were used in this experiment. Ten were exposed to laser energy and two as control. Acute sinusitis was created by packing the nasal cavity using a sponge soaked in solution containing pathogenic microorganisms (*S. aureus*, *S. pneumoniae*, *P. aeruginosa*, and *aspergillus fumigatus*). Each one ml of bacteria solution contained a minimum of 10(8) colony forming units. CT scanning was performed in some of the infected animals radiologically confirming sinusitis. **Methods:** Two days following the inoculation of bacteria into the nose, the nasal pack was removed and nasal passages were exposed to laser irradiation. Two laser modalities were tested. A near infrared (IR) diode laser at 940nm with diffuser fiber tip was used in five rabbits. A combination of photosensitizer (methylene blue 0.01% - 0.05%) and visible red light was used in a second cohort. Nasal cultures were obtained before and after the laser treatments. Animals were sacrificed five days following treatment and bacteriologic/histologic results were analyzed. **Results:** An average of three log reduction in bacterial counts was achieved with both laser methods compared to controls. Histologic studies demonstrated preservation of tissue integrity without any damage to the nasal mucosa. **Conclusions:** Significant bacterial reduction was achieved with IR laser and photo activated therapies in this experimental animal study of acute sinusitis. This new and innovative method of bacteria killing without damaging the functions of the host tissue may have important clinical application in the future.

9:39 Low Cost Simulation for Skill Attainment in Endoscopic Sinus Surgery

Kevin C. McMains, MD, San Antonio, TX

Erik K. Weitzel, MD, Woodville, Australia

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the need for operative skills development outside of the operating room; 2) define low fidelity and high fidelity simulation; and 3) apply low cost, low fidelity instruction in training of otolaryngology residents.

Objectives: To demonstrate improvement in student and resident performance of set endoscopic maneuvers with repeated attempts in a sinus lab setting and to support the use of low fidelity simulation for resident training preliminary to endoscopic sinus surgery. **Study Design:** Prospective, nonrandomized, cohort study. **Methods:** Cohorts of 5 senior medical students and 4 midlevel residents (PGY-3/PGY-4) were timed performing a series of endoscopic maneuvers in a sinus lab setting using standard endoscopic equipment with fresh cadaveric specimens. Data was collected by stopwatch and recorded in seconds. Three attempts were recorded for each participant. Parametric data was analyzed with two way T-test and one way ANOVA using SPSS 11.0. Curve fitting was performed with Microsoft Excel Chart. **Results:** At all three attempts residents were significantly faster to accomplish the endoscopic goals correctly (attempt 1: 20.25 vs. 80.20 sec ($p=0.002$), attempt 2: 9.00 vs. 26.40 sec ($p=0.003$), attempt 3: 7.00 vs. 21.80 sec ($p=0.008$)). Participants demonstrated significant improvement in overall surgical to complete endoscopic tasks between the 1st/2nd and 1st/3rd attempts ($p=0.009$ and $p=0.006$). These findings remained significant for subgroup analysis when residents and students were studied independently. The trend for improvement between the 2nd and 3rd attempt was not statistically significant. **Conclusions:** Both senior medical students and midlevel residents improved their performance of programmed endoscopic tasks with repeated practice in a sinus lab setting. Midlevel residents are capable of accomplishing endoscopic maneuvers faster than medical students. Practicing endoscopic skills in a sinus lab setting can develop basic skills necessary to perform more complicated endoscopic surgical procedures in the sinuses.

9:46 Break With Exhibitors/View Posters - Coquina Ballroom

MODERATOR

Brent A. Senior, MD, Chapel Hill, NC

10:15 Long Term Frontal Sinus Patency after Endoscopic Frontal Sinusotomy

Yvonne Chan, MD, Savannah, GA

Christopher T. Melroy, MD, Savannah, GA
Carolyn A. Kuhn, Savannah, GA
William T. Daniel III, Savannah, GA
Frederick A. Kuhn, MD*, Savannah, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand that with meticulous surgical technique and proper postoperative care, with and without revision surgery, one should be able to achieve high quality and long lasting frontal sinus ostium patency. Participants should also be able to recognize that frontal sinus patency rates after endoscopic frontal sinusotomy are comparable between eosinophilic chronic rhinosinusitis and CRS without eosinophilia.

Objectives: To evaluate long term frontal sinus patency after endoscopic frontal sinusotomy in patients with and without eosinophilic inflammatory polyps. **Study Design:** Retrospective chart review. **Methods:** Symptom assessment and endoscopic photographs were prospectively collected on patients who underwent frontal sinusotomy between 7-1-1999 and 12-31-1999. Subjective symptom improvement was evaluated using the RSOM 31. Objective findings of endoscopic frontal sinus patency were documented by archived digital photography. **Results:** Seventy-two patients with 133 frontal sinuses underwent endoscopic frontal sinus surgery in 1999 and had an average followup of 46.9 months. The patient population was divided into two groups: 23 patients had eosinophilic CRS (ECRS) and 49 patients had CRS without eosinophilia. The average followup for patients with ECRS is 67.7 months and 38.9 months for CRS patients without eosinophilia. The overall frontal sinus ostium patency rate was found to be 87.5%. The ECRS patients had a frontal sinus patency rate of 87% and ones without eosinophils had a frontal sinus patency rate of 88%. **Conclusions:** Long term endoscopic confirmation of frontal ostium patency demonstrates that endoscopic frontal sinusotomy can yield high quality, durable results. There was no difference in patency results between chronic rhinosinusitis without eosinophilia and eosinophilic chronic rhinosinusitis.

10:22 Anatomical Changes of the Ethmoid Cavity Following Endoscopic Sinus Surgery - Functional and Aesthetic Implications

Michael P. Platt, MD, Boston, MA
Mary E. Cunnane, MD, Boston, MA
Hugh D. Curtin, MD, Boston, MA
Ralph Metson, MD*, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the unexpected anatomical changes that may occur following ethmoidectomy.

Objectives: Alteration of the bony architecture of the paranasal sinuses is a common finding in patients with chronic rhinosinusitis. Remodeling of the ethmoid sinus framework following endoscopic surgery, however, is a newly described entity. The objective of this study was to determine the incidence and extent of these changes in ethmoid size following ethmoidectomy. **Study Design:** Retrospective chart and CT scan review. **Methods:** 2,633 consecutive sinus CT scans were reviewed. Seven dimensions were measured using Voxar 3D software on 124 scans in 62 patients that met inclusion criteria. **Results:** Comparison of pre- and postoperative CT scans (performed 2 to 37 months after ethmoidectomy) revealed a significant decrease in mean ethmoid cavity width of 1.2+1.6mm at the level of the cribriform plate ($p<0.0001$) and 0.9+1.7mm at the planum sphenoidale ($p<0.0001$). Five patients (8.1%) were found to have a clinically relevant decrease of more than 2mm in ethmoid width (mean 3.1+0.9mm). These changes appeared to be the result of postoperative bowing of the medial ethmoid walls with a corresponding increase in orbital volume. This impression was corroborated by the finding of a mean postoperative retro-displacement of the globes (enophthalmos) of 0.3+0.8 mm ($p=0.008$). Surgery performed on the frontal sinus at time of ethmoidectomy was found to be an independent predictor of the observed changes in sinus dimensions ($p=0.007$). **Conclusions:** Unexpected functional and aesthetic outcomes may occur following sinus surgery due to remodeling of the ethmoid sinus. These changes may reflect postoperative loss of supporting structural air cells and adhesion formation.

10:29 Endoscopic Endonasal Surgery for Petrous Apex Lesions

Adam M. Zanation, MD, Pittsburgh, PA
Carl H. Snyderman, MD, Pittsburgh, PA
Ricardo L. Carrau, MD*, Pittsburgh, PA
Amin B. Kassam, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the differential diagnosis for petrous apex lesions; and understand the advantages and limitations of various endoscopic petrous apex approaches.

Objectives: To define clinical/anatomic indications and clinical outcomes for endoscopic approaches to petrous apex lesions. **Study Design:** Retrospective clinical outcome study. **Methods:** All medical records from patients with endoscopic endonasal approaches to isolated petrous apex lesions reviewed for demographics, diagnoses, presentation, endoscopic approach and clinical outcomes. Patients with lesions that involved the petrous apex but were not isolated here were excluded. **Results:** 20 total patients were included in the analysis: 13 inflammatory cystic lesions (9 cholesterol granulomas and 4 petrous apicitis) and 7 solid lesions. Chondrosarcoma was the most common solid petrous apex lesion in our series. 12 of 13 cystic lesions were drained endoscopically (1 surgery aborted). All drained patients had resolution of presenting symptoms. One patient had closure of the outflow tract without return of symptoms and

one patient had revision endoscopic drainage due to scarring and neo-osteogenesis and return of unilateral headache. No carotid injuries or no new cranial neuropathies occurred perioperatively. The advantages and limitations of medial transsphenoidal approaches (with and without carotid mobilization) and transpterygoid infrapetrous approaches are discussed. **Conclusions:** The endoscopic endonasal approach to petrous apex lesions is safe and effective for appropriately selected patients.

10:36 An Early Detection Protocol for Invasive Fungal Sinusitis in Neutropenic Patients Successfully Reduces Extent of Disease at Presentation and Long Term Morbidity

Lindsey Clemson, MD, Atlanta, GA

John M. DelGaudio, MD, Atlanta, GA*

Educational Objective: At the conclusion of this presentation, the participants should be able to understand how an early detection multidisciplinary protocol for invasive fungal sinusitis in neutropenic patients reduces the number of anatomic sites are involved at presentation, the number of surgical procedures necessary, and the long term morbidity.

Objectives: To evaluate the effectiveness of a multidisciplinary early intervention protocol for diagnosis of invasive fungal sinusitis (IFS) in neutropenic patients. A protocol was initiated in 2001 where neutropenic patients who developed fever and/or sinonasal symptoms undergo early sinus CT scan and endoscopic evaluation by an otolaryngologist. CT scans were evaluated for previously reported signs of early IFS including nasal cavity mucosal thickening. **Study Design:** Retrospective chart review from an academic tertiary care hospital. **Methods:** We compared the number of sites of disease involvement at presentation, number of operative procedures performed, disease resolution, long term morbidity, and mortality between groups treated before and after protocol initiation. **Results:** Twenty-nine patients had confirmed IFS. Group 1 includes 14 patients treated before and group 2 includes 15 patients treated after protocol initiation. The average number of sites involved was 2.5 in group 1 and 1.47 in group 2 (p=0.047). The average number of surgical procedures for disease control was 2.2 in group 1 and 1.0 in group 2 (p= 0.015). Long term morbidity occurred in 43% (6/14) group 1 patients compared to 6% (1/15) group 2 patients (p=0.031). Recovery and mortality from IFS was 78.6 % and 7.1% in group 1 and 80% and 6% in group 2. **Conclusions:** IFS requires early diagnosis and treatment for optimum outcome. A protocol of early intervention using previously defined CT criteria resulted in reduced number of anatomic sites involved at presentation leading to fewer surgeries and less long term morbidity. No difference in survival was found as this is more a factor of recovery from neutropenia.

10:43 The Effect of Intentional Cranial Deformation on Frontal Sinus Development and Morphology

Belachew Tessema, MD, New York, NY

William Lawson, MD DDS, New York, NY*

Steven D. Schaefer, MD, New York, NY*

Samuel Marquez, PhD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand what intentional cranial deformation is and what its effect is on the development of the frontal sinus.

Objectives: Intentional cranial deformation (ICD) has been documented to be a worldwide phenomenon whose practice elicits considerable shape changes to the neurocranium during the early stages of postnatal development. Since the development of the frontal sinuses begins after early childhood, the application of ICD procedures should affect morphological growth trajectories in its anatomy. This qualitative and quantitative study examines the effects of ICD on the frontal sinus development and morphology. **Study Design:** Prospective imaging three dimensional volumetric evaluation. **Methods:** Twenty intentionally deformed (ID) and twenty non-deformed (ND) dry crania from distinct Bolivian and Peruvian indigenous populations were selected from the Division of Anthropology at the American Museum of Natural History. The crania were scanned using a high-speed helical CT scanner. Craniofacial linear measures, along with endocranial (EC) and frontal sinus volumetric determinations were obtained using a three dimensional (3-D) volume rendering program. **Results:** 3-D reconstructed volumetric studies showed no statistical differences between the EC volume of ID and ND crania. Analysis of frontal angle showed statistically significant difference between ID and ND crania (p<0.001). Volumetric measurements of frontal sinus showed no statistically significant differences between ID and ND crania. **Conclusions:** ICD procedures affect more readily the extrasplanchnocranial moiety as detected by external linear measurements of adult crania. However the development of the frontal sinus seems not to be affected by these external changes. This study emphasizes the developmental potential of the paranasal sinuses which is not affected by structural changes within the neurocranium.

10:50 - RHINOLOGY PANEL: MY WORST CASE EVER

11:20 Moderator: Brent A. Senior, MD, Chapel Hill, NC

Panelists: David W. Kennedy, MD FACS*, Philadelphia, PA
Marvin P. Fried, MD FACS*, Bronx, NY
Bradley F. Marple, MD FACS, Dallas, TX
James A. Stankiewicz, MD FACS, Maywood, IL

- 11:20 AMERICAN LARYNGOLOGICAL ASSOCIATION DANIEL C. BAKER JR. LECTURE
Paradigms and Progress in Vocal Fold Restoration
Charles N. Ford, MD*, Madison, WI
- 11:40 TRIOLOGICAL SOCIETY JOSEPH OGURA LECTURE
Would Dr. Ogura Approve of Endoscopic Resection of Esthesioneuroblastomas? An Analysis of Endoscopic Resection Data Vs. that of Craniofacial Resection
Paul A. Levine, MD*, Charlottesville, VA
- 12:00 Lunch in Exhibit Hall/View Posters - Coquina Ballroom

2nd Friday **May**

6:30 - 8:00 INTERNATIONAL WINE TASTING RECEPTION

Gazebo

All COSM attendees are invited to attend.

Business casual dress.

Tickets may be purchased at www.cosm.md

Members & non-members \$65

Residents & Fellows \$25

3rd Saturday **May**

- 7:00 - Business Meeting (Members Only)
7:50 New Fellow Induction and Reception -
Mediterranean Ballroom Salon 5

CONCURRENT SESSIONS

SESSION I: HEAD & NECK

Mediterranean Ballroom Salon 5

SESSION II: LARYNGOLOGY & GENERAL

Mediterranean Ballroom Salon 6-8

CONCURRENT SESSION I: HEAD AND NECK

Mediterranean Ballroom Salon 5

MODERATOR

Ricardo Carrau, MD*, Pittsburgh, PA

- 8:00 Welcome and Announcements
- 8:05 Endoscopic Management of Zenker's Diverticulum

Dawn B. Sharp, MD, Birmingham, AL
J. S. Magnuson, MD FACS, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to describe two minimally invasive endoscopic techniques used in management of Zenker's diverticulum. Participants will also be able to discuss outcomes of each procedure and advantages over conventional Zenker's diverticulum open repair.

Objectives: Report outcomes of endoscopic stapler assisted and harmonic scalpel assisted esophago-diverticulostomy in management of Zenker's diverticulum. **Study Design:** A retrospective chart review of 39 consecutive patients with Zenker's diverticulum. **Methods:** Patients' records were reviewed for age, sex, symptoms, preoperative swallow radiography or esophagoscopy, size of diverticulum, procedure type, length of hospital stay, postoperative swallow evaluation, complications, and postoperative symptoms. **Results:** Thirty-nine patients were treated endoscopically for Zenker's diverticulum. Seven of the 39 patients had persistent or reoccurring symptoms after initial intervention. Forty-seven procedures were performed: 28 stapler assisted, 12 harmonic scalpel assisted, and 1 using both endoscopic techniques. Five patients underwent additional procedures after stapler assisted repair, 1 after harmonic scalpel assisted repair, and 1 after open repair. Three procedures were aborted due to unfavorable anatomy and 3 patients underwent subsequent open procedures. The average postoperative hospitalization length was 1.0 days. Postoperative Gastrografin swallow studies excluded leakage in all endoscopically repaired cases. There was resolution of dysphagia in 26 patients who underwent endoscopic management initially. **Conclusions:** Endoscopic management of Zenker's diverticulum is a safe and minimally invasive technique. It offers high patient satisfaction rates, shorter operative and hospitalization lengths, and reduced major complications and complexity of postoperative care when compared to open repair.

8:13 Sialoendoscopy: Indications and Associated Complications

Rohan R. Walvekar, MD, Pittsburgh, PA
Ali Razfar, ScB, Pittsburgh, PA (Presenter)
Ricardo L. Carrau, MD*, Pittsburgh, PA
Barry M. Schaitkin, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to get a perspective of the indications and complications associated with sialoendoscopy and its utility in treating nonneoplastic disorders of the major salivary glands

Objectives: To review our experience with sialoendoscopy for the management of nonneoplastic disorders of the major salivary glands and to validate its use in our patient population. **Study Design:** Retrospective chart review. **Methods:** An IRB approved retrospective chart review identified 56 consecutive cases of sialoendoscopy procedure performed over two years at a tertiary care center from July, 2005 till August, 2007. **Results:** The mean age of presentation was 43 years (range 7-77 years) with a male to female sex ratio of 1:2. All the procedures were performed under general anesthesia. The most common indications included sialolithiasis (52%) followed by salivary gland swelling (16%). The average size of the stones ranged from 0.2cms - 1.2 cm with overall success rate for endoscopic stone removal being 74% (14/19). Three patients (3/29) required a planned combined technique for stone removal. The overall complication rate was 29% (16/56). Of these major complications such as duct perforation and avulsion occurred in 12.5% (2/16) and minor complications occurred in 87.5% (14/16) patients. **Conclusions:** In the early phase of learning complication rates with sialoendoscopy can be significant. Our series shows comparable success rates to published series. Hence we conclude that sialoendoscopy is a safe and effective option to treat nonneoplastic disorders of the major salivary gland in our patient population, avoiding the traditional risks associated with submandibular and parotid gland surgery such as marginal mandibular and facial nerve injury.

8:21 Transoral Excision of the Submandibular Gland

Ryan M. Kauffman, MD, Nashville, TN
James L. Netterville, MD*, Nashville, TN
Brian B. Burkey, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the anatomy of the floor of mouth and the anatomy around of the submandibular gland and Wharton's duct. They should also be able to discuss the transoral surgical approach to excision of the submandibular gland, the indications for the procedure, and the risks and benefits of the approach. We will demonstrate the transoral approach to excising the submandibular gland in 8 patients.

Objectives: We will discuss the transoral surgical approach to excising the submandibular gland, the relevant anatomy, the indications, and the risks and benefits of the procedure. We will present our case series of 8 patients. **Study Design:** A retrospective review of a series of 8 patients in which transoral submandibular gland excision was attempted over the past 2 years was performed. **Methods:** The series of eight patients who underwent transoral submandibular gland excision was examined for age, indication for operation, previous head or neck operation, complications, length of stay, and postoperative pathology. Relevant indications, risks, and benefits are also discussed in conjunction with relevant surgical anatomy and approach utilized. **Results:** Of 8 patients who underwent attempted transoral submandibular gland excision 7 operations were completed transorally. Only one operation was converted to a standard external approach due to severe scarring. Six of 8 patients presented with chronic sialadenitis, 2 of 8 having obstructing sialoliths. Two patients presented with other benign cystic lesions consistent with ranula in one and infected mucocele in another. There was only one patient

with a complication of incision breakdown and delayed healing in an irradiated field. There were no complications involving the lingual or hypoglossal nerves and there were no hemostatic complications. **Conclusions:** Transoral excision of the submandibular gland is a viable and safe approach to be utilized. There are no external scars caused, there is no risk to the marginal mandibular branch of the facial nerve, and skin incisions through irradiated fields are avoided. Although the surgical anatomy is somewhat novel, the transoral approach has been used effectively and without complication in removing benign submandibular gland pathology in our series.

8:29 Comparison of Tonsillectomy to Tonsil Biopsies in Detecting Occult Primary Tumors

Joshua D. Waltonen, MD, Columbus, OH

Enver Ozer, MD, Columbus, OH

David E. Schuller, MD, Columbus, OH*

Amit Agrawal, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the effectiveness of tonsillectomy and deep tonsil biopsies when searching for unknown primary tumors of the head and neck.

Objectives: In patients with metastatic carcinoma to the neck but a primary tumor not evident on physical examination, radiography, or panendoscopy, we hope to compare the yield of detecting occult tumors by performing tonsillectomy and deep tonsil biopsies. **Study Design:** Retrospective study. **Methods:** Over a ten year period the charts of all patients with unknown primary tumors were reviewed. Patients with findings on examination, imaging, or endoscopy that led to detection of a primary tumor were excluded. Specifically we compared groups of patients who had undergone tonsillectomy to those who had undergone deep tonsil biopsies in search of an occult primary tumor. **Results:** One hundred twenty-two patients were identified; none had any findings on physical examination, imaging studies, or panendoscopy to suggest a primary tumor site. All had biopsies of the tongue base, hypopharynx and nasopharynx. Tonsil biopsies were performed in 95 patients. In this group 11 primary tumors were identified (11.6%): 3 in the tonsils, 6 in the tongue base, 1 in the hypopharynx, and 1 in the nasopharynx. Tonsillectomy was performed in 27 patients. Eleven primary tumors were identified (40.7%): 8 in the tonsils, 2 in the tongue base, and 1 in the hypopharynx. All tonsil primary tumors identified were ipsilateral to the presenting neck mass. The overall yield of finding occult primary carcinoma in the tonsil was 3.2% for deep tonsil biopsies vs. 29.6% for tonsillectomies ($p=0.0013$). **Conclusions:** Tonsillectomy offers a significantly higher likelihood of finding occult tonsillar tumors than deep tonsil biopsy.

8:37 Effect of Hyperbaric Oxygen Therapy on a Murine Squamous Cell Carcinoma Model

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

Patrick L. Fraley, MD, St. Louis, MO

Robert O'Bert, MD, St. Louis, MO

Catherine Heintz, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the possible cancer risks of treating head and neck cancer patients with hyperbaric oxygen therapy.

Objectives: Hyperbaric oxygen therapy (HBO) is sometimes used to assist in wound healing following major head and neck cancer surgery. However there is concern that HBO treatments might enhance the growth of any residual microscopic disease. This was studied in a mouse model of squamous cell carcinoma. **Study Design:** Animal study. **Methods:** SCC-VII/SF tumor cells were cultured then injected (3×10^3 cells) into C3H/HeJ mice in five groups: subcutaneous (SQ) control (N=13), SQ immediate (N=12), SQ delayed (N=13), tail vein (TV) control (N=8), and TV immediate (N=9). The three experimental groups were subjected to HBO therapy, 2.4 Atm for 90 minutes, 5 days per week for 4 weeks, starting on post-injection day 3 ("immediate") or 10 ("delayed"). Tumors in the SQ mice were measured 3x per week. Lung metastases in the TV mice were counted at necropsy. **Results:** Following HBO the tumor volume in the SQ immediate group was 49.1% higher than the control group, and the SQ delayed group was 604% higher than controls ($p<.05$). The delay period allowed extra tumor growth prior to HBO; when corrected for this the delayed group growth curve paralleled the immediate group with a tumor volume 47.0% higher than controls. The TV groups had similar numbers of lung metastases with a mean of 8.7 mets in the control group and 9.0 mets in the HBO group (NS). **Conclusions:** This study suggests HBO therapy does accelerate the growth of microscopic foci of squamous cell carcinomas. This finding differs from some earlier studies and warrants further study.

8:45 Q&A

MODERATOR

Mark C. Weissler, MD*, Chapel Hill, NC

8:50 Role of Planned Post-Chemoradiotherapy Selective Neck Dissection in the Multimodality Management of Head and Neck Cancer

Reza S. A. Nouraei, MD, London, UK

Peter M. Clarke, MD, London, UK

Chad Al-Yaghchi, MD, London, UK
Guri S. Sandhu, MD, London, UK
Simon Stewart, MD, London, UK
Anne Sandison, MD, London, UK

Educational Objective: At the conclusion of this presentation, the participants should be able to better appreciate the continued necessity for performing neck dissection surgery in all patients with N2-3 disease even following definitive chemoradiotherapy. The participants should also be able to appreciate that by synergistically combining unique benefits of surgery and chemoradiation, the need for radical neck surgery is markedly reduced resulting in significantly reduced postoperative morbidity.

Objectives: To assess the oncological efficacy and functional outcome of selective post-chemoradiotherapy neck dissection for stage IV head and neck squamous cell carcinoma. **Study Design:** Retrospective chart review. **Methods:** Review of patients with N2-3 cervical metastases at presentation who underwent planned neck dissection following complete, biopsy-proven clearance of primary site mucosal disease with chemoradiotherapy between 1999 and 2006. **Results:** There were 33 males and 10 females. The average age at presentation was 57±9 years. Oropharynx was the most common primary site (n=24; 56%). 51 hemi-neck dissections were performed including six bilateral and 2 revision procedures. Surgery was selectively directed towards neck levels with high volume pre-chemoradiotherapy disease. Sixteen patients (37%) had residual viable post-chemoradiotherapy neck disease. Patient weight did not deteriorate following neck dissection (p>0.4). Eleven patients required shoulder physiotherapy of which nine settled with conservative measures. Five year hemi-neck disease control and disease specific survival rates were 93% and 63% respectively. Presence of viable post-chemoradiotherapy neck disease was the only independent predictor of regional control (p<0.001; Hazard Ratio 0.0; 0.00-0.38) and disease specific survival (p<0.02; Hazard Ratio 0.28; 0.05-0.81). Surgery was twice more likely to confer therapeutic benefit than to cause a complication. **Conclusions:** Neck dissection is safe and effective and a necessary component of the multimodality management of all patients with N2-3 disease. It should be universally performed following satisfactory demonstration of primary site disease clearance with chemoradiotherapy. Effectiveness of chemoradiation in eliminating low volume disease makes radical neck dissection unnecessary in most cases. Surgery should instead be selective and synergistic with chemoradiation and be directed toward removing those levels with pretreatment high volume disease.

8:58 The Utility of Transoral Resection of the Tonsil for Squamous Cell Carcinoma

Douglas K. Henstrom, MD, Rochester, MN
Eric J. Moore, MD, Rochester, MN
Jeremy K. Gregory, BS, Rochester, MN
Kerry D. Olsen, MD*, Rochester, MN
Jan L. Kasperbauer, MD*, Rochester, MN
Amy L. Weaver, MS, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the utility of the transoral resection technique for treating primary squamous cell carcinoma of the tonsil; and 2) discuss the long term survival outcomes and recurrence rates of patients treated with transoral resection of the tonsil for squamous cell carcinoma.

Objectives: The most common subsite of oropharyngeal squamous cell carcinoma (SCC) is the tonsil. Current treatment modalities include any combination of surgery, radiation, and chemotherapy. Outcomes in patients treated with transoral tonsil resection are presented. **Study Design:** Retrospective chart review. **Methods:** We identified and reviewed the medical charts of 102 patients who underwent transoral tonsil resection of their primary tumor at our tertiary care center between 1996-2004. Outcome rates were estimated using the Kaplan-Meier method. **Results:** Of the 102 patients 25.5% received surgery only, 69.6% received surgery and radiation while the remaining 4.9% received surgery in combination with radiation and/or chemotherapy. Pathologic staging at time of surgery was stage 1 (6.9%), stage 2 (6.9%), stage 3 (19.6%), stage 4a (61.8%), stage 4b (2%). Median hospital stay was 3 days. Only 14 patients required a trach at the time of surgery and 13 were successfully decannulated (median trach time=7 days). Only 35 patients required temporary feeding tube placement (median tube time=8 days). Sixteen patients received a peg tube and 12 were removed (median peg tube time=152 days). Among those alive at last followup, the median followup was 4.0 years. The 5 year survival free of local recurrence, regional recurrence and distant metastasis were 91.8%, 97.0% and 91.0% respectively. Overall survival was 92.2% at 2 years and 85.0% at 5 years. **Conclusions:** Transoral resection of the tonsils for squamous cell carcinoma is a safe and very effective treatment for overall control of the disease with very low overall loss of organ function.

9:06 The Impact of Surgery in the Management of the Head and Neck Carcinoma Involving the Carotid Artery

Enver Ozer, MD, Columbus, OH
Amit Agrawal, MD, Columbus, OH
David E. Schuller, MD*, Columbus, OH

Educational Objective: At the conclusion of the presentation the participants should be able to understand and discuss the feasibility of the carotid artery dissection and/or resection and reanastomosis and show its positive impact on survival and disease control rates for the head and neck carcinomas involving the carotid artery.

Objectives: To demonstrate the feasibility of the carotid artery dissection and/or resection and reanastomosis and show its positive impact on survival and disease control rates for the head and neck carcinomas involving the carotid artery. **Study Design:** Tertiary center (CCC). Retrospective study. **Methods:** Ninety patients with head and neck malignancies involving the carotid artery were operated for the carotid artery dissection and/or resection and reanastomosis in the last 10 years. **Results:** Eighty (89%) of the 90 patients' head and neck malignancies were squamous cell carcinoma (SCC). Fifty two (65%) and 28 (35%) of 80 patients were recurrent and stage IV disease respectively. There was no stage I-III disease. Carotid artery was dissected and preserved in 64 (71.1%) of the 90 patients. Eighteen (20%) of 90 patients needed carotid artery dissection with resection and reanastomosis. Eight (8.9%) patients were unresectable. Sixty (75%) of 80 patients needed regional or free flaps and grafts (dermal). Overall 2 and 5 year estimated survivals were 33.9% and 24.7% for all; 14.9% and 11.2% for recurrent; 65.9% and 55.4% for stage IV previously untreated; 33.8% and 33.8% for carotid artery resected-reanastomosed patients respectively. **Conclusions:** The carotid artery dissection without resection is an achievable goal in majority of patients with the advanced stage head and neck carcinoma involving the carotid artery. Resection and reanastomosis of carotid artery especially in the previously untreated carotid involved patients is a feasible surgery and achieves a better survival and disease control rates when compared to the unresected or recurrent disease patients.

9:14 Treatment of Early Stage Glottic Cancer: Metaanalysis Comparison of Endolaryngeal Laser Excision and Standard Fractionated External Beam Radiotherapy

Manish D. Shah, MD, Toronto, ON Canada

Maurice D. Ogaick, BSc, Toronto, ON Canada

Kevin M. Higgins, MD FRCSC, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the optimal treatment modality for early stage glottic cancer.

Objectives: The optimal treatment modality for management of early stage glottic cancer is controversial. External beam radiation therapy (XRT) and transoral endolaryngeal laser (TOL) surgical excision are accepted treatments. The primary objective of this study was to conduct a metaanalysis of existing studies to compare the oncologic outcomes of TOL surgery and XRT in the treatment of early glottic cancer. The secondary outcome examined was post-treatment voice quality. **Study Design:** Metaanalysis. **Methods:** With respect to oncologic control six head-to-head comparison studies and 22 consecutive case series were identified. All studies were retrospective. No randomized control trials were identified. The case series were pooled as a composite group using a random effects model. The analysis was based upon over 6800 patients. Pooled odds ratios (OR) and confidence intervals (CI) were calculated. The primary endpoints were 5 year local control (LC), laryngectomy free survival (LFS), and 5 year overall survival (OS). For post-treatment voice quality eight studies were identified. Both objective and subjective measures of voice quality were used as endpoints. **Results:** There were no significant differences between TOL surgery and XRT with respect to LC (OR 0.81, 95% CI 0.51-1.3) and LFS (0.84, 0.42-1.66). The weighted mean difference for OS was 0.03. For the measures of voice quality there were no objective differences; however, there was a trend towards superiority for XRT. **Conclusions:** This is the first study to examine the management of early stage glottic cancer using systematic metaanalysis methodology. This metaanalysis shows that there is no clear difference in oncologic outcome between TOL surgery and XRT. There is, however, a trend for improved post-treatment voice quality with XRT. The clinical significance of this is questionable as objective voice analyses often do not correlate with subjective quality assessments.

9:22 Early and Late Complications Associated with Mandibular Reconstruction following Composite Resection of Advanced Oral Cancer—A 15 Year Review

James J. Jaber, MD PhD, Maywood, IL

Chad A. Zender, MD, Maywood, IL

Kamil Muzaffar, MD, Maywood, IL*

Vandevender Darl, MD, Maywood, IL

John A. Guilliot, MD, Maywood, IL

Jonathan Moreira, BS BA, Maywood, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to compare and contrast the early and late complications of mandibular reconstruction following composite resection for advanced oral cancer. Be able to understand several predictors in association with these complications.

Objectives: A number of different strategies for mandibular reconstructions have been reported. Advantages and disadvantages have been reported for each method, but no study has comprehensively compared and contrasted early and late complications associated with these reconstructions following resection of advanced oral cancer. The study goal was to document and analyze complications associated with the various mandibular reconstruction methods at our institution. **Study Design:** A retrospective, 15 year review from a tertiary care academic cancer registry. **Methods:** Inclusion criteria included patients with advanced oral cancer who required a composite mandibulectomy and subsequent reconstruction (n = 92) during 1992 to 2005. Primary outcomes measured included early and late complications associated with defect reconstruction. Several predictors were also independently analyzed in association with these complications including type of reconstruction, comorbidities and timing of complications with concomitant adjuvant therapy. Secondary outcomes measured were local/regional cancer recurrence and complications associated with donor site. Mean followup time was 4.3

years, SD \pm 1.9. **Results:** The majority of patients were diagnosed with stage IV (n = 84), SCCa (n = 84) with an average mean age of 65 years, SD \pm 7.1. Most patients underwent a free fibula osteocutaneous flap (FFF, n = 60), followed by free radial/ulnar myocutaneous flap (n = 8), pedicled flap with no bone/bar (n = 12), reconstruction bar with local flap (n = 8), and autologous bone with flap (n = 2). There were twenty early complications in 16 patients (17%); 4 orocutaneous fistula; 3 hematomas; 3 osteomyelitis; 3 extruded hardware with removal; 2 wound dehiscence; 2 thrombosis with recovery of flap; 2 full flap failure; 2 partial flap loss. Sixteen late complications were observed in twelve patients (13%); 5 orocutaneous fistula, 3 osteoradionecrosis, 2 osteomyelitis; 2 mandibular deformity; 2 extrusion of hardware; 1 partial flap loss; and 1 full flap failure. Local/regional recurrence rate was 13%. Early and late complications were highly associated with the FFF, concomitant adjuvant therapy, and significant comorbidities (P < 0.05). All patients seen at last followup continued to have viable flaps. **Conclusions:** Mandibular reconstruction following extensive resection of oral cancer provides immediate restoration helping to restore function and cosmesis. We have found success using the various types of reconstruction tailored to each patient's needs with good outcomes. The majority of early and late complications were orocutaneous fistulas and only three flap failures recorded. In particular the vascularized FFF provides a successful bone graft for mandibular restoration with an acceptably low complication rate.

9:30 End-to-Side Venous Anastomoses with an Anastomotic Coupling Device for Microvascular Free Tissue Transfer in Head and Neck Reconstruction

Natalya Chernichenko, MD, New Haven, CT

Douglas A. Ross, MD, New Haven, CT

Joseph Shin, MD, New Haven, CT

Clarence T. Sasaki, MD, New Haven, CT*

Stephen Ariyan, MD, New Haven, CT

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate understanding of current literature as it pertains to the use of anastomotic coupling device in patients undergoing free tissue transfers. In addition participants will develop appreciation of microsurgical technique of end-to-side venous anastomosis with a coupling device, as well as specific clinical scenarios when this technique is used. Finally participants should be able to compare clinical outcomes of coupled end-to-side anastomosis with a conventional technique.

Objectives: The purpose of this study is to demonstrate the success rate of using a coupling device for end-to-side venous anastomosis in patients undergoing free tissue transfer (FTT) in head and neck reconstruction. **Study Design:** Retrospective case series. **Methods:** Retrospective data were collected in consecutive series of 137 patients undergoing surgical resection of head and neck tumors followed by FTT. All microvascular FTTs were performed between November of 2001 and August of 2007. The Unilink coupling device was used in this case series. Flap survival and thrombosis of the coupled end-to-side venous anastomoses were determined. **Results:** 134 consecutive patients underwent a total of 137 microvascular free tissue transfers using a coupling device. In our series a total of 174 end-to-side anastomoses were completed in 93 patients. Of these 77 patients had both venous anastomoses and 2 patients had one venous anastomosis per patient performed in end-to-side fashion. Reconstruction included 73 radial forearm, 17 fibula and 3 rectus abdominis free flaps. There were 3 venous insufficiency related complications of which 2 were salvageable. There was one case of flap failure resulting in a free flap survival rate of 99%. **Conclusions:** This largest reported series of end-to-side venous anastomoses with an anastomotic coupling device demonstrates feasibility and efficacy of this technique in head and neck reconstruction.

9:38 Q&A

9:45 - Break in Exhibit Hall/View Posters - Coquina Ballroom 10:15

MODERATOR

Anna Maria Pou, MD, New Orleans, LA

10:15 Dynasplint for Management of Trismus after Treatment of Upper Aerodigestive Tract Cancer

Christopher F. Baranano, MD, Birmingham, AL

Eben L. Rosenthal, MD, Birmingham, AL*

Bruce A. Morgan, MD, Birmingham, AL

Nancy L. McColloch, SLP, Birmingham, AL

Jeffrey S. Magnuson, MD, Birmingham, AL

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the potential use of Dynasplint Trismus System for improving trismus resulting from the treatment of upper aerodigestive tract cancer.

Objectives: To evaluate the effectiveness of a novel trismus splinting system (Dynasplint Trismus System) on patients who have received treatment for upper aerodigestive tract cancer. **Study Design:** Retrospective cohort study. **Methods:** Charts were reviewed

from a list of patients receiving Dynasplint Trismus System (DTS) during one year. Inclusion criteria were: diagnosis with cancer of the upper aerodigestive tract; treatment with radiation, chemotherapy, and/or surgery; and <30mm maximal incisal opening. Exclusion criteria were age <19 years and presence of infection contributing to trismus. Maximal incisal opening (MIO) and rate of improvement of trismus at select intervals were measured. **Results:** Twenty six patients met study criteria. Fifteen (57%) patients continue to use the DTS. Initial MIO was 19±5mm and final MIO was 25±6.1mm. Overall measured gain was 34±23% and rate of gain was 0.16±0.14mm/day. However rate of gain was 0.36±0.27mm/day in the first 6 weeks. **Conclusions:** The Dynasplint Trismus System is effective at increasing the mandibular range of motion at a rate of change that is maximized during initial treatment.

10:23 Neuropsychiatric Evaluation in Patients with Skull Base Tumors

Iman Naseri, MD, Atlanta, GA

Charles E. Moore, MD, Atlanta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) determine the relationship between the neuropsychological status (e.g. cognition, depression) of patients with tumors of the skull base both before and after their treatment; and 2) compare the incidence of depression in patients undergoing surgical versus nonsurgical treatment.

Objectives: 1) Determine the relationship between the neuropsychological status (e.g. cognition, depression) of patients with tumors of the skull base both before and after their treatment; and 2) compare the incidence of depression in patients undergoing surgical versus nonsurgical treatment. **Study Design:** Retrospective review. **Methods:** A retrospective review of 52 patients with various tumors of the skull base was performed. These patients were treated in an academic tertiary care hospital between 1999 and 2004. All subjects were divided into two groups: those who underwent surgery with or without additional treatments such as radiation or chemotherapy, and the second group underwent radiation or chemotherapy as the only mode of treatment. All of the patients completed a neuropsychiatric evaluation before and after their treatment regimen. The results of the evaluations were then compared between the two groups using Fisher's exact test for comparison and incidence of neurocognitive deficits and depression between the two groups. **Results:** There was no significant difference in the incidence of depression and neurocognitive deficits between the two groups of patients. The patients in the radiation and/or chemotherapy group tend to improve in their depressive symptoms and neurocognitive deficiencies after the completion of their treatment regimen. The most common attributing factor to depression in both groups was chronic pain which was not improved after pain management. All significant results were calculated using a 95% confidence interval. **Conclusions:** No significant difference was found in the incidence of depression and neurocognitive deficits between patients undergoing surgical versus nonsurgical treatments for tumors involving the skull base.

10:31 Assessing the Impact of Low Baseline Parathyroid Hormone Levels on Surgical Treatment of Primary Hyperparathyroidism

Michael J. Clark, MD, Danville, PA

Phillip K. Pellitteri, DO, Danville, PA*

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss the difference between low baseline hyperparathyroidism and high baseline hyperparathyroidism in relationship to intraoperative parathyroid hormone (iPTH) degradation, surgical findings, imaging and outcome; and 2) explain the impact on the kinetic profile of PTH degradation in the low baseline group in determining adequacy of resection.

Objectives: To compare patients with a parathyroid hormone (iPTH) index level less than 100pg/ml (low baseline) with patients with an index level greater than 100pg/ml (high baseline) relative to: intraoperative iPTH levels (IOPTH), surgical findings, imaging and outcome. **Study Design:** Retrospective chart review. **Methods:** The medical records of 298 patients with primary hyperparathyroidism undergoing parathyroid exploration utilizing IOPTH level were reviewed. The 154 patients found to have a low baseline iPTH were compared with the 144 patients with a high baseline iPTH level. Specific comparisons were made in regard to IOPTH, surgical findings, preoperative imaging localization and surgical outcomes. **Results:** There was no significant difference between the two groups in regard to recalcitrant disease. Twenty percent of the low baseline group of patients had multigland disease versus 8% of the high baseline patients. The kinetic profile of iPTH degradation differed between the two groups with 16% of low baseline patients demonstrating less than a 50% drop in IOPTH 10 minutes postresection compared with 8% in the high baseline group. **Conclusions:** Patients with low baseline iPTH levels are over two times more likely to have multigland disease than patients with high baseline levels. Preoperative imaging in this group is less likely to yield a solitary adenoma even in the absence of multigland disease. IOPTH degradation kinetics are variable between groups resulting in the possibility of inconsistent correlation with complete resection. These findings suggest that the current IOPTH guidelines, with reference to adequacy of resection, may need to be amended especially for patients with low baseline iPTH levels.

10:39 Early Prediction of Hypocalcemia after Thyroidectomy Using Parathyroid Hormone and Calcium Levels: An Analysis of Pooled Individual Patient Data from Four Observational Studies

Jacob Pieter Noordzij, MD, Boston, MA*

Jeff Saad Jumaily, BS, Boston, MA (Presenter)

Ian K. McLeod, MD, Washington, DC

Richard J. Payne, MD, Montreal, PQ Canada
Mary S. Dietrich, PhD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand how the combination of PTH and serum calcium levels (checked within 6 hours of completing thyroidectomy) is highly accurate in predicting which patients will become symptomatically hypocalcemic.

Objectives: Determine the sensitivity, specificity, and overall accuracy of the combination of parathyroid hormone (PTH) and serum calcium in predicting hypocalcemia (when checked within hours after completing thyroidectomy). **Study Design:** Analysis of pooled individual patient data from 4 observational studies. **Methods:** We conducted a systematic search for articles (published between 1966 and January 2006) using PTH assay, checked within hours of completing thyroidectomy, to predict postoperative symptomatic hypocalcemia. Studies were excluded if all patients were treated with postoperative calcium or if early PTH values were used to alter the management of the patient. Individual patient data (perioperative PTH and calcium levels, development of hypocalcemia) were obtained for 253 patients from the corresponding authors of 4 studies and pooled to yield the following results. **Results:** The accuracy of PTH alone in determining hypocalcemia was excellent when checked 1 to 6 hours postoperatively. The accuracy of calcium alone in determining hypocalcemia was fair at 1-2 hours after thyroidectomy and improved to good at 5-6 hours postoperatively. Combining PTH and calcium levels adds to the predictive ability—increasingly so at 5-6 hours postoperatively. A PTH decline of 60% coupled with a simultaneous 10% calcium drop 6 hours postoperatively resulted in a sensitivity and specificity of 100%. **Conclusions:** Serum calcium and PTH (checked 1-6 hours after surgery) can be used together to very accurately predict whether a patient will become hypocalcemic after thyroidectomy. This may allow earlier discharge of the normocalcemic patient and earlier identification of patients requiring treatment for post-thyroidectomy hypocalcemia.

10:47 Minimally Invasive Video Assisted Thyroidectomy (MIVAT) in a Community Based Otolaryngology Practice

Tejas H. Raval, MD, Boston, MA
Jagdish K. Dhingra, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the technique of minimally invasive video assisted thyroidectomy, discuss the inclusion criteria for use of this technique, and compare possible advantages of this technique over conventional thyroidectomy.

Objectives: Minimally invasive video assisted thyroidectomy (MIVAT) is a novel technique with reported advantages over conventional thyroidectomy including reduced postoperative pain and hospital stay and improved cosmesis. We report our results using MIVAT from a single surgeon in community based otolaryngology practice. **Study Design:** Retrospective review. **Methods:** Over a 9 month period 27 patients requiring hemi or total thyroidectomy were screened for use of MIVAT technique based on previously published criteria. Fourteen patients underwent the MIVAT procedure, and 13 underwent conventional thyroidectomy. Patient demographics and surgical indications were reviewed. Operative notes were reviewed for surgical time, nerve and parathyroid gland identification, and blood loss. Postoperative charts and office notes were reviewed for pain scores, length of hospital stay, cosmetic outcome, and complications. **Results:** For MIVAT patients nodule size was below 35mm diameter and histology ranged from benign to well differentiated carcinoma. Operative time improved commensurate with our experience. The external branch of the superior laryngeal nerve was identified and stimulated in 70% MIVAT cases as compared to 30% in open technique. Shorter hospital stay, smaller incision, and reduced pain were advantages of MIVAT. No drains were used. Complications included temporary recurrent laryngeal nerve paresis in two patients and transient hypoparathyroidism in one. **Conclusions:** MIVAT is a safe technique that can easily be learnt as it duplicates the steps of conventional thyroidectomy. Nearly half of patients referred to our community based practice were candidates for this approach. Improved pain, cosmesis, and functional outcome possibly due to greater visualization of superior laryngeal nerve make this a desirable technique for select cases.

10:55 Q&A

11:00 - 12:00 PANEL: HEAD AND NECK SURGERY 2008: EMERGING TECHNOLOGIES, EMERGING PROCEDURES

Moderator: David J. Terris, MD*, August, GA
Panelists: Paul W. Flint, MD*, Baltimore, MD
Ricardo Carrau, MD*, Pittsburgh, PA
Francisco J. Civantos, MD*, Miami, FL

**CONCURRENT SESSION II:
LARYNGOLOGY & GENERAL
Mediterranean Ballroom Salon 6-8**

MODERATOR

C. Gaelyn Garrett, MD*, Nashville, TN

8:00 Welcome and Announcements

8:05 Effects of Glucocorticoids on Vocal Fold Epithelia Barrier Properties

Mahalakshmi Sivasankar, PhD, West Lafayette, IN

Bonnie Blazer-Yost, PhD, Indianapolis, IN

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate knowledge of the effects of inhaled corticosteroids on epithelial barrier properties and ion transport in the vocal folds, and also recognize the importance of electrophysiological investigations of vocal fold epithelia in developing tissue specific pharmacological treatments to combat airway inflammation.

Objectives: Glucocorticoids are potent anti-inflammatory steroid hormones that are commonly prescribed to combat infection and inflammation of the respiratory tract. Prevailing research suggests that nebulized glucocorticoid preparations are predominantly deposited in the larynx and pharynx rather than lower airway. In fact dysphonia is the most common side effect of glucocorticoid deposition in the larynx. The aim of this study was to investigate the mechanism for glucocorticoid entry into the vocal fold mucosa. Specifically we investigated the effects of commonly prescribed glucocorticoids (dexamethasone and fluticasone propionate) on vocal fold epithelial barrier properties and ion transport. **Study Design:** Experimental design with treatment and control group. **Methods:** Viable porcine vocal fold epithelia were mounted on Ussing Chambers and were exposed to 0.0001M fluticasone propionate or dexamethasone (N = 8) or control buffer (N = 8) for more than 5 hours. Epithelial barrier properties and ion transport were measured using electrophysiologic parameters. **Results:** Vocal folds remained viable despite exposure to glucocorticoid treatments. Luminal treatment with glucocorticoids did not significantly reduce epithelial resistance compared to control condition. **Conclusions:** Inhaled glucocorticoids are being increasingly prescribed for the treatment of airway inflammation and asthma. Data from the current study demonstrates that the phonatory side effects of inhaled glucocorticoids are not associated with altered epithelial barrier properties but potentially with nonspecific receptor binding in vocal fold mucosa. To our knowledge this is the first study to examine the effects of inhaled steroids on vocal fold epithelia. The implications of current findings towards developing tissue specific anti-inflammatory treatments will be discussed.

8:13 Crosstalk between Adipose-Derived Stem Cells and Fibroblasts Retrieved from Normal and Scarred Vocal Folds of the Ferret in an in Vitro Co-Culture System

Yoshihiko Kumai, MD PhD, Boston, MA

James B. Kobler, PhD, Boston, MA

Hyoungshin Park, PhD, Boston, MA

Gerardo Lopez-Guerra, MD, Boston, MA

Victoria L. Herrera, MD, Boston, MA

Steven M. Zeitels, MD, Boston, MA*

Educational Objective: At the conclusion of this presentation, the participants should be able to understand a co-culture system for modeling interactions of stem cells and vocal fold fibroblasts.

Objectives: Understanding stem cell/fibroblast interactions is important for developing stem cell therapies for the vocal fold. As an initial approach we measured extracellular matrix (ECM) {e.g., hyaluronic acid (HA), collagen} production in co-cultures of adipose-derived stem cells (ADSCs) with fibroblasts from normal and scarred vocal folds. **Study Design:** Fibroblasts and ADSCs were cultured alone and together. HA and collagen production by co-cultures was compared to control cultures at 24 and 72 hour time points. **Methods:** Ferret superficial-lamina-propria (SLP) derived fibroblasts and ADSCs isolated from abdominal fat were co-cultured. Scar SLP-derived fibroblasts were isolated from vocal folds that underwent microsurgically induced scar. Transwell plates were seeded with 50,000 fibroblasts in the top chambers and 50,000 ADSCs in the bottom chambers. HA and collagen were assayed by Enzyme Linked Immunosorbent Assay (ELISA) and dye-binding methods. **Results:** Scar SLP-derived fibroblasts produced less HA and more collagen than normal SLP-derived fibroblasts by 72 hours ($p < .05$) but not by 24 hours. Preliminary co-culture data suggests that collagen production by 72 hours in both scar and normal SLP-derived fibroblast/ADSC co-cultures was significantly ($p < .05$) less than predicted; however HA production did not seem to be modulated by co-culture. **Conclusions:** Normal and scar derived SLP fibroblasts appear to maintain phenotypic differences in culture by 72 hours with differential ECM synthesis. Crosstalk between co-cultured fibroblasts and ADSCs was apparent from decreased collagen by 72 hours; however HA production was unchanged. This could indicate that ADSC mediated remodeling pathways affect both normal and scar-derived fibroblasts. Further studies of SLP fibroblast interactions with ADSCs evaluating ECM production and remodeling are needed.

8:21 Characterization of an In Vivo Model of Muscle Stem Cell Therapy for the Treatment of Vocal Fold Paralysis

Stacey L. Halum, MD, Indianapolis, IN
Kelly K. Hiatt, MD PhD, Indianapolis, IN (Presenter)
Momita L. Naidu, BS, Indianapolis, IN
D. Wade Clapp, MD, Indianapolis, IN

Educational Objective: At the conclusion of this presentation, the participants should be able to assess the use of muscle stem cells as a potential therapy for vocal fold paralysis.

Objectives: Current treatments for vocal fold paralysis are suboptimal in that they fail to restore dynamic function. Autologous muscle stem cell (MSC) transplantation is a promising potential therapy for vocal fold paralysis in that it could attenuate denervation induced muscle atrophy and provide a vehicle for delivery of neurotrophins, thereby potentially guiding reinnervation in a selective fashion. The goal of these studies was to use our previously described in vivo model of RLN injury and to characterize optimal conditions for MSC survival in transplanted TA muscle following denervation. **Study Design:** Animal experiment. **Methods:** RLN transections and sternocleidomastoid muscle (~1 gram) biopsies were performed in male Wistar rats. One month later 106 EGFP expressing MSCs labeled via retroviral transduction were injected into the denervated hemilarynx along with one of four adjuvant therapies: cardiotoxin (10-5 M), insulin-like growth factor-1 [(IGF- 1) 1mg/ml], ciliary neurotrophic factor [(CNTF) 1mg/ml], or saline. One month after transplantation laryngeal specimens were fixed and sectioned. MSC survival was then assessed by quantifying mean fluorescence of the sections. **Results:** All specimens contained numerous surviving MSCs as demonstrated by EGFP expression. Moreover, MSCs differentiated and fused with endogenous myofibers resulting in diffuse fiber fluorescence. Sections derived from CNTF and IGF-1 adjuvant groups exhibited greater EGFP expression than controls groups (p=0.03) suggesting these factors enhance MSC survival. **Conclusions:** These studies further characterize a novel in vivo model of MSC transplantation following RLN injury. Additionally CNTF and IGF-1 significantly enhanced survival of transplanted MSCs. Taken together these studies may have implications for future treatments of vocal fold paralysis.

8:29 Quantitative Assessment of Laryngeal Muscle Morphology after Nerve Injury: Right vs Left Differences

Gayle E. Woodson, MD*, Springfield, IL
Larry F. Hughes, PhD, Springfield, IL
Robert Helfert, PhD, Springfield, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the effects of denervation on laryngeal muscle.

Objectives: Some reports document atrophy and fibrosis in denervated laryngeal muscles. Others indicate resistance to atrophy. Spontaneous reinnervation has been documented after recurrent laryngeal nerve (RLN) but not vagus nerve (VN) injury. Study goal is to clarify the effects of nerve injury and reinnervation on thyroarytenoid (TA) and posterior cricoarytenoid (PCA) muscles. **Study Design:** Laboratory experiment. **Methods:** We measured total size and individual fiber diameters in TA and PCA of cats after transecting right or left RLN or VN. Muscle cross-sections were stained with H&E and trichrome. Microscopic images were acquired using an image analysis workstation. Muscle fibers were randomly selected using a sampling grid. Diameter and cross-sectional area of each fiber muscle were recorded as well as the cross-sectional area and diameter of each muscle. **Results:** Muscle fiber diameter was unaffected by VN injury, but mean PCA area was 8.5 mm² on the denervated side vs 15 mm² on the control side; and the TA, 11.5 vs 13 mm². RLN injury did not affect whole muscle size, but PCA fiber diameter was 36.1µm on lesion side, vs 32.5 control; and TA fiber diameter, 30 vs 26 µm. An unexpected finding was that observed differences were significantly greater for left nerve lesions, whether RLN or VN. **Conclusions:** This study suggests that denervation decreases the number of muscle fibers, while remaining fibers hypertrophy after reinnervation. The longer course of the RLN on the left side may reduce spontaneous reinnervation. This could contribute to the higher incidence of left versus right sided laryngeal paralysis.

8:37 Formal Psychological Testing in Patients with Paradoxical Vocal Cord Dysfunction

L. Arick Forrest, MD, Columbus, OH
Omar F. Husein, MD, San Diego, CA
Tiffany N. Husein, MA, San Diego, CA
Tendy C. Chiang, MD, Columbus, OH
Michael D. Trudeau, PhD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the psychological characteristics of patients with paradoxical vocal cord dysfunction; 2) offer therapeutic options for patients with paradoxical vocal cord dysfunction.

Objectives: The etiology of paradoxical vocal cord dysfunction (PVCD) has been unclear, but it has long been hypothesized that there is a significant psychological component. **Study Design:** This study was designed to elucidate the psychological profiles of patients with confirmed PVCD utilizing sound psychological testing. **Methods:** A prospective cohort study of patients over the age of 18 with breathing difficulty and newly diagnosed PVCD were studied. The diagnosis of PVCD was established on fiberoptic laryngeal videostroboscopy

with demonstration of inappropriate constriction during respiration. Forty-five patients consented and were administered the Minnesota Multiphasic Personality Inventory (MMPI-2) and the Life Experiences Survey (LES) to determine the relationship between psychopathology and stress with PVCD. **Results:** Compared to the normative sample for the MMPI-2, PVCD patients scored very high on the hypochondriasis scale, slightly lower on the depression scale, and very high on the hysteria scale. This pattern is consistent with a diagnosis of a conversion disorder ($p < 0.01$). Only 11 patients had normal scores on the MMPI suggesting no psychopathology. On the LES assessment female PVCD patients had no significant difference in total levels of stress than a general population. Male subjects had lower levels of total stress than a general male population. **Conclusions:** This is the first study to confirm PVCD is consistent with a conversion disorder representing a physical manifestation of underlying psychological difficulty. These results have implications for treatment. Psychotherapy directed for somatoform and conversion disorders may need to be added to traditional speech therapy for increased efficacy.

8:45 Validation of a Laryngeal Dissection Module for Training in Phonomicrosurgery

Stephanie P. Contag, BA, Atlanta, GA

Adam M. Klein, MD, Atlanta, GA

Angela C. Blount, MD, Birmingham, AL

Michael M. Johns, MD, Atlanta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the utility of a laryngeal dissection module as a training device for phonomicrosurgery.

Objectives: Phonomicrosurgery is highly specialized requiring advanced expertise. Its difficulty has highlighted the need for better teaching technology. This study validated the use of a new surgical trainer called the laryngeal dissection module. **Study Design:** The module uses synthetic, multi-layered vocal cords inside an anatomically scaled model larynx mounted on a platform, a microscope, and microsurgical instruments. The purpose of this study was to test the module's ability to differentiate novices from expert surgeons and to test the module's ability to improve novice performance with training. **Methods:** Experts ($n=5$) and novices ($n=21$) were instructed to remove a superficial lesion from the right vocal cord. The task was assessed for total errors, including time and injury to the superficial peripheral tissue, the lesion, and the deep tissue. Novice and expert performance was compared using an independent samples t-test and a Fisher's Exact test. Subsequently novices completed three practice trials and a post-training trial which was assessed for improvement compared to pre-training performance using a Wilcoxon Sign Rank test. **Results:** Experts completed the task with fewer total errors than novices ($p < 0.001$) and made fewer injuries to the oval lesion ($p = 0.01$). Novices improved performance with training, making fewer total errors in the post-training trial ($p = 0.003$), reducing injury to the superficial peripheral tissue ($p = 0.02$), and taking less time to complete the task ($p = 0.04$). **Conclusions:** The laryngeal dissection module was validated as a surgical trainer. It was able to differentiate expert versus novice performance, and it improved novice performance through training.

8:53 Arytenoid Adduction with Medialization Laryngoplasty vs. Injection Laryngoplasty or Medialization: The Role of Arytenoidopexy

Melissa M. Mortensen, MD, New York, NY

Peak Woo, MD, New York, NY*

Linda Carroll, PhD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to determine that arytenoidopexy should be added to a medialization laryngoplasty procedure for patients with unilateral vocal cord paralysis with large preoperative acoustic and aerodynamic values.

Objectives: There continues to be controversy about the added role of arytenoid adduction (AA) in the rehabilitation of unilateral vocal fold paralysis (UVCP). Objective analysis of acoustic and aerodynamic measures before and after surgery may resolve this issue. **Study Design:** This is a retrospective study of eighty-five patients with unilateral vocal cord paralysis. **Methods:** Eighty-five with UVCP patients undergoing surgical rehabilitation by injection laryngoplasty ($n=45$), medialization laryngoplasty alone ($n=14$), or medialization laryngoplasty and arytenoid adduction ($n=26$) were studied before and after surgery. Acoustic and aerodynamic measures were recorded in a soundproofed room. The medialization laryngoplasty group (injection medialization and medialization alone) data was compared with the AA-ML group. **Results:** Preoperatively the average phonatory function of the AA-ML group was worse than the ML group. This was not statistically significant. Postsurgery the mean phonatory function in the AA-ML group was better in all measures. This was again not statistically significant. There were greater improvements in aerodynamic measures (maximum phonation time and phonatory flow) than acoustic measures (Jitter, Shimmer, S/N ratio). The degree of change was comparable with slightly better trend for greater change in the AA-ML group. None of the measures were significant using a paired t-test when compared within each group with a single measure alone. The results were Jitter: ML; Pre-op 3.743, Post-op 1.945 Delta 2.466, AAML; Pre-op 4.311, Post-op 1.888, Delta 2.690, Shimmer: ML; Pre-op 7.318, Post-op 3.8319, Delta 4.484. AAML; Pre-op 9.705, Post-op 3.637, Delta 6.359, S/N ratio ML; Pre-op 0.177 Post-op 0.144, Delta 0.098, AAML Pre-op 0.229, Post-op 0.147, Delta 0.112, Mean Phonation time (sec): ML; Pre-op 8.302, Post-op 12.11, delta 05.255, AAML Pre-Op 8.66, Post-OP 14.83, Delta 7.468, Mean Phonatory Flow (L/s) ML Pre-Op 0.362, Post-op 0.236, Delta 0.193, AAML Pre-op 0.381, Post-op 0.219, Delta 0.247, Subglottic pressure ML; Pre-op 8.254, Post-op 7.71, Delta 2.985, AAML Pre-op 8.570, Post-op 8.020, Delta 2.408. **Conclusions:** Both AA-ML and ML improve phonatory function but not to normal. AA-ML patients trends towards worse presurgical function and had better postoperative function. Despite a lack of significant differences between groups the

9:01 Q&A

MODERATOR

Sigsbee W. Duck, MD*, Gillette, WY

9:07 Gold Laser Tonsillectomy: A Safe New Method

Jerald E. Giles, MD, New Orleans, LA

N. Knight Worley, MD, New Orleans, LA

Shane A. Gailushas, BS, New Orleans, LA

Natacha Telusca, BSN, New Orleans, LA

Paul A. Friedlander, MD, New Orleans, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to compare complication rates between Gold laser tonsillectomy versus Coblation tonsillectomy and cold steel dissection tonsillectomy.

Objectives: To compare the postoperative complication rates of patients undergoing Gold laser, Coblation, and cold steel dissection tonsillectomy. This is the first study comparing the Gold laser tonsillectomy to other techniques. **Study Design:** A retrospective review of 748 consecutive patients, ages 2-18, undergoing tonsillectomy at a pediatric teaching institution. **Methods:** Tonsillectomy with or without adenoidectomy was performed utilizing either the Gold laser (n=435), Coblation device (n=153), or cold steel dissection (n=160) between August 2005 and August 2007. Hospital charts were then reviewed to determine the rates of post-tonsillectomy hemorrhage and dehydration requiring hospital admission. **Results:** There is a statistically significant decrease in the rate of post-tonsillectomy hemorrhage in patients undergoing Gold laser tonsillectomy compared to Coblation tonsillectomy ($p < 0.05$). In the Gold laser group there were 7 bleeding events (1.61%), 9 in the Coblation group (5.88%), and 1 bleed from the cold steel dissection group (0.63%). The hospital admission rates for dehydration were 1.61%, 0.65%, and 1.25% respectively. There was one death in the Coblation group. **Conclusions:** Tonsillectomy by means of the Gold laser can be safely performed. This method resulted in a lower incidence of post-tonsillectomy hemorrhage compared to Coblation in our study group.

9:15 Intracapsular Microdebrider vs Coblator vs Electrocautery Tonsillectomy: A Prospective Randomized, Double Blinded Clinical Trial

Yushan L. Wilson, MD, New York, NY

Augustine L. Moscatello, MD, New York, NY (Presenter)

David M. Merer, MD, Ardsley, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the advantages of microdebrider and coblator tonsillectomy techniques over traditional electrocautery for sleep disordered breathing in children.

Objectives: To evaluate three current tonsillectomy techniques—intracapsular microdebridement, coblation, and traditional electrocautery dissection—comparing surgical parameters, efficacy, and morbidity in the treatment for obstructive sleep disordered breathing in children. **Study Design:** Prospective, double blinded study with followup by telephone interview. **Methods:** From February 2004 to July 2006 a total of 156 patients between the ages of 6 months and 22 years scheduled for adenotonsillectomy for obstruction were randomly assigned to electrocautery, coblator, and microdebrider groups. **Results:** Microdebrider technique produced the shortest total surgical time, averaging 16 minutes. Use of coblation resulted in 2 less days of pain medication compared to electrocautery. Patients in the coblator and microdebrider groups returned to a normal diet 1.51 days and 1.77 days earlier, respectively, than in the electrocautery group. They also returned to preoperative activity levels 1.85 days and 2.06 days earlier than in the electrocautery group. The coblator and microdebrider did not differ significantly from each other in all other parameters. The three techniques showed no statistically significant difference in assessment of difficulty, average pain scores, or postoperative complications. **Conclusions:** Postoperative recovery following adenotonsillectomy in children with obstructive sleep apnea is significantly earlier with use of either the coblator or microdebrider versus traditional electrocautery. Microdebrider and coblator were comparable in all other areas except for shorter operative time for the microdebrider.

9:23 Safety and Outcomes of Outpatient Pediatric Otolaryngology Procedures at an Ambulatory Surgery Center

Rahul K. Shah, MD, Washington, DC

Leila Welborn, MD, Washington, DC

Samaneh Ashktorab, BS, Washington, DC

George H. Zalzal, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the unique safety and qual-

ity issues of surgery centers with regards to otolaryngology surgery. Further participants should be able to implement measures in their own practices that will be shown by the authors to be successful in their surgery center to ensure safe and excellent outcomes (e.g., our screening criteria for surgical candidacy).

Objectives: To determine the safety and outcomes of outpatient pediatric otolaryngology procedures performed at an ambulatory surgery center (ASC). **Study Design:** Retrospective review. **Methods:** Pediatric otolaryngology cases performed at an outpatient ASC of a tertiary care, academic children's medical center from 2000-2007 were reviewed. **Results:** Of all cases 4977 (55%) were otolaryngology procedures. Twelve surgeons and ten pediatric anesthesiologists staffed the cases; no residents/fellows were involved. The cases were as follows: 2044 (41.1%) myringotomy and tympanostomy tube; 1437 (28.9%) adenoidectomy (with tympanostomy tube placement and/or turbinectomy); 880 (17.7%) tonsillectomy (with or without adenoidectomy). According to American Society of Anesthesiologist (ASA) classification: 87.9% were ASA I, 11.7% ASA II, 0.4% ASA III. There were 9 unanticipated outcomes: four post-adenotonsillectomy and one post-adenoidectomy bleeds (3 requiring reoperation the same day), 2 patients with low pseudocholinesterase levels, one post-adenotonsillectomy patient requiring overnight monitoring, and one patient with an incidental finding of a subglottic mass. Preoperative ASA status on these 9 patients was 7 (78%) ASA I, 2 (22%) ASA II. **Conclusions:** Pediatric otolaryngology procedures contribute significant volume to our ASC. Surgery at our ASC is extremely safe with a rate of unanticipated outcomes of 0.2% - a comparison is not found in the literature. Patients with ASA status of II and III have similar outcomes as healthy children (ASA I). Criteria used by our institution in successfully screening patients for candidacy at the ASC will be presented including measures implemented in response to the infrequent unanticipated sequelae - demonstrating the role and success of periodic iterative changes.

9:31 Dural Arteriovenous Fistula: Diagnosis, Treatment and Outcomes

Samuel D. Cohen, MD, Winston-Salem, NC

J. Dale Browne, MD, Winston-Salem, NC

Susan G. Butler, PhD, Winston-Salem, NC

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the main methods of diagnosis and treatment of dural arteriovenous fistulas.

Objectives: The objective of this study is to determine the sensitivity of computed tomography angiography (CTA) and magnetic resonance angiography (MRA) compared to the gold standard of conventional carotid angiography in the diagnosis of dural arteriovenous fistula (DAVF). Further objectives include identifying outcomes of treatment and complications as a function of pretreatment radiologic classification. **Study Design:** This is a retrospective review of adults diagnosed with DAVF between 1990 and 2006. **Methods:** Data collected included age, gender, presenting clinical symptoms, diagnostic imaging modalities (conventional angiography, CTA, and/or MRA), interventions (self-compression of artery, embolization, craniotomy or a combination of these), results (symptoms resolved, improved, or same), and complications (embolic or surgical). All DAVF were classified according to the Cognard classification. **Results:** There were a total of 46 patients with 51 fistulas of which 42 patients (46 fistulas) had complete followup data. CTA had a sensitivity of 15.4% while MRA a sensitivity of 50%. Embolization (either single or multiple treatments) was the most common treatment being done in 36/46 (78%) fistulas. Presenting symptoms were resolved or improved in 45/46 fistulas (97.8%) regardless of treatment or Cognard classification. There were complications in 12/46 (26%) most of which were transient and resolved without permanent sequelae. **Conclusions:** DAVF is vascular lesion that is best diagnosed with conventional angiography but can often be found with MRA. Treatment with endovascular embolization is effective and has few significant complications.

9:39 Q&A

9:45 - Break in Exhibit Hall/View Posters - Coquina Ballroom 10:15

MODERATOR

Bradley F. Marple, MD, Dallas, TX

10:15 Clinical Predictors of Impaired Sleep Architecture

Luc G.T. Morris, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the concept of sleep architecture and the clinical importance of sleep quality, discuss several risk factors for impaired sleep architecture, and compare those which have greatest significance on multivariate analysis.

Objectives: Sleep quality, measured by polysomnography, may be assessed by overall sleep architecture and fragmentation. In general sleep characterized by less slow-wave and rapid eye movement (REM) sleep is considered lighter and less restorative. Clinical predictors of impaired sleep architecture have not been investigated. **Study Design:** Prospective institutional review board approved study of 253 patients undergoing overnight polysomnography. **Methods:** Dependent measures included the percentage of sleep time spent in each sleep stage, the respiratory disturbance index (RDI) and apnea-hypopnea index (AHI). Independent measures included age, gen-

der, body mass index (BMI), Epworth Sleepiness Scale (ESS), and Snoring Severity Scale (SSS). **Results:** On univariate analysis impaired or lighter sleep architecture—decreased REM and slow-wave sleep, and increased stage I sleep—was significantly correlated with older age ($p<0.0001$), male gender ($p<0.0001$) and higher BMI ($p<0.0001$). Scores on two self-reported clinical questionnaires, the ESS and SSS, correlated significantly with lighter sleep ($p<0.0001$). RDI and AHI both correlated with lighter sleep ($p<0.0001$). On multivariate analysis only RDI and AHI remained significant ($p<0.05$). **Conclusions:** We present the first report of clinical predictors of sleep architecture. Impaired or lighter sleep quality, manifested as alterations in sleep architecture, is experienced by patients of older age, male gender, higher BMI, and patients with higher self-reported scores on the ESS and SSS. The severity of sleep disordered breathing, expressed as RDI or AHI, is the most significant predictor of impaired sleep architecture.

10:23 Characterization of Airway Obstruction and Autonomic System in Obstructive Sleep Apnea Syndrome

Jose E. Barrera, MD, Stanford, CA
Andrew B. Holbrook, MS, Stanford, CA
Juan M. Santos, PhD, Stanford, CA
Gerald R. Popelka, PhD, Stanford, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe how real time MRI (RT-MRI) and simultaneous autonomic measures characterize anatomic site of obstruction in obstructive sleep apnea (OSA).

Objectives: To relate dynamics of airway obstruction to simultaneous autonomic changes in subjects with OSA during natural sleep. **Study Design:** Ten OSA subjects underwent continuous RT-MRI and simultaneous autonomic measures during a 90 minute nap without sedation. **Methods:** All subjects received an OSA diagnosis based on polysomnography, Fujita classification, functional outcomes of sleep questionnaires (FOSQ), and Epworth sleepiness scores (ESS). The mid-sagittal upper airway was visualized with RT-MRI while measuring time-synchronized autonomic measures of actigraphy, pulse arterial tone (PAT), oxygen saturation, and pulse rate using a small, wrist-worn portable device (Watch-PAT 100, Itamar, Israel). The relation between the RT-MRI identified airway obstructions and the autonomic measures was quantified. Ongoing changes in PAT amplitude were compared to the airway cross-sectional area. **Results:** Airway obstructions identified on the RT-MRI were consistent with Fujita classification but provided additional information including dynamic visualization of upper airway narrowing and obstruction and independent epiglottis obstruction. Subjects with no previous surgery had successful outcomes likely because the RT-MRI guided the subsequent surgery. Subjects with a failed previous surgery had persistent palate obstruction with and without other sites of airway narrowing. PAT amplitude changes were related to cross-sectional airway area and demarcated the dynamics of obstruction. **Conclusions:** RT-MRI with simultaneous autonomic system measures is a novel approach to objectively characterize airway obstruction during natural sleep in OSA subjects. This approach targets actual site of obstruction preoperatively and has the potential of improving successful surgical outcomes.

10:31 The Impact of Bariatric Surgery on Obstructive Sleep Apnea

Stephanie M. Cole, MD, San Diego, CA
Marco A. Ayala, MD, San Diego, CA
Jay R. Grove, MD, San Diego, CA
David A. Bradshaw, MD, San Diego, CA
Darrell H. Hunsaker, MD, San Diego, CA*

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) explain the evaluation of patients suspected of having obstructive sleep apnea; 2) explain the pathophysiology of obstructive sleep apnea in obese patients; 3) discuss the metabolic affects of obesity and their impact on sleep apnea; and 4) discuss the impact of bariatric surgery induced weight loss on the physiology of sleep apnea.

Objectives: Despite decreases in body mass index (BMI) after bariatric surgery, the extent to which this relates to resolution of comorbid conditions such as obstructive sleep apnea is not well elucidated. The present study characterizes the relationship between BMI, daytime sleepiness, airway obstruction, and OSA in bariatric surgery patients. **Study Design:** Prospective, nonrandomized study of patients undergoing bariatric surgery. **Methods:** Patients scheduled for bariatric surgery were referred to the department of otolaryngology. Patients were evaluated preoperatively using the ESS, history and physical, and polysomnography. The ESS, BMI, modified Mallampati score (MMS), base of tongue (BOT) grade, and apnea-hypopnea index (AHI) were recorded. The goal was to repeat the evaluation at 6 and 12 months postoperatively. The world literature was searched via Medline and reviewed for the diagnosis, pathophysiology, and treatment of obese patients with OSA. The extent to which weight loss through surgical intervention impacted patients with OSA was emphasized. **Results:** The preoperative incidence of OSA in the 37 patients thus far enrolled in our study is 40%. Preoperative ESS did not correlate with presence or severity of OSA, but the majority of patients reported subjective improvement in daytime sleepiness postoperatively. The MMS and BOT grade correlated with the presence of OSA and were improved postoperatively in several cases including one patient who demonstrated resolution of severe OSA (AHI 45) after bariatric surgery (AHI 0.2). **Conclusions:** The presence of airway obstruction was noted to improve after weight loss in this population. An extensive literature review was performed.

10:39 Histologic Effects after Uvulopalatoplasty with Radiofrequency and Sclerosant Substances in Animal Model

Denilson Storck Fomin, MD PhD, Sao Paulo, Brazil
Ralph Silveira Dibbern, MD, Sao Paulo, Brazil
Maria Celia Jamur, MD, Sao Paulo, Brazil
Constance M. Oliver, MD, Sao Paulo, Brazil
Jose Antonio Oliveira, MD, Sao Paulo, Brazil

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the final results and to choose the best treatment for patient with snoring in accordance with the collagen type.

Objectives: This study was undertaken to compare the histological effects in the soft palate in canine animal model after uvulopalatoplasty with the use of radiofrequency and sclerosant substances. **Study Design:** Analyzing the alterations of the mucosa and submucosa structures as well as the collagen types after uvulopalatoplasty. These surgical techniques are used in patients for the treatment of snoring and mild sleep apnea to increase the tension and reduce the soft palate. **Methods:** Fifteen canine animals were divided into five groups (1, 2, 3, 4 - uvulopalatoplasty; 5 - control) with 3 animals in each group: first group which were undergone to etanolamina injection; group 2 which were undergone to glicose 50% injection; group 3 which were undergone to radiofrequency-coblation; group 4 which were undergone to radiofrequency volumetric reduction (Somnoplasty) and group 5 served as control. After five weeks the animals were sacrificed. The mucosa and submucosa portion were analyzed histologically with Sirius Red coloring and polarization microscopic. The statistics analyses were done through linear models of mixed effect (aleatory and fixed effects), through the Proc Mixed of software procedure SAS, version 8.02. **Results:** The histological analysis showed the increase of the type I collagen in relation to the type III collagen in all groups that were undergone the radiofrequency and sclerosant substances when compared to the control group. The type I collagen was present in bigger quantity in those animals which were undergone to the etanolamina than another groups. The histological analysis also showed in the etanolamina group the absence of chronic inflammatory processes or mucosa and submucosa necrosis. **Conclusions:** In accordance with our results the etanolamina can be a good substance to treat the patients with snoring because after the uvulopalatoplasty to increase the tension in the soft palate the best collagen is the most stiffness collagen the type I.

10:47 Transforming Growth Factor-²¹ Shows an Incremental Osteoinductive dose Response Relationship

J. Paul Moxham, MD FRCSC*, Vancouver, BC Canada
Kevin K. M. Wong, MD, Vancouver, BC Canada (Presenter)
Douglas J. Kibblewhite, MD FRCSC, Vancouver, BC Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the concept of osteoinduction and its relevance to reconstruction of bony defects.

Objectives: Transforming growth factor-²¹ (TGF-²¹) is a polyfunctional cytokine with known roles in fibrosis and bone formation. Previous studies have shown its osteoinductive capabilities. Our objective is to determine if there is a dose response curve for TGF-²¹ in a rabbit calvarial defect model. **Study Design:** Controlled animal study using arms of increasing concentrations of TGF-²¹ to evaluate the osteoinductive potential of each arm. **Methods:** 16 skeletally mature New Zealand white rabbits were randomized into control and experimental arms. Incremental doses of TGF-²¹ delivered in an inactivated guanidine-extracted demineralized bone matrix (Gu-DBM) carrier were implanted into a critically sized calvarial defect. The animals were sacrificed at 4 weeks and histomorphometric analysis was then accomplished. **Results:** TGF-²¹ showed a fairly linear dose response relationship with the higher doses chosen for this study causing more robust osteoinduction in this critically sized rabbit calvarial defect model. **Conclusions:** In this incremental dosing study TGF-²¹ demonstrates increasing osteoinduction with increasing dose levels in this particular animal model.

**11:00 - PANEL: THE IMPACT OF ALLERGY ON THE PRACTICE
12:00 OF OTOLARYNGOLOGY**

Moderator: Bradley F. Marple, MD, Dallas, TX
Panelists: Berrylin J. Ferguson, MD*, Pittsburgh, PA
Paul Fass, MD, Aventura, FL
Matthew W. Ryan, MD, Dallas, TX
Richard Haydon, MD, Lexington, KY
Michael J. Parker, MD, Camillus, NY

12:00 Lunch in Exhibit Hall/View Posters - Coquina Ballroom

**5:30 - 7:00 MEET THE AUTHORS POSTER RECEPTION (with ASPO)
COQUINA BALLROOM**

4th Sunday May

7:00 - Business Meeting (Members Only) -
7:50 Mediterranean Ballroom Salon 5

OTOLOGY SESSION Mediterranean Ballroom Salon 5

8:00 Announcements
Introduction of President-Elect
Myles L. Pensak, MD*, Cincinnati, OH

MODERATOR

Peter S. Roland, MD*, Dallas, TX

8:05 **Demonstration of Nasopharyngeal and Middle Ear Mucosal Biofilms in an Animal Model of Acute Otitis Media**

Michael Hoa, MD, Detroit, MI
Lisa Christensen, BS, Detroit, MI
Aaron Duberstein, MD, Detroit, MI
Theodore Liao, BS, Detroit, MI
Richard Berk, PhD, Detroit, MI
James M. Cotichia, MD, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss the potential importance of the nasopharynx as a reservoir for middle ear infections; 2) discuss the relationship between middle ear and nasopharyngeal biofilms in middle ear infections in an animal model of AOM; and 3) discuss the chinchilla model of AOM and its implications for future research.

Objectives: Determine if nasopharyngeal (NP) and middle ear (ME) biofilms play a role in the animal model of acute otitis media (AOM).
Study Design: Sixty female chinchillas, six months of age, free of ME disease were utilized to develop an AOM animal model.
Methods: To replicate the pathogenesis of AOM, chinchilla model of nasopharyngeal inoculation with influenza A following streptococcus pneumonia seven days later. Controls were inoculated with Sorensen's phosphate buffer (PBS). Animals were assessed daily using otoscopic/tympanometric analysis and sacrificed on days 1, 2, 5, 8 and 14. The NP and ME mucosa was harvested/prepared for scanning electron microscopy (SEM).
Results: ME inflammation was exhibited by day 2 post-bacterial inoculation with peak at day 8. 13% dually inoculated chinchillas displayed type B tympanogram while 47% displayed type C. Otoscopy performed rating tympanic membrane inflammation on a scale of 0-4 (0=normal-to-4=severe/drainage). Otoscopic findings demonstrated 10% experimental chinchillas had grade 2 score, 23% grade 3, and 10% grade 4 score. None of the controls had combined abnormal tympanomic/otoscopic findings. Evaluating SEM imaging dense biofilms were present on 83% nasopharynx and 50.0% ME on day 8 experimentals. Animals with ME inflammation/infection had biofilms identified in 58% of NP specimens vs 0% controls statistically significant at $p < .001$, biofilms were identified in 47% of ME specimens with ME inflammation/infection vs 0% controls statistically significant at $p < .001$.
Conclusions: The study utilizing nasopharyngeal inoculation is thought to closely parallel the natural pathogenesis of AOM in humans. Demonstration of mucosal biofilms, both the nasopharynx 58% and ME 47% of animals with ME inflammation/infection in contrast to controls lend further support to the importance of mucosal biofilms in the pathogenesis of AOM.

8:13 **Mupirocin Topical Treatment for Otitis Externa**

Jean Paul Font, MD, Galveston, TX
Tomoko Makishima, MD, Galveston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to know that mupirocin is an excellent candidate for treatment of otitis externa.

Objectives: To determine the in vitro efficacy of mupirocin against fungal species associated with otitis externa (OE) and to determine effects of mupirocin on inner ear hair cells in vitro. **Study Design:** Two parts: 1) a retrospective epidemiology study; and 2) an in vitro study of efficacy and ototoxicity. **Methods:** For the first part of the study microbiology cultures of otorrhea from OE patients were obtained. Isolated fungal species were tested for sensitivity to mupirocin, nystatin, terbinafine, ketoconazole, clotrimazole, and gentian

violet. Zones of inhibition were compared at 24 and 48 hours. For the second part of the study mouse inner ear organotypic cultures were utilized to evaluate ototoxicity of mupirocin. Inner ear cultures were incubated in medium with or without 0.2% mupirocin, or with 0.03% gentamicin (GM) for 24, 48, 72 and 96 hours. Viability of inner ear hair cells was compared. **Results:** Fungi were cultured from 67% of ears with otitis externa (aspergillus 50%, candida 17%), bacterial species from 50%, and mixed fungal and bacterial species from 11%. Mupirocin and gentian violet were effective against both cultured aspergillus and candida species. In cochlear cultures incubated with mupirocin, hair cell morphology change was observed at 72 and 96 hours. In contrast significant inner hair cell loss was observed at 24 hours under GM incubation. **Conclusions:** Mupirocin is a single agent with both antibacterial and antifungal activity relevant to OE. Ototoxicity of mupirocin was milder than that of GM in vitro. These results suggest that mupirocin is an excellent candidate for treatment of OE.

8:21 Laryngeal Mask Airway Use in Otolgic Surgery

Marco A. Ayala, MD, San Diego, CA
Robert M. Marks, MD, Portsmouth, VA
Alicia R. Sanderson, MD, San Diego, CA
Ben J. Balough, MD, San Diego, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the use of laryngeal mask airway versus endotracheal tube in airway management during general anesthesia for major otologic surgery.

Objectives: The laryngeal mask airway (LMA) offers an alternative to the traditional oral endotracheal tube (ETT) for general anesthesia. The purpose of this study was to evaluate the safety and efficacy of the LMA compared to ETT in general anesthesia in patients who have undergone major otologic surgery. **Study Design:** A retrospective chart review study was conducted on 484 patients who underwent major otologic surgery at a large military tertiary care teaching hospital from January 2002 to August 2005. **Methods:** A review of otologic surgical cases using the LMA (n=167) was compared to a similar cohort managed with an oral ETT (n=317). The patient's age, weight, indication for surgery, comorbid conditions, ASA classification, duration of surgery, and adverse events were recorded. Specific data reviewed included airway complications, intraoperative times, anesthetic medications, postoperative nausea and vomiting, and time spent in the post-anesthesia care unit. **Results:** There were no major airway complications in either group requiring an emergency airway. Decreased use of anesthetic medication was noted in the LMA group. Statistical analysis of variances was performed using Student's T-test. The time from completion of surgery to patient exiting the operating room was shorter for the LMA group than the ETT group. There were no statistical differences in PACU time, postoperative nausea and vomiting, or time in the operating room to the start of surgery. **Conclusions:** The LMA offers a safe alternative in children and adults to endotracheal tube intubation with no observed increased risk of airway complications in patients undergoing major otologic surgery.

8:29 Stapedectomy Outcomes: Teflon-Wire versus Nitinol Prosthesis

Jason A. Diaz, MD, Salt Lake City, UT
Clough Shelton, MD*, Salt Lake City, UT

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the differences between the Teflon-wire and Nitinol prosthesis and compare hearing outcomes when these devices are used during stapedectomy for otosclerosis.

Objectives: To compare the effectiveness of two stapes prostheses in improving the hearing of patients undergoing stapes surgery for otosclerosis. **Study Design:** Retrospective chart review. **Methods:** Teflon-wire and Nitinol stapes prostheses were compared with regard to effectiveness in closing the air bone gap. 679 cases were reviewed representing all stapedectomies performed by a single surgeon from 1996 to 2005. Patients who underwent stapedectomy for reasons other than otosclerosis, revision cases, cases in which alternate prostheses were used, and those with inadequate audiometric data were excluded. All cases were done using the laser or drill by small fenestra technique. Inclusion criteria were met by 260 cases. Patients were grouped according to type of prosthesis used and hearing results were compared. Measured outcomes were four frequency air bone gap closure, pure tone thresholds, and rate of sensorineural hearing loss (SNHL). **Results:** The study group was comprised of 233 Teflon-platinum and 27 Nitinol prostheses. Closure of the air bone gap to within 10 dB was achieved in 84% of patients with Teflon prostheses compared to 96% of those with Nitinol prostheses. The groups were equivalent with regard to site of disease as well as technique used to create the fenestra. Rate of SNHL was low for both groups and not significantly different. **Conclusions:** Although both prostheses provided acceptable results, the Nitinol prosthesis was superior. The smaller numbers in the Nitinol group may confound these results. The lack of randomization may have also introduced a selection bias.

8:37 CT Examination of the Temporal Bones: Prevalence of Superior and Posterior Semicircular Canal Dehiscence

Rohini Nadgir, MD, Boston, MA
Anand K. Devaiah, MD, Boston, MA
Ashleigh Halder, BA, Boston, MA
Osamu Sakai, MD PhD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the clinical relevance of semicircular canal dehiscence, describe the use of CT in detection of dehiscence, and the prevalence of semicircular canal dehiscence.

Objectives: Semicircular canal dehiscence (SCD) is an important clinical entity and CT imaging is a key in diagnosis. Advances in CT can generate submillimeter high resolution images through the temporal bones (TB), but can inadvertently overdiagnose SCD. The purpose of this study is to retrospectively investigate CT studies performed and evaluate for prevalence of superior and posterior canal dehiscence. **Study Design:** Retrospective patient review. **Methods:** Temporal bone CTs performed for all patients between July 2005 and March 2007 were retrospectively reviewed for dehiscence of the superior and posterior semicircular canals. All studies were performed on a 64 detector row CT scanner at 0.625 mm collimation in bone algorithm and reformatted in coronal and sagittal planes. Superior and posterior semicircular canals were characterized as normal, thin, or dehiscent by two neuroradiologists. Results were tabulated and discrepancies were resolved by consensus. The clinical rationale and symptoms for scans were correlated to the findings; patients with clinical findings of SCD were excluded. **Results:** A total of 229 patients (458 TB) were identified using the selection criteria. Two TB were also excluded due to destructive changes from neoplasm yielding 456 TB. Prevalence of superior semicircular canal dehiscence in this patient population was calculated at 9% (6% of TB) and prevalence of posterior canal dehiscence was calculated at 0.9% (0.7% of TB). **Conclusions:** The prevalence of SCD on imaging is greater than that described in autopsy series, indicating that the condition is likely overdiagnosed on imaging. Prevalence of posterior canal dehiscence is significantly lower, but to our knowledge has not yet been reported in the literature.

8:45 Does Fundal Tumor Extension Have a Negative Impact on Hearing Preservation in Surgery for Intracanalicular Acoustic Neuromas?

Quy T. Nguyen, MD PhD, San Diego, CA

Bill Mastrodimos, MD, San Diego, CA

Roberto A. Cueva, MD, San Diego, CA*

Educational Objective: At the completion of this presentation, the participants should be able to discuss the impact of fundal extension on hearing preservation in surgery for intracanalicular acoustic neuromas.

Objectives: To compare hearing preservation rates following surgery for intracanalicular acoustic neuromas with or without fundal extension. **Study Design:** Retrospective chart review at a tertiary referral center. **Methods:** Between 2001 and 2006, 115 acoustic neuroma patients underwent retrosigmoid craniotomy for tumor resection with attempted hearing preservation. Patients with intracanalicular tumors (1 cm < in maximal dimension) were selected. Pre- and postoperative audiograms, preoperative MRI, and the operative reports were reviewed to collect the required information. IRB review of this retrospective chart resulted in an exemption. **Results:** Data for twenty-eight patients (18 female/10 male) meeting selection criteria was available. Fundal involvement was identified in twenty of the twenty-eight patients. Average tumor size for patients with fundal extension (+FE) was 6.25 ± 2.15 mm and without fundal extension (-FE) was 8.05 ± 2.17 mm ($p = 0.05$). Seventy-eight percent of patients (22/28) had preserved hearing defined as AAO-HNS class A, B or C. Average postoperative SDS for these patients was $91.2\% \pm 12.3$. Eighty-five percent (17/20) of +FE patients had preserved hearing (class A = 35%, class B = 50%) while 62.5% (5/8) of -FE patients had hearing preserved (class A = 12.5%, class B = 25%, class C = 25%). This difference was statistically significant, ($p < 0.001$, chi-square test). **Conclusions:** Fundal involvement appears to have a positive impact on hearing preservation in surgery for intracanalicular acoustic neuromas. This unexpected result may be due to smaller average tumor sizes found in tumors with fundal extension compared to those without fundal extension.

8:53 Management of Spontaneous Cerebrospinal Fluid Leakage from the Temporal Bone

Joe W. Kutz, MD, Dallas, TX

Brandon R. Isaacson, MD, Dallas, TX

Peter S. Roland, MD, Dallas, TX*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the surgical management of CSF leakage of temporal bone origin.

Objectives: To compare the use of alloplastic bone cement to autologous materials in the repair of cerebrospinal fluid leakage of temporal bone origin. **Study Design:** Retrospective case review. **Methods:** All patients presenting with spontaneous cerebrospinal fluid (CSF) leakage that was proven to be from a temporal bone source by appropriate diagnostic evaluation were included. Diagnostic evaluation included CT, MRI, MRI cisternography as indicated. Most middle fossa tegmen defects were repaired through a middle fossa craniotomy approach. The materials for closure were chosen by the primary surgeon and included alloplastic bone cement in some cases. **Results:** Fifteen patients had defects involving the middle fossa tegmen, and 1 patient had both posterior and middle fossa tegmen defects. All patients underwent a middle fossa craniotomy. Eight patients were repaired using alloplastic bone cement, and 7 patients were repaired using only autologous materials. One patient had recurrent CSF leakage from a middle fossa tegmen defect after successful repair of a posterior fossa defect that was closed using alloplastic bone cement. The only complication was a subdural hematoma that resolved with conservative treatment. There were no infectious complications in either group. **Conclusions:** CSF leakage from the middle fossa tegmen can be treated with a middle fossa craniotomy approach utilizing a variety of materials, including alloplastic bone cement, with a high rate of success and low morbidity.

MODERATOR

J. Thomas Roland, Jr., MD*, New York, NY

9:06 Anatomy of the Middle Turn Cochleostomy

Brandon Isaacson, MD, Dallas, TX

Charles G. Wright, PhD, Dallas, TX

Peter S. Roland, MD, Dallas, TX*

Joe W. Kutz, MD, Dallas, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the anatomy of the middle turn cochleostomy that is occasionally required in extensive labyrinthitis ossificans.

Objectives: Middle turn cochleostomies are occasionally utilized for cochlear implant electrode placement in patients with basal turn labyrinthitis ossificans. This study evaluated the anatomic characteristics of the middle turn cochleostomy and its suitability for placement of implant electrodes. **Study Design:** Prospective anatomic study in cadaveric human temporal bones. **Methods:** In an initial pilot study three cadaveric human temporal bones were dissected using a facial recess approach. A middle turn cochleostomy was drilled 2 mm anterior to the oval window and just inferior to the cochleariform process. The preparations were then stained with osmium tetroxide and microdissections were performed. The location of the cochleostomy on the cochlear spiral and its path through the various cochlear compartments were evaluated. **Results:** Each cochleostomy was located 360 degrees from the round window at the beginning of the middle turn. Two cochleostomies traversed the spiral ligament and scala media prior to entering scala vestibuli. In the third specimen the cochleostomy entered the scala vestibuli directly without entering scala media. There were no injuries to the basilar membrane or modiolus. In each case the cochleostomy appeared to have a horizontal or slightly superior trajectory which could potentially effect electrode placement. **Conclusions:** This study demonstrates that electrodes inserted via a middle turn cochleostomy are likely to enter scala vestibuli and have access to the middle and apical cochlear turns. It is also possible that the electrode could be directed into the distal portion of the basal turn depending on cochleostomy orientation. Additional findings regarding electrode orientation and positioning following middle turn cochleostomy insertion will be presented.

9:14 Predictors of Cochlear Implant Outcomes in Families with Multiple Implant Recipients

Anil K. Lalwani, MD, New York, NY*

Adam A. Weisstuch, BA, New York, NY

J. Thomas Roland, MD, New York, NY*

Susan B. Waltzman, PhD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the ability to predict the likelihood of success following cochlear implantation in a patient if the outcome following cochlear implantation in another family member is known.

Objectives: The purpose of this study was to determine if the performance of the first implanted member of a family will predict the performance of family members subsequently implanted. **Study Design:** Retrospective chart review. **Methods:** Eighty-seven cochlear implant recipients, each belonging to a family with two or more implanted members, were the subjects of this study. Routine audiometric measurements and age appropriate speech perception tests were performed pre- and postoperatively. In addition length of deafness, age at implantation, etiology, length of device usage and other disabilities were correlated to outcome. **Results:** Implant recipients within a family showed improved performance regardless of the order of implantation; however functional outcome was negatively influenced by length of deafness and greater age at implantation. In families with GJB2 related deafness the predictive component between family members was strong when compared with unidentified etiology. **Conclusions:** On average if the first implanted family member performs well with a cochlear implant, those following will do well; however, within families, length of deafness and age at implantation influenced outcome. This has important implications for members of families considering cochlear implantation.

9:22 Effect of Preoperative Residual Hearing on Speech Perception following Cochlear Implantation

Oliver F. Adunka, MD, Chapel Hill, NC

Emily Buss, PhD, Chapel Hill, NC

Marcia S. Clark, AuD, Chapel Hill, NC

Harold C. Pillsbury, MD, Chapel Hill, NC*

Craig A. Buchman, MD, Chapel Hill, NC*

Educational Objective: At the conclusion of this presentation, the participants should be able to provide adequate counselling to patients with substantial residual hearing prior to cochlear implantation.

Objectives: To assess the effect of substantial preoperative residual hearing on speech perception outcomes in adult cochlear implant recipients. **Study Design:** Retrospective chart review in a tertiary care academic referral center. **Methods:** Twenty-nine patients with substantial preoperative residual hearing underwent cochlear implantation. Twenty-one age and duration of hearing loss-matched recipients without preoperative residual hearing served as controls. Postoperative speech perception was assessed using CUNY, CNC, and HINT in quiet and in noise (+10 dB SNR) tests at 1, 3, 6, and 12 months following fitting. **Results:** Following implantation there were no significant differences between groups for any of the tests administered. The mean change in speech perception abilities from baseline was significantly greater for the control patients than those with substantial preoperative residual hearing at a number of the test intervals across the various conditions. Moreover, at both 1 and 3 months, some patients in the residual hearing group had speech perception scores that were worse than their preoperative values. Ultimately all of the patients with substantial residual hearing surpassed their preoperative performance. **Conclusions:** Patients with substantial preoperative residual hearing can gain significant benefit from cochlear implantation. While the degree of improvement in these individuals is somewhat more modest than those patients without preoperative residual hearing, the outcomes are still excellent. That there were no significant differences between the patient groups suggests that having substantial residual hearing prior to implantation does not provide a measurable performance advantage for electrical stimulation. Patients with substantial residual hearing who are contemplating cochlear implantation should be counseled regarding a possible initial decline in speech perception performance.

9:30 Incidence and Indications for Revision Cochlear Implant Surgery

Kevin D. Brown, MD PhD, Miami, FL

Sarah S. Connell, MD, Miami, FL

Thomas J. Balkany, MD, Miami, FL*

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the incidence and most common causes for cochlear implant revision.

Objectives: Identify incidence of and most common causes for cochlear implant revision. **Study Design:** Retrospective case series. **Methods:** The operative records were reviewed for all cases of revision cochlear implantation between 1996 and 2006. The causes of reimplantation were classified as device failure, device migration, electrode migration, exposure/infection, and trauma. **Results:** A total of 580 cochlear implants were performed during the study period. A total of 44 revision procedures (7.6%) were performed on implants originally inserted at this institution. The most common reason for revision was device failure (29 patients, 66% revisions) followed by trauma (5 patients, 11%), electrode migration (4 patients, 9%), exposure/infection (3 patients, 7%), and device migration (3 patients, 7%). **Conclusions:** Revision surgery is an infrequent occurrence in cochlear implant surgery. The most common reason for revision surgery in this series was device failure. Proper patient education prior to surgery about the potential need for revision surgery, as well as its causes, is critical to prevent confusion over the need for revision surgery.

9:38 Update on Use of the Auditory Brainstem Implant in Children

Liliana A. Colletti, PhD, Verona, Italy

Leonardo L. Zoccante, MD, Verona, Italy

Sheila F. Veronese, PE, Verona, Italy

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the development of auditory perceptual and nonverbal cognitive abilities of children with profound hearing loss undergoing auditory brainstem implantation.

Objectives: This study illustrates the trend of young deaf children undergoing auditory brainstem implantation (ABI) in terms of their auditory perceptual development and their nonverbal cognitive abilities. **Study Design:** Retrospective case review. **Methods:** In our department from 2000 to 2007, 29 children aged 14 months to 16 years received an ABI for different tumor and non-tumor diseases. Two children suffered from neurofibromatosis type 2 (NF2). Twenty-two children had cochlear nerve aplasia, nine of whom with associated cochlear malformations; 2 children had cochlear malformations; 1 child had auditory neuropathy; 1 child had post-meningitis cochlear ossification and 1 child had traumatic cochlear nerve avulsion. Six children have elsewhere previously had a CI with no sound detection. The retrosigmoid-transmeatal approach was used in tumor patients and the retrosigmoid approach was used in all non-tumor patients. Perceptual auditory abilities were evaluated with the EARS battery. Cognitive evaluation was performed on 10 children using the LEITER-R test. Intraoperative EABRs and postoperative EABRs and EMLRs were performed. **Results:** No postoperative complications were observed. All children consistently use their devices for more than 75% of waking hours and have environmental sound awareness and utterance of words and simple sentences. Scores on two of the four subtests considered for cognitive evaluation in this study increased significantly during the ABI use in all ten children. **Conclusions:** The findings of the present study indicate that children with cochlear or cochlear nerve abnormalities with or without associated cognitive deficits should not be excluded to ABI implantation.

9:46 Q&A

9:50 - 10:20 Break in Exhibit Hall/View Posters - Coquina Ballroom

GENERAL & EDUCATIONAL ISSUES SESSION - Mediterranean Ballroom Salon 5

MODERATOR

Jesus E. Medina, MD*, Oklahoma City, OK

10:20 The Effect of Uvulopalatopharyngoplasty on Continuous Positive Airway Pressure Therapy in Obstructive Sleep Apnea/Hypopnea Syndrome

Michael Friedman, MD, Chicago, IL*

Rohit S. Soans, MD, Chicago, IL

Samir Kakodkar, BS, Chicago, IL

Ryan Burgette, BS, Chicago, IL

Roshan Soans, BS, Chicago, IL

Ninos Joseph, BS, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the effects of uvulopalatopharyngoplasty on continuous positive airway pressure therapy in obstructive sleep apnea/hypopnea with respect to titration pressures, CPAP compliance, and average daily use.

Objectives: To investigate the effect of uvulopalatopharyngoplasty on subsequent continuous positive airway pressure (CPAP) therapy in patients with OSAHS. **Study Design:** A prospective study. **Methods:** 30 patients who underwent uvulopalatopharyngoplasty (UPPP) and tongue base reduction with persistent symptoms of OSAHS were recruited. The control group included 30 newly diagnosed OSAHS patients without prior surgery. Both groups were well matched in regards to age, body mass index, and apnea-hypopnea index. All patients underwent manual CPAP titration studies and two measurements were made. First the lowest pressure to resolve episodes of apnea/hypopnea was recorded as the optimal CPAP setting. Second the highest pressure the patient could tolerate without significant mouth leak was recorded as the maximum pressure setting. CPAP compliance and average daily use were also compared between the two groups. **Results:** Optimal CPAP setting was attained by all subjects and was lower than the maximal pressure in all cases. The average optimal pressures were lower for the post-UPPP group and maximum CPAP pressures were similar between the two groups. CPAP compliance and average daily use were improved in the post-UPPP group. **Conclusions:** In this study patients who had persistent symptoms of OSAHS post-UPPP did not have significant mouth leak that would preclude CPAP therapy. All patients were able to reach optimal CPAP pressure setting. Post-UPPP patients had lower optimal pressure setting than the control group. There was also increased patient compliance and average daily use of CPAP in the post-UPPP group.

10:28 Subcutaneous Implants Coated with Tissue Engineered Cartilage

Soo W. Kim, MD PhD, Seoul, South Korea

Eric J. Dobratz, MD, Charlottesville, VA

John A. Ballert, MD, Charlottesville, VA

Andrew T. Voglewede, BS, Charlottesville, VA

Stephen S. Park, MD, Charlottesville, VA*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss feasibility of bioimplants coated with tissue engineered cartilage as a future graft material.

Objectives: This study investigated utility of well known bioimplants; porous high density polyethylene (PHDPE) and expanded polytetrafluoroethylene (e-PTFE) coated with tissue engineered cartilage (TEC). **Study Design:** Laboratory research. **Methods:** In experimental group (n=20) bioimplant (PHDPE, e-PTFE) was coated with 2% alginate impregnated with isolated chondrocyte density of 20.0×10^6 cells/ml from human septal cartilage and was implanted into nude mice. In control group (n=20) we only implanted bioimplants coated with alginate. Gross, histological and biochemical findings were examined after 10 weeks and 20 weeks of harvesting. **Results:** Implant coated with TEC was successfully generated in 18 (94.7%) of experimental group (n=19). The mean decreasing difference in weight was increased in 20 weeks compared with 10 weeks in control group (P=0.017) and the mean increasing difference in weight was increased in 20 weeks compared with 10 weeks in experimental group (P=0.009). The mean length difference in longest diameter was decreased in experimental group compared with control group at 10 weeks (P=0.018) and 20 weeks (P=0.01). Bioimplants coated with neocartilage similar to native cartilage was confirmed by histologically and grossly at 10 weeks and 20 weeks. In e-PTFE group fibrovascular ingrowth into pore was more fast and prominent in experimental group than native cartilage and we also observed cartilage formation into pore. TEC harvested at 20 weeks had approximately 80% of the glycosaminoglycan (GAG) present in native cartilage. **Conclusions:** Bioimplants coated with TEC from human septal cartilage can be reliably produced and predetermination of shape is possible. We can see more fast and prominent fibrovascular ingrowth and cartilage formation into pore of e-PTFE which means more strong and fast fixation. These results demonstrate the feasibility of bioimplants coated with TEC as a future graft material.

10:36 Errors with Concentrated Epinephrine in Otolaryngology

Rahul K. Shah, MD, Washington, DC
Elizabeth W. Hoy, MHA, Washington, DC
David W. Roberson, MD*, Boston, MA
David R. Nielsen, MD, Alexandria, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) demonstrate the significant errors and adverse events that have been reported by otolaryngologists from inadvertent use of concentrated epinephrine; and 2) discuss measures that can be implemented to prevent inadvertent administration of concentrated epinephrine.

Objectives: Obtain quantitative and qualitative data on errors with concentrated epinephrine in otolaryngology. **Study Design:** Survey study. **Methods:** Confidential, voluntary, on-line survey of AAOHNS members conducted under the auspices of the AAOHNS. **Results:** 126 surveys were completed. In the past year sixteen respondents (12.7%) experienced a problem with misadministration of concentrated epinephrine; eighteen respondents (16.4%) heard of such an error. Fourteen respondents noted adverse outcomes from these instances including five mortalities. Most respondents (68.9%) are concerned about potential mix-up in the administration of epinephrine during surgery. In reviewing problems with epinephrine over an otolaryngology career 48 respondents reported an average of 2.5 errors in their career (stddev 4.52, range 1—30 times). The average length of practice was 19.6 years (range 1—43 years, stddev 9.37 years). A potential epinephrine misadministration rate of 0.05/year of practice can be derived from the data. **Conclusions:** Otolaryngologists are vulnerable to errors in administration of concentrated epinephrine; an otolaryngologist will experience approximately 1.8 instances of misadministration of epinephrine over a 35 year career. AAOHNS members are concerned about preventing these high risk errors. In addition to double-checks we strongly recommend that all physicians using concentrated epinephrine, whether in office based, outpatient surgical, or operating room settings, ensure development, implementation, and training in systems and back-ups that will eliminate the potential for misadministration of epinephrine. Further regulatory bodies should consider forcing mechanisms to reduce inadvertent administration of concentrated epinephrine.

10:45 Video Rigid Laryngeal Endoscopy Provides a More Comfortable and Complete Laryngeal Examination Than Does a Laryngeal Mirror Examination

Joshua L. Dunklebarger, MD, Pittsburgh, PA
Berrylin J. Ferguson, MD*, Pittsburgh, PA
Diane Rhee, BS, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss and examine their use of VRL and LME and apply it to their daily practice.

Objectives: To determine whether there are differences in patient preference and extent of laryngeal visualization between video rigid (30 degree endoscope) laryngoscopy (VRL) and laryngeal mirror examination (LME). **Study Design:** A prospective comparison by patients undergoing laryngeal examination by both VRL and LME conducted by two examiners experienced in both mirror and rigid video endoscopy. **Methods:** Thirty-eight patients had laryngeal examination by both VRL and LME in alternating order. Patients were instructed to observe their exam on a monitor screen during the rigid exam. At the conclusion of both laryngeal examinations patients were asked to rank comfort and level of gagging on a 1 to 10 scale for both VRL and LME, as well as preference between the two methods and whether seeing their laryngeal examination on the video screen was helpful. The extent of laryngeal visualization by the clinician was recorded for each examination. **Results:** Patient comfort level was greater with VRL ($p < 0.001$) and gagging was significantly less with VRL ($p < 0.001$) compared to LME. VRL provided a more complete examination of the larynx by the clinician ($p < 0.001$) compared to LME. Patient preference significantly favored VRL (78.9%) compared to LME (18.4%) and 2.6% had no preference. $p < 0.001$ 84.2% found visualization of laryngeal exam on the monitor during the VRL helpful. **Conclusions:** VRL is superior to LME for most patients based on comfort, extent of laryngeal examination by the clinician and patient preference. The majority of patients found visualization of their laryngeal examination during VRL to be helpful.

10:53 Undergraduate Otolaryngology Education in Medical School

Paolo Campisi, MD, Toronto, ON Canada
Jamil Asaria, MD, Toronto, ON Canada
Dale H. Brown, MBChB*, Toronto, ON Canada

Educational Objective: At the conclusion of this presentation, the participants should be able to develop a protocol for undergraduate medical education in otolaryngology.

Objectives: Ensuring adequate training in otolaryngology to 226 medical students per year is an enormous challenge from an administrative and resource perspective. Acquiring competency in the diagnosis and management of otolaryngologic conditions is imperative and relevant. Diseases of the otolaryngologic axis lead to 30 to 50% of visits to family medicine and primary pediatric practices. Furthermore health management data indicate that acute upper respiratory tract infection and otitis media are the two most commonly presenting diagnoses in pediatric emergency departments. A recent review of the quantity and nature of undergraduate otolaryngology instruction in a national medical school system indicates that rotations in otolaryngology are mostly non-standardized and in 62% of

schools are not mandatory. The objective of this report is to present the management of an undergraduate otolaryngology curriculum of a large medical school with a yearly enrolment of 226 students. Specifically the administration of core learning material, scheduling, patient encounter and procedure logging, and student and instructor evaluations with novel computerized, online systems will be presented. The structure of undergraduate medical education in otolaryngology in Canadian medical schools will also be summarized. **Study Design:** See above. **Methods:** See above. **Results:** See above. **Conclusions:** See above.

11:01 Four Years of ACGME Duty Hour Regulations: Have They Made a Difference?

David C. Shonka, MD, Charlottesville, VA
Tamer A. Ghanem, MD PhD, Charlottesville, VA
Matthew A. Hubbard, BS, Charlottesville, VA
Daniel A. Barker, BS, Charlottesville, VA
Bradley W. Kesser, MD, Charlottesville, VA*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the impact of the duty hour restrictions on resident education and patient care.

Objectives: Measure compliance with the Accreditation Council of Graduate Medical Education (ACGME) resident work hour regulations and evaluate their impact on patient care and resident performance on the Otolaryngology Training Examination (OTE). **Study Design:** Retrospective review of an otolaryngology residency program's resident duty hours violations and OTE scores and review of the associated hospital's benchmark data was conducted from 2000 to 2007. **Methods:** Resident duty hour violations were compiled and analyzed for individual violation, postgraduate year (PGY), and service in the program. Annual OTE scores and hospital benchmark measures (inpatient mortality, inpatient length of stay, 30 day readmission rate) were compared before and after the institution of the ACGME duty hours mandate. **Results:** The 10 hour rule was most frequently violated; residents on the oncology service and PGY-2 year were most commonly in violation. There was no difference before and after institution of the ACGME duty hours mandate in 30 day hospital readmission rates ($p=0.42$), hospital mortality index ($p=0.55$), and OTE scores ($p=0.11$) (Student's t test). The average length of inpatient stay was shorter before institution of the ACGME rules ($p=0.04$). **Conclusions:** Institution of the ACGME regulations did not improve patient care as measured by the 30 day readmission rate and in-hospital mortality. The average length of inpatient stay was longer after implementation of these rules, although there may be no direct correlation. Resident performance on the OTE did not change after implementation of the ACGME rules. Further studies are warranted to assess the impact of the ACGME work hour regulations on patient care and resident-physician training.

11:09 Q&A

MODERATOR

Myles L. Pensak, MD*, Cincinnati, OH

11:13 Monitoring Stress Levels in Post-Graduate Medical Training

Justin D. Hill, MD, Iowa City, IA
Richard J.H. Smith, MD, Iowa City, IA*

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the utility of the Maslach Burnout Inventory in monitoring stress levels in resident physicians.

Objectives: The Accreditation Council for Graduate Medical Education (ACGME) mandates that residency program directors (PD) monitor resident wellbeing including stress. Burnout, as a measure of work related stress, is defined by a high degree of emotional exhaustion and depersonalization and a low degree of personal accomplishment using the Maslach Burnout Inventory-Human Services Survey (MBI-HSS). The purpose of this study is to describe the use of the MBI-HSS as a method of monitoring stress levels in an academic otolaryngology residency training program and introduce this survey as a tool for wider use in meeting ACGME requirements. **Study Design:** Prospective survey. **Methods:** The MBI-HSS was administered to residents in an academic otolaryngology residency training program on three separate occasions. Surveys were also completed by faculty and staff within the department on one occasion. Low, average, and high levels of burnout were identified for the individual categories of emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA); average levels for each category were calculated. **Results:** Twenty-two residents completed the first survey, 19 completed the second administration and 24 completed the third. Thirteen faculty and 23 staff also completed the third survey. We found that three, one, and one residents reported high levels of burnout on the first, second and third surveys respectively. These figures compare to one faculty member and no staff members in the same department reporting high levels of burnout. **Conclusions:** The MBI-HSS is an established and validated tool for identifying burnout in resident physicians. Residency PDs may find the MBI-HSS useful as an aid in monitoring resident wellbeing and stress. In our own department we found levels of burnout comparable to those previously reported for residents and faculty in this specialty.

11:21 The Current State of Otolaryngology Resident Surgical Skills Assessment

David J. Brown, MD, Baltimore, MD

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the differences in surgical skills assessment amongst US otolaryngology residency programs and compare and contrast those programs who identify residents in need of help.

Objectives: 1) Assess current status of operative competency assessment and feedback amongst US otolaryngology residency programs; and 2) evaluate correlations between assessment/feedback tools and remediation. **Study Design:** Survey of program directors (PDs). **Methods:** The survey was sent to 100 PDs inquiring about program size, mode of feedback, assessment tools, surgical portfolios, remediation, and number of residents requiring remediation in past 5 years. **Results:** Amongst 61 respondents subjective evaluations are used by 98%. Formative feedback after cases is used by 41%. Summative feedback at end of the rotation is done by 52%. Objective Structured Assessments of Technical Skills (OSATS) was used by 11 (18%) of programs, most were large on the basis of number of residents and/or faculty. Operative portfolios are kept by 48% of programs. The percentages of programs requiring surgical remediation and those with mechanisms are both 39%. Those programs with residents requiring remediation were more likely to have mechanism in place (71% vs 27%; $p=0.0017$). No difference in absolute number of remediations based on programs size. Programs with combination formative feedback, summative feedback and a remediation mechanism (16% of cohort) are more likely to identify residents requiring remediation (70% vs 25%; $p=0.007$). **Conclusions:** Standardized surgical curricula and assessment tools are needed. Programs with more intensive evaluation/remediation mechanisms are statistically more likely to have residents requiring remediation. This may reflect their ability to better identify the struggling resident. Programs with remediation residents are statistically more likely to have remediation mechanisms in place, but ALL programs should be prepared to formally remediate residents.

11:29 Use of SharePoint Content Management Software for the Enhancement of Otolaryngology Resident Education

Tapan A. Padhya, MD, Tampa, FL

Kestutis Paul Boyev, MD, Tampa, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the use of SharePoint to organize, enhance and deliver course content.

Objectives: The SharePoint Content Management System (CMS) can be used to tap the full value of online course material by integrating the management of learning content, e-portfolios, and a virtual hard drive. This software, initially created for the business world, creates a web accessible repository which enables collaboration and content sharing, moving the Department of Otolaryngology toward a networked learning environment with faculty, residents, and medical students at the Medical Center. Content posted in SharePoint is linked to courses, so that changes made to content in the CMS propagate to all instances the content appears, thereby reducing time spent updating all courses separately. **Study Design:** The Department of Otolaryngology with the help of College of Medicine Health Information Technology was able to design the SharePoint portal and categorize the content according to Department of Otolaryngology, American Academy of Otolaryngology, and American Board of Otolaryngology educational objectives. **Methods:** Collaboration between College of Medicine Health Information Technology, the Administration of the College and the Department of Otolaryngology. Faculty time and funding provided by Department of Otolaryngology. **Results:** The initial launch has been well received and the Department has the capability to track frequency of access and edit real time content in real time. This will ultimately help augment resident and medical student access to standardized otolaryngology content. **Conclusions:** The Department of Otolaryngology SharePoint site is the first initiative to move to web based access to departmental schedules/announcements but more importantly offers everyone access to educational content in a "virtual hard drive".

11:37 Burnout in Academic Faculty of Otolaryngology-Head and Neck Surgery

Justin S. Golub, MD, Seattle, WA

Michael M. Johns III, MD, Atlanta, GA

Paul S. Weiss, MS, Atlanta, GA

Atul K. Ramesh, BA, Toledo, OH

Robert H. Ossoff, DMD MD, Nashville, TN*

Educational Objective: At the conclusion of this presentation, the participants should be aware of the prevalence of burnout among academic otolaryngologists and be able to discuss its association with various factors.

Objectives: To characterize burnout in academic faculty of otolaryngology-head and neck surgery. To identify associated modifiable factors to reduce burnout and improve the health of the field. **Study Design:** Mailed survey. **Methods:** A cross section of US academic otolaryngologists was sampled through a mailed survey. Content included the Maslach Burnout Inventory-Human Services Study (MBI-HSS) and questions assessing potential burnout predictors such as demographic information, professional stressors, satisfaction, self-efficacy, and support systems. **Results:** Burnout was common among academic otolaryngologists. High burnout was observed in 4% of faculty, moderate burnout in 66%, and low burnout in 30%. Women experienced a statistically higher level of emotional exhaustion than men. In addition associate professors were significantly more burned out than full professors, and microvascular surgeons were notably more burned out than all other subspecialists. The strongest predictors of burnout were dissatisfaction with the balance between per-

sonal and professional life, low self-efficacy, inadequate research time, and inadequate administration time. A significant association was seen between high burnout and likelihood to leave academic medicine within the next 1-2 years. **Conclusions:** Burnout was prevalent among US academic otolaryngologists, although levels were lower than those of otolaryngology chairs and residents. Modification of risk factors, such as allowing sufficient faculty time for research and administrative activities, should be undertaken to curb the development of burnout and its deleterious sequelae.

11:45 Pay for Performance: A Journey to the Dark Side

Glenn W. Knox, MD JD, Jacksonville, FL*

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the legal implications of “pay for performance” programs, discuss the liability of health plans, physicians and managed care organizations under these programs, and to explain physician rights regarding performance “report cards” and plan termination.

Objectives: To analyze the potential legal implications of “pay for performance” programs. **Study Design:** Retrospective analysis of legal cases involving 1) liability of health plans and managed care organizations under P4P; 2) physician rights re: report cards and plan termination; 3) discoverability of P4P information; and 4) admissibility in court of clinical guidelines and performance results from P4P programs. **Methods:** Retrospective analysis of 10 legal cases involving liability of health plans, managed care organizations and physicians under P4P programs. **Results:** Based on legal precedents, P4P will likely increase risk of liability of health plans and MCOs. Physicians will have limited rights regarding “report cards” and plan termination. P4P information may be discoverable in court. Managed care organizations may face increased liability from physicians over credentialing decisions. MCOs may face increased liability from patients and physicians over performance ratings. **Conclusions:** P4P will most probably have the perverse impact of reducing quality by 1) increasing bureaucracy, paperwork and costs; 2) increasing litigation; and 3) making medicine less desirable as a career.

11:53 Q&A

12:00 Adjourn

TRIOLOGICAL SOCIETY 2008 POSTER PROGRAM

GENERAL, PEDIATRICS & PLASTICS

1. Sinus Surgery in Cystic Fibrosis Patients: Comparison of Sinus and Lower Airway Cultures

Brianne C. Barnett, BS, Minneapolis, MN

John J. McNamara, MD, Minneapolis, MN

Marsha J. Finkelstein, MS, Minneapolis, MN

James D. Sidman, MD, Minneapolis, MN*

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the bacteria responsible for causing sinus and pulmonary infections in cystic fibrosis patients; and 2) understand the temporal relationship between sinus and pulmonary infections as cystic fibrosis patients age.

Objectives: The aim of this study is to determine whether cross-infection occurs between infections in the sinuses and lower airways in cystic fibrosis patients, and to determine whether the infections begin in the sinuses before spreading to the lungs. **Study Design:** Retrospective study of pediatric cystic fibrosis patients who underwent simultaneous sinus surgery and bronchial washings. **Methods:** The results of the cultures were reviewed to determine if the same organisms colonized both the sinuses and lower airways. **Results:** Staph. aureus was found in 40.7% of the sinuses but only 33.3% of the lower airways. One patient had staph. aureus in the lower airway but not the sinuses. Pseudomonas, hemophilus influenza, and Moraxella showed similar patterns: multiple instances of positive sinus cultures and negative bronchial cultures but only a small number of cases with positive lower airway cultures and negative sinus cultures. **Conclusions:** The data showed that as patients age they are more likely to have infections in both upper and lower airways, but infections start in the upper airways at a younger age. In many cases organisms were cultured from sinuses in patients who had negative lower airway cultures. In only a few instances organisms grew in the lower airways and not the sinuses. In most cases the bacteria that caused sinus infections at a young age caused the lung infections in older patients. This is the first time that cultures taken simultaneously from the sinuses and lower airways have shown that bacteria spread from the sinuses to the lungs to cause infections and not vice versa.

2. WITHDRAWN--Cutaneous Malignancies of the External Ear: Unique Characteristics

Ryan F. Brown, MD, St. Louis, MO

Stephen S. Park, MD FACS, Charlottesville, VA*

Mark A. Russell, MD, Charlottesville, VA

Educational Objective: At the conclusion of this presentation, the participants should be able to compare characteristics of BCCA and SCCA of the external ear such as demographics, locations of occurrence, metastasis, and recurrence rates following Mohs micrographic surgery. Also they should be able to discuss the importance of aggressively treating these cancers and of providing long term followup.

Objectives: To analyze the characteristics of auricular carcinoma and recurrence rates following Mohs. **Study Design:** Retrospective chart review with followup questionnaires. **Methods:** A retrospective chart review of all patients seen in the departments of otolaryngology and dermatology and treated for BCCA and SCCA of the pinna between January 2000 and December 2002. Data was collected from charts and a questionnaire was mailed to those following up elsewhere. **Results:** 181 patients with 203 cancers. 66% were BCCA and 34% were SCCA. For BCCA the most common sites were the helix (34.8%) and concha (18.5%). No patients presented with perineural spread or lymph node involvement, and 9.6% had invasion thru cartilage. For SCCA the helix (42.6%) and antihelix (20.6%) were most commonly involved, 7.4% of patients had perineural invasion, 2.9% had positive lymph nodes, and 19.1% invaded through the cartilage. Recurrence rates for those with greater than 24 month followup were 3/79 (3.8%) for BCCA with an average interval of 34 months and 1/36 (2.7%) for SCCA with an interval of 8 months. 2/36(5.6%) SCCA also showed late metastasis to the parotid and lymph nodes. **Conclusions:** A higher prevalence of SCCA found on the pinna than other head and neck sites, that show a greater tendency toward perineural invasion, lymph node spread, and cartilage involvement than BCCA of the pinna. Recurrence rates many months after Mohs

implies need for long term, fastidious surveillance.

3. Clinical Trial Comparing Coblation Adenotonsillectomy Versus FloSeal or Cautery Hemostasis Adenotonsillectomy

Siri Sunderi K. Cheng, MD, Oakland, CA

Joshua A. Gottschall, MD, Oakland, CA

Stephen H. Jo, MD, Oakland, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the differences in intraoperative and postoperative morbidity between three different methods of adenotonsillectomy.

Objectives: To compare intraoperative and postoperative morbidity between three methods of adenotonsillectomy. **Study Design:** Historical controlled clinical trial. **Methods:** 34 pediatric patients underwent coblation (CO) tonsillectomy with coldsteel adenoidectomy. Objective data collected included procedure time and blood loss. Parents recorded pain scores, pain medication usage, and time to return to regular diet and activity for 14 days. Postoperative complications were recorded. This was compared with previously collected data from our institution using the same protocol in 68 patients who underwent coldsteel adenotonsillectomy with either FloSeal (FS) or electrocautery (EC) hemostasis. Data from all three groups was collected during a 2 year period. **Results:** The CO patients, compared to the FS patients, had no difference in operative time (16.4 min vs 17.0 min, $P>0.05$) or blood loss (37.74ml vs 49.2 ml, $P>0.05$); and compared to the EC patients had shorter operative times (16.4 min vs 45.6 min, $P<0.05$) and less blood loss (37.7ml vs 70.8 ml, $P<0.05$). The CO patients, compared to the FS patients, reported having significantly more pain during postoperative days 3 through 12 ($P<0.05$) and took longer to return to regular diet and activity; and compared to the EC patients had no difference in postoperative pain or return to regular diet or activity ($P>0.05$). There was no statistical difference between postoperative hemorrhage rates between the CO group versus either the FS or EC group (0.06% vs 0.0%, $p>0.05$). **Conclusions:** Coblation tonsillectomy does not show improved postoperative morbidity compared to the other two methods.

4. Mucous Membrane Plasmacytosis of the Oral Cavity and the Larynx: Two Case Reports

Allis H. Cho, MD, Shreveport, LA

Cherie-Ann O. Nathan, MD, Shreveport, LA*

James D. Cotelingam, MD, Shreveport, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify mucous membrane plasmacytosis as a differential in lesions of the upper aerodigestive tract and review the clinical presentations, histopathology, and treatment of the disorder.

Objectives: Mucous membrane plasmacytosis is a rare plasma cell proliferative disorder with only 9 cases reported in the literature. **Study Design:** Case reports. **Methods:** Two patients presented to us, one with chief complaints of hoarseness and the other with a 6 month history of a nonhealing ulcer of the lower lip. Physical examination showed mucosal irregularity diffusely involving the glottis and supraglottis with normal vocal cord mobility in the first case. In the second case an extensive ulcerative lesion of the lower lip was noted although the patient had been treated by a dermatologist for six months with various topical agents. **Results:** Direct laryngoscopy of the first patient revealed thickened cobblestoning of the entire posterior pharyngeal wall and the larynx. A lip shave with mucosal advancement was performed on the second patient as the initial biopsy only showed chronic inflammation. Pathology showed polyclonal plasmacytic infiltration. This led to a workup to rule out syphilis and multiple myeloma which then led to the diagnosis of plasmacytosis. Reactive plasmacytosis was confirmed by immunohistochemistry and in situ hybridization ruled out plasmacytoma. Pulsed corticosteroids with prednisone 100 mg for four days every month resulted in marked improvement in both patients. **Conclusions:** Mucous membrane plasmacytosis is a very rare benign, idiopathic disorder. Differential diagnosis includes pemphigus, Wegner's, sarcoidosis, fungal infection, syphilis, tuberculosis, and cancer. Plasmacytosis is diagnosed by histological examination. Effective treatment has not been shown with antibiotics, radiation, or surgical excision; however pulsed corticosteroids have been shown to be effective.

5. Pediatric Tracheotomies in Special Populations; Comparison of Operative Times and Overall Survival Rates

Catherine A. Craig, MD, Omaha, NE

Elizabeth R. Lyden, MS, Omaha, NE

Debbi W. Goebel, MD, Omaha, NE

Educational Objective: At the conclusion of this presentation, the participants should be able to compare operative times for children with normal laryngotracheal complexes to children with difficult to palpate anatomy. In addition participants should be able to discuss factors that affect overall survival for children who undergo tracheotomy.

Objectives: To determine if tracheotomies performed in children described as having normal anatomy take less time to perform than in children with clinically difficult to palpate anatomy and to compare operative times for children with congenital cardiac anomalies to oper-

ative times for all other children presenting for tracheotomy. In addition a secondary analysis was performed for the overall survival rate (OAS) for children with congenital cardiac anomalies versus children without and for children with prolonged intubation. **Study Design:** Retrospective study. **Methods:** Sixty-three children were identified to have undergone tracheotomy by a single otolaryngologist. Of these 53 met the study's criteria. Demographic information, indication for operation, operative start and stop times, description of anatomy, and patient outcomes were recorded for each child. **Results:** Twelve patients were identified as having difficult to palpate laryngo-tracheal complexes, and nine patients had previously undergone cardiac procedures. Both groups had significantly longer operative times, 69 and 65 minutes, compared to other children, 50 minutes (p -value < 0.0001 and 0.05). Children who were intubated for less than 10 days had a statistically significantly higher likelihood of survival when compared to children intubated 10 or more days [95% (95% CI: 80%, 99%) versus 55% (95% CI: 27%, 75%)]. The OAS for children who had previously undergone cardiac procedures who then needed a tracheotomy was significantly worse, 44% (95% CI: 14%, 72%), compared to all other patients 91% (95% CI: 77%, 96%). **Conclusions:** The indications for tracheotomies in children have evolved and have developed special populations requiring special considerations.

6. A Review of a Simple Procedure to Correct External Nasal Valve Collapse

Jess Dhaliwal, MD, Rochester, MN
Oren Friedman, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) explain the pathophysiology of external nasal valve collapse; 2) explain the diagnosis of external nasal valve collapse; 3) describe the surgical approaches for placement of alar batten grafts in the treatment of external nasal valve collapse; and 4) establish the cosmetic acceptability of the less commonly described surgical approach via an external incision in the alar-facial groove for the treatment of external nasal valve collapse.

Objectives: To explain a simple but rarely described surgical technique for placement of alar batten grafts in patients with external nasal valve collapse. **Study Design:** Retrospective review, literature search. **Methods:** A literature search was performed to identify surgical approaches for placement of alar batten grafts in the treatment of external nasal valve collapse. A retrospective review was conducted to find patients who had been treated for external nasal valve collapse with alar batten grafts. Two approaches were identified. One group of patients had internal incisions within the nasal vestibule for placement of batten grafts. Another group had external incisions within the alar facial groove. Aesthetic outcomes of both approaches were noted. **Results:** Nearly all authors describe a marginal or rim incision for placement of alar batten grafts in patients with external nasal valve collapse. A thorough literature search identified only one description over 20 years ago of an external incision in the alar-facial groove. The external incision has been routinely used in patients with external nasal valve collapse and has been found to be simple and produce excellent cosmetic results. **Conclusions:** For patients with isolated external nasal valve collapse placement of alar batten grafts with an external incision in the alar-facial groove is a simple procedure that can be performed by surgeons without significant rhinoplasty experience. This can also be performed easily in the office. This approach is commonly used for many of our patients and has excellent cosmetic results.

7. Comparison of Middle Ear Pathogens in Nasopharyngeal (NP) Biofilms and Middle Ear (ME) Effusions of Children with Recurrent Acute Otitis Media

Aaron Duberstein, MD, Detroit, MI
Michael Hoa, MD, Detroit, MI
Lisa Christensen, BS, Detroit, MI
Michael S. Hauptert, DO, Detroit, MI
Richard Berk, PhD, Detroit, MI
James M. Cotichia, MD, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) discuss the importance of nasopharyngeal mucosal biofilms as reservoirs for middle ear pathogens; 2) discuss the role of middle ear pathogens in recurrent infections of the tubotympanum; and 3) discuss the role of adenoidectomy in treatment of recurrent acute otitis media.

Objectives: To utilize realtime PCR (RT-PCR) and SEM imaging to compare middle ear (ME) pathogens in nasopharyngeal (NP) biofilms and middle ear effusions of children with RAOM. **Study Design:** 5 patients undergoing bilateral myringotomy and tube placement and adenoidectomy for RAOM. **Methods:** RT-PCR analysis of bacterial DNA of the middle ear (ME) pathogens *S. pneumoniae*, *H. influenzae*, and *M. catarrhalis*, extracted from matched middle ear fluid and adenoid tissue from children with RAOM was performed along with SEM imaging of adenoid tissue. **Results:** ME pathogens were identified in all ME fluid and most of these specimens were polymicrobial. Any of these pathogens detected in ME fluid were also detected in paired NP specimens. *Moraxella catarrhalis* was identified in all ME and NP specimens. *Haemophilus influenzae* was identified in 2 of 5 ME specimens and in all NP specimens. *Streptococcus pneumoniae* was identified in 3 of 5 ME specimens and in 4 of 5 NP specimens. Biofilms were visualized by SEM in all NP specimens and accounted for greater than 85% of the mucosal surface. **Conclusions:** Numerous investigators have identified mucosal biofilms in the ME and nasopharynx of children with AOM. Dense mucosal biofilms have also more recently been identified in the nasopharynx of children with RAOM. In our study there was no instance where pathogens identified in the middle ear fluid were not identified in NP mucosal biofilms. This study supports the hypothesis that NP mucosal biofilms act as a reservoir of middle ear pathogens for infection of the tubotympanum in children with RAOM.

8. Acute Frontal Sinusitis Complicated by Frontal Lobe Abscess—Combined Otolaryngology/ Neurosurgery Intervention Utilizing Image Guidance

Alfred J. Fleming Jr., MD, Columbus, OH
Bradley T. Otto, MD, Philadelphia, PA
Ryan T. Hendricker, MD, Columbus, OH
Charles A. Elmaraghy, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate how the fields of otolaryngology and neurosurgery may both contribute to the treatment of complicated acute frontal sinusitis. The participants should also be able to see an example of how image guidance helps in the surgical management of complicated acute frontal sinusitis.

Objectives: The objective of this case report is to demonstrate how a case of acute frontal sinusitis complicated by a frontal lobe abscess may be successfully treated with a combined approach by P=pediatric otolaryngologists and neurological surgeons with the assistance of a computed tomography image guidance system. **Study Design:** Case report. **Methods:** The case is described and includes history and physical examination, preoperative imaging, surgical intervention, postoperative imaging, hospital course and followup. The medical literature is also reviewed for similar cases and surgical approaches. **Results:** This complicated acute frontal sinusitis patient had complete resolution of symptoms and no complications after a team approach conducted by pediatric otolaryngologists and neurological surgeons. The computed tomography system was helpful for both subspecialty services, and this patient avoided both craniotomy and bicoronal approach to the sinuses. **Conclusions:** Pediatric otolaryngology and neurological surgery may improve patient outcomes and decrease morbidity by coordinating their efforts in cases of acute frontal sinusitis complicated by brain abscesses. Computed tomography image guidance technology allows both surgical subspecialties to offer minimally invasive approaches.

9. Comparison of the Incidences of Obstructive Sleep Apnea/Hypopnea Syndrome in Hispanic Americans versus Caucasian Americans

Michael Friedman, MD, Chicago, IL*
Rohit S. Soans, MD, Chicago, IL
Michael Somenek, MD, Chicago, IL
Roshan Soans, BS, Chicago, IL
Ninos Joseph, BS, Chicago, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the ethnic variation in the incidence of OSAHS in the Hispanic American population as compared to the Caucasian American population.

Objectives: To determine the relative incidence of obstructive sleep apnea/hypopnea syndrome in Hispanic Americans compared to a cohort of Caucasian Americans. **Study Design:** A prospective study. **Methods:** A prospective study of 300 Hispanic Americans and 300 Caucasian Americans was undertaken to evaluate OSAHS incidence based on subjective symptoms and anatomic findings. Subjects were from public health fairs held at various venues in a large city where attendees were invited for a free ENT screening. **Results:** Using the OSAHS scores based on subjective symptoms and anatomic findings, the Hispanic American group had a higher incidence of “probable” OSAHS. In addition to symptoms of OSAHS the questionnaire ascertained that Hispanic Americans are more likely to accept loud snoring as compared to Caucasian Americans. **Conclusions:** OSAHS may be more common in Hispanic Americans but Hispanic Americans are more likely to accept snoring. The medical community should strive to increase awareness and education about OSAHS in the Hispanic American community.

10. Complications and Satisfaction with Pediatric Osseointegrated External Ear Prostheses

Katherine K. Hamming, MD, Minneapolis, MN
Todd W. Lund, DDS, Minneapolis, MN
Timothy A. Lander, MD, Minneapolis, MN
James D. Sidman, MD, Minneapolis, MN*

Educational Objective: At the conclusion of this presentation, the participants should understand the complications associated with titanium osseointegrated ear prostheses and should be able to discuss this as an option for children with microtia or anotia.

Objectives: To determine the complication rate of and the patient satisfaction with titanium osseointegrated implants for congenital microtia and anotia. **Study Design:** Retrospective chart review of patient records from a tertiary pediatric otolaryngology practice. **Methods:** The charts were reviewed for all pediatric patients who had undergone titanium implants for attachment of artificial ears from 2000-2006. Data collected included demographic information, congenital syndrome, number and size of screws placed, occurrence of skin reactions, presence of other complications, and length of time patients wore the prosthetic ear. Bone anchored hearing aids were not included in this review. **Results:** Eight patients, nine ears were implanted. Median age was 7 years old. 6/8 had oculoauriculovertebral (OAV) syndrome and 2 had isolated microtia. All titanium screws achieved complete osseointegration and no implants have failed.

5/27 (18%) of the screws contacted dura but no patient exhibited CSF leak, meningitis, or other central complications. 3/9 ears developed skin complications at the abutment site and 1/9 required revision soft tissue surgery. All the patients with resolved skin complications wear their prosthesis full time during waking hours. **Conclusions:** Titanium osseointegrated ear prosthesis is a safe and useful procedure for children with microtia. It should be presented as an option for these patients with low complication rates and high acceptance rates by patients.

11. Retropharyngeal and Prevertebral Infections: A Diagnostic Dilemma

Karen A. Hawley, BS, Boston, MA
Osamu Sakai, MD PhD, Boston, MA
Kenneth M. Grundfast, MD FACS FAAP, Boston, MA*
Rohini N. Nadgir, MD, Boston, MA
Saito Naoko, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the diagnostic significance of laterality on CT or MRI in distinguishing retropharyngeal from prevertebral infections.

Objectives: Many otolaryngologists believe a median raphe extending posteriorly from the pharyngeal constrictors prevents retropharyngeal space (RPS) infections from crossing the midline. Since this raphe exists only in the RPS, not in the prevertebral space (PVS), the belief has been that unilateral radiographically apparent abscesses in this region are likely to be in the RPS, not in the PVS. However, radiology texts do not suggest laterality is a reliable way to differentiate RPS from PVS infections. Differentiating these infections is important because their management differs significantly. The goal of this study is to determine the significance of extension across the midline in distinguishing RPS from PVS infections on radiographic studies. **Study Design:** Retrospective chart review. **Methods:** Charts and imaging studies were reviewed in patients presenting with deep neck infections (DNI) between 2003 and 2007 who had an MRI or CT demonstrating evidence of infection(s) involving the RPS, PVS or both. Three radiologists individually evaluated the imaging studies for laterality, extension of infection across the midline, cephalad-caudad level of infection and effect on prevertebral musculature. **Results:** 100% of the infections were bilateral. 94% of RPS, 86% of PVS and 100% of infections involving both spaces crossed the midline ($p=0.65$). Of RPS infections 38% caused prevertebral muscle flattening, 9% caused fullness and 53% had no effect. 100% of PVS infections and infections in both spaces caused prevertebral musculature fullness ($p<0.0001$). **Conclusions:** Laterality of radiographically apparent abscesses cannot be used reliably to distinguish RPS from PVS. Fullness of the prevertebral musculature is a non-specific finding but flattening and indentation of these muscles may suggest infection in the RPS.

12. Orbital Floor Fractures: Intraoperative Imaging, Endoscopic Transantral Repair with Posterolateral Maxillary Sinus Wall Fixation and Anatomical Study of the Internal Maxillary Artery

Selena E. Heman-Ackah, MD MBA, Minneapolis, MN
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 1) describe a technique for repair of orbital floor fractures endoscopically via a transantral (Caldwell-Luc) approach using titanium mesh prosthetic secured in the posterior lateral wall of the maxillary sinus; 2) understand the potential for decreased complication with the transantral approach when compared to transconjunctival approach for repair of orbital floor fractures; 3) describe the potential benefits of intraoperative three dimensional (3D) scanning in orbital floor fracture repair via the endoscopic approach; and 4) describe the anatomy of the internal maxillary artery (IMax) in the pterygopalatine fossa as it relates to the internal fixation of the titanium mesh to the posterolateral maxillary sinus wall.

Objectives: To evaluate the utility of intraoperative 3D scanning in repair of orbital floor fracture, to describe and review outcomes of endoscopic orbital floor fractures repair via a transantral approach using titanium mesh prosthetic secured in the posterior lateral wall of the maxillary sinus, and to evaluate the anatomy of the IMax in the pterygopalatine fossa as it relates to this procedure. **Study Design:** Cohort study. **Methods:** Intraoperative complications and outcomes were recorded from patients that underwent endoscopic orbital floor repair. Adult cadaver cephalic specimens were examined. Measurements were taken of the dimensions of the maxillary sinus and its relationship to the course of the IMax within the pterygopalatine fossa. **Results:** Eleven patients with endoscopic orbital floor fracture repairs were reviewed. One patient that underwent repair without 3D scanning required revision repair. All patients ultimately had excellent results without evidence of diplopia or enophthalmos. Twenty-two adult cadaver cephalic specimens were examined. No statistically significant variability in maxillary sinus dimensions was noted. A safe area for screw placement was identified greater than or equal to 12 mm from the roof of the sinus and 7 mm from the medial wall of the sinus. **Conclusions:** Endoscopic repair of the orbital blowout fractures can safely be performed via a transantral approach with fixation of the titanium mesh prosthetic in the posterior lateral wall of the maxillary sinus without risk of injury to the IMax or other complications. Intraoperative 3D scanning allows confirmation of accurate placement of mesh prosthesis.

13. Gold Laser Adenoidectomy: Long Term Results with Concurrent Pressure Equalization Tube Placement

Jonathan B. Ida, MD MA, New Orleans, LA

N. Knight Worley, MD, New Orleans, LA

Ronald G. Amedee, MD FACS, New Orleans, LA*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the complication rate of adenoidectomy performed with the Gold laser for adenoid hypertrophy and chronic otitis media with effusion, as well as compare and discuss these results relative to other adenoidectomy techniques.

Objectives: To report the long term results of Gold laser adenoidectomy with pressure equalization tube (PET) placement by measuring the incidence of otorrhea and middle ear effusion after tube extrusion. **Study Design:** A prospective study of 50 patients, ages 8 to 48 months, who underwent Gold laser adenoidectomy with PE tube placement in a pediatric outpatient setting. **Methods:** We previously reported the initial results at 4 months postop of 50 patients treated for adenoid hypertrophy and chronic otitis media with effusion (COME). All patients were then evaluated at 8 months, 12 months, and 16 months postoperatively. The incidence of otorrhea, extrusion of the PE tubes, and middle ear status was recorded. **Results:** The incidence of otorrhea was 3/50 (6%) at 8 months, 0 (0%) at 12 months, and 2 (4%) at 16 months. At 16 months the PE tubes had extruded in 29 (58%) and 28/29 (97%) of these had clear middle ears. Forty-nine patients (98%) overall had clear middle ears at the last exam. One patient required a second set of tubes. **Conclusions:** The long term results of Gold laser adenoidectomy with PE tube placement for adenoid hypertrophy and COME compare favorably with the initial report of the technique, as well as with other techniques as reported in other studies.

14. Does Treatment of Upper Airway Infections Improve Severity of Atopic Dermatitis in Children?

Aayesha M. Khan, MD, St. Louis, MO

Elaine C. Siegfried, MD, St. Louis, MO

Thomas J. Donovan, MD, St. Louis, MO

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the significant impact treatment that concurrent upper airway infections can have on the course and management of severe refractory atopic dermatitis.

Objectives: Atopic dermatitis (AD) is the most common chronic pediatric skin disease. It afflicts 20% of children in the United States with 10% having moderate-severe, unremitting, lifelong disease that often requires hospitalization and systemic immunosuppressive therapy. It can drastically affect the patient's quality of life and also creates a significant financial burden for the family as well as the society. Various bacterial infections have been recognized as triggering and exacerbating factors in AD; however the exact role of upper airway infections and the impact of treatment of UAI on the severity of AD is not known. The aim of the study was to determine if treatment of UAI improves severity of AD in children. **Study Design:** Retrospective case series. **Methods:** The records of pediatric patients with severe refractory AD being treated with systemic immunosuppressive therapy that underwent surgical treatment for UAI including chronic or recurrent adenotonsillitis and/or rhinosinusitis between October 2004 and October 2007 were retrospectively reviewed. Improvement was considered significant if the immunosuppressive drugs were discontinued after surgical treatment of UAI. **Results:** Ten patients, seven males and three females, were included in the study. Nine (90%) patients were able to discontinue the use of systemic immunosuppressive therapy after appropriate surgical treatment of their UAI. **Conclusions:** This is the first study to report improvement in severity of AD with surgical treatment of UAI and suggests that treatment of concurrent UAI may have a significant impact on the course and management of pediatric patients with severe refractory AD.

15. Aspiration in a Child Undergoing Intrasalivary Gland Injection of Botulinum Toxin for Sialorrhea

Eric D. Lamarre, MD, Cleveland, OH

Paul R. Krakovitz, MD, Cleveland, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to cite a case report of a patient who developed significant dysphagia and aspiration following intrasalivary gland injection of botulinum toxin for sialorrhea.

Objectives: Botulinum toxin injections to salivary glands are an effective treatment modality for children with sialorrhea. We present a case report of a child who developed significant dysphagia and aspiration following intrasalivary botulinum toxin injections for sialorrhea. **Study Design:** Case report. **Methods:** Three year old male with a history of mitochondrial cytopathy and hypotonia presented to clinic with uncontrolled, excessive drooling. After reviewing treatment options parents decided on botulinum toxin injections. He was injected with 40 units of toxin to each parotid gland and 30 units to each submandibular gland with a concentration of 120 units/ml using ultrasound guidance under general anesthesia. **Results:** While sialorrhea improved postoperatively, he began to cough with thin liquids three days after injection. A modified barium swallow demonstrated severe oropharyngeal dysphagia with aspiration and inconsistent cough reflex. He had decreased base of tongue constriction with increased residuals in the valleculae. A nasogastric tube was maintained for 5 weeks and then removed after clinical improvement of swallowing. **Conclusions:** The patient had preexisting oropharyngeal dysphagia related to his underlying hypotonia, however the worsening of deglutition was attributed to inadvertent dissemination of the toxin into

the glottic musculature. We have since included routine preinjection speech therapy evaluations and have adjusted our volume and dose of toxin injected. Despite ultrasound guidance for injections, it is important to be aware of the possibility of dissemination of the toxin into surrounding spaces causing undesired muscular paralysis. Routine assessment of swallowing mechanics is prudent especially in children with preexisting risk factors for aspiration.

16. Retroesophageal Subclavian Artery: A Cause of Acute Airway Obstruction following Tracheostomy

Jennifer L. Long, MD PhD, Los Angeles, CA

Jack J. Liu, BS, Los Angeles, CA

Chau T. Nguyen, MD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe anatomic anomalies of the subclavian artery, understand common complications after tracheostomy, and recognize that vascular anomalies can rarely cause tracheostomy obstruction.

Objectives: 1) Describe the usual anatomy and clinical course of a retroesophageal subclavian artery or arteria lusoria; 2) present a case report of acute tracheostomy obstruction due to arteria lusoria; and 3) discuss post-tracheostomy complications. **Study Design:** Case report and literature review. **Methods:** We present the case of a 79 year old man with a previously asymptomatic retroesophageal subclavian artery who required tracheostomy for a laryngeal neoplasm. **Results:** The patient underwent uncomplicated tracheostomy. During arousal from anesthesia he developed signs of acute airway obstruction. Flexible tracheoscopy identified a bulging, pulsatile mass compressing the posterior tracheal wall and causing obstruction of the tracheostomy tube tip. A longer tube was placed to bypass the obstruction. The patient's symptoms resolved and the tracheostomy was eventually removed after treatment of his laryngeal cancer with chemoradiation. **Conclusions:** Arteria lusoria is a relatively common vascular anomaly which may remain unrecognized if it does not produce the typical symptoms of dysphagia or upper limb hypoperfusion. We present an unusual complication of this condition causing potentially life threatening obstruction of a tracheostomy tube. No other case of tracheostomy obstruction by an aberrant subclavian artery has been reported. Rapid recognition and management of any tracheostomy obstruction is critical. Other more common causes of tracheostomy complications are reviewed.

17. The Role of Nasal Saline Gel in the Treatment of Chronic Anterior Epistaxis in Anticoagulated Patients

Doug D. Massick, MD, Columbus, OH

Educational Objective: At the conclusion of this presentation, the participants should be able to determine the role nasal saline gel has in the treatment of chronic anterior epistaxis in anticoagulated patients.

Objectives: Determine the efficacy of the application of nasal saline gel as the sole treatment of anterior epistaxis in anticoagulated patients. **Study Design:** Prospective clinical evaluation. **Methods:** Seventy-four consecutive patients presenting with chronic anterior epistaxis and medical history of anticoagulation were enrolled. Patients were seen at one week, one month, and followup telephone conversation at three months to evaluate the efficacy of this therapy. **Results:** Sixty-nine of the seventy-four patients enrolled experienced resolution of their chronic epistaxis. Five patients required cauterization due to persistent epistaxis. **Conclusions:** The application of nasal saline gel is indicated as the sole therapy in the majority of anticoagulated patients with chronic epistaxis.

18. Development and Validation of a Patient Rated Snoring Severity Scale (SSS)

Luc G.T. Morris, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the importance of an objective method for quantifying snoring symptoms, discuss potential clinical uses for such an instrument, and to compare this method to non-validated or subjective methods or techniques which require third party bed partner input.

Objectives: Snoring is a common clinical problem encountered in an otolaryngology practice affecting 44% of men and 28% of women. There is currently no validated measure of snoring symptoms permitting objective assessment of symptom severity and outcome after therapy. We report the development and validation of a reliable patient rated questionnaire which does not rely on bed partner input. **Study Design:** Prospective, institutional review board approved study of 211 patients referred to a university based sleep disorders center. **Methods:** A previously reported snoring severity scale (SSS) was modified for use as a patient rated instrument and administered at the time of polysomnography. This questionnaire assesses snoring frequency, periodicity and loudness. Factor analysis also included correlation with measures of sleep disturbance including Epworth Sleepiness Scale (ESS) score and respiratory disturbance index (RDI). External independence was confirmed by correlation with age and gender. Internal consistency was assessed in a subset of retested patients with Cronbach's alpha. **Results:** The SSS showed excellent internal consistency with Cronbach's alpha of 0.945. Factor analysis confirmed that the SSS was highly significantly correlated with both ESS ($r=0.40$, $p<0.0001$) and RDI ($r=0.50$, $p<0.0001$) and independent of both age ($r=-0.02$, $p=NS$) and gender ($r=0.14$, $p=NS$). **Conclusions:** We report the development and validation of the SSS, which permits objective assessment of snoring severity and sleep disturbance, based on patient self-rating. This scale may be useful in

19. Rapid Risk Stratification for Obstructive Sleep Apnea, Based on Snoring Severity and Body Mass Index

Luc G.T. Morris, MD, New York, NY
Andrew Kleinberger, BS, New York, NY
Omar Burschtin, MD, New York, NY
Lisa A. Liberatore, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the difficulties in identifying those snoring patients who have sleep apnea, compare the relative risks posed by snoring and body mass index, and understand a simple protocol incorporating snoring severity and BMI as a method of classifying patients as low risk or high risk for sleep apnea.

Objectives: It is unclear whether all snorers require polysomnography. While snoring affects 44% of men and 28% of women only 4% of men and 2% of women have clinically significant OSA. We report a simple clinical risk stratification test for OSA. **Study Design:** Prospective, IRB approved study of 211 patients at a sleep disorders center. **Methods:** A validated 3 question (9 point) snoring severity scale (SSS) was administered followed by overnight polysomnography. BMI, demographic and sleep study data were collected. Receiver operating characteristic (ROC) analysis and Pearson correlation were used to develop a sensitive screening test for OSA. **Results:** Snoring severity score and BMI were selected as the most accurate predictors of OSA (area under ROC curve of 0.82 and 0.71 respectively). A bipartite threshold of SSS=4 or BMI=26, if used to screen for moderate-to-severe OSA, carried sensitivity of 97.4%, specificity of 40%, positive predictive value of 82.3%, negative predictive value of 84.2%, and accuracy of 87.1%. Patients at high risk for moderate/severe OSA were those with BMI ≥ 32 (89% PPV) and with SSS ≥ 7 (92% PPV). **Conclusions:** The statistic most highly predictive of OSA was patient rated SSS, a three question instrument. Combining SSS with BMI yielded a highly sensitive screening test for moderate/severe OSA. Patients with both BMI <26 and SSS <4 were at low risk. Conversely patients with either BMI ≥ 32 or SSS ≥ 7 were at high risk. This simple clinical assessment may be useful in risk stratifying patients for polysomnography and therapy.

20. The Photonic Band Gap Fiber Assembly CO2 Laser Flexible Fiberoptic System and the Pediatric Airway

Julina Ongkasuwan, MD, Houston, TX
Tulio A. Valdez, MD, Houston, TX
John P. Gavin, MD, Houston, TX
Ellen M. Friedman, MD, Houston, TX*

Educational Objective: At the conclusion of this presentation, the participants should be familiar with how the flexible laser works, identify potential disease processes for which it would be particularly useful, and be aware of a potential pitfall in the use of this new device.

Objectives: The carbon dioxide (CO2) laser has been the most commonly used laser in otolaryngology since its introduction in the 1970's. However, the ability to treat distal subglottic and tracheal lesions has been limited by its cumbersome delivery system. The advent of the photonic band gap fiber assembly (PBFA) allows the use of the CO2 laser through a flexible fiber. Reports have been published on the successful application of this technology in adult patients, but this has yet to be translated to the pediatric otolaryngology population. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review of laser procedures undertaken using the OmniGuide, Inc. (Cambridge, MA) PBFA system at a tertiary referral center was performed from January to September 2007. **Results:** There were a total of 23 procedures performed on 16 patients. Ages ranged from 2 months to 27 years. The interventions included ablation of papilloma, suprastomal granulation tissue, dilation of tracheal stenosis (six cases each), ablation of hemangioma (three procedures on one patient), supraglottoplasty (one), and cordotomy (one). We found the PBFA to be an especially useful tool for addressing disease distal to the vocal folds. In the case of supraglottoplasty the PBFA did not offer a significant benefit over the micromanipulator. In one patient we identified submucosal dissection of air, possibly related to the nitrogen flow of air used to clear the tip, which resolved spontaneously. **Conclusions:** The primary advantage of the PBFA is its ability to access difficult to reach locations in the airway. In this early device review we have identified one potential pitfall. While using the fiber surgeons need to be cognizant of the PBFA fiber placement, taking care to avoid contacting the mucosa.

21. Pharyngoesophageal Complications following Anterior Cervical Spine Surgery

Tapan A. Padhya, MD, Tampa, FL
Viengsouk A. Phommachanh, MD, Tampa, FL (Presenter)
Yash J. Patil, MD, Cincinnati, OH
Juan I. Uribe, MD, Tampa, FL
Thomas B. Freeman, MD, Tampa, FL
Thomas V. McCaffrey, MD, Tampa, FL*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the presentation, diagnostic evaluation, and treatment options regarding pharyngoesophageal perforation related to spinal hardware.

Objectives: To review the presentation, management, and outcome of patients with pharyngoesophageal perforation as a result of anterior cervical spine surgery in six patients treated at a tertiary care facility as well as in those reported in the literature. **Study Design:** Retrospective chart analysis from 2000-2007 at tertiary academic center. **Methods:** A small cohort of patients that were treated for delayed pharyngoesophageal perforation will be included in this study. Charts will be reviewed for information regarding initial symptomatology, diagnostic testing, lab results, medical and surgical management, and ultimate outcome. **Results:** In the current literature the incidence of delayed pharyngoesophageal perforation from anterior cervical spine surgery ranges from 0.2% to 1.49. Patients usually presented with symptoms of persistent dysphagia, odynophagia, neck abscess, and aspiration pneumonia. Radiographic assessment with barium esophagram will often reveal a pseudodiverticulum or extravasation of contrast. Management of hardware exposure and pharyngoesophageal injury included hardware removal, primary closure of the perforation with buttressing of the suture line using a pedicled sternocleidomastoid muscle flap or vascularized free flap. **Conclusions:** Pharyngoesophageal perforation from hardware erosion following anterior cervical spine surgery has a more insidious onset than those following instrumental perforations such as during esophagoscopy for diagnosing malignancy, removing foreign bodies, or dilation of stricture. Surgical exploration is warranted when neck abscess, formation of pseudodiverticulum, recurrent aspiration pneumonia, or clinical signs of sepsis develop. Removal of hardware and primary repair of the pharyngoesophageal injury, supported by a pedicled muscle flap or vascularized free flaps have been performed successfully.

22. Tongue Base Coblation as an Adjunct to Uvulopalatopharyngoplasty in the Surgical Treatment of Sleep Apnea

Nora W. Perkins, MD, Albany, NY

Steven M. Parnes, MD, Albany, NY*

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the benefits of tongue base coblation when used in association with uvulopalatopharyngoplasty in the surgical treatment of sleep apnea.

Objectives: The aim of this study is to assess the improvement in sleep apnea, based on polysomnographic data, with the use of tongue base coblation in addition to uvulopalatopharyngoplasty. **Study Design:** Patients underwent tongue base coblation and uvulopalatopharyngoplasty. Preoperative polysomnographic data was compared to postoperative polysomnographic data which was taken at least three months after the surgical procedure. **Methods:** Fourteen patients with sleep apnea were evaluated in a university affiliated, private, outpatient otolaryngology clinic. Appropriate candidates underwent tongue base coblation and uvulopalatopharyngoplasty. Chart review was performed and demographic, preoperative polysomnographic data and postoperative polysomnographic data was evaluated. **Results:** Thirteen men and one woman with sleep apnea were treated with tongue base coblation and uvulopalatopharyngoplasty. The average preoperative respiratory disturbance index (RDI) was 36.4. Postoperative polysomnograms were taken at least three months after the surgical procedure. At this point in time only four of the fourteen patients have undergone postoperative polysomnogram. Preliminary results revealed that the all patients had an improvement in their RDI. Improvements ranged from 2 to 83 with a mean of 32. **Conclusions:** Procedures to address the tongue base are often used in conjunction with uvulopalatopharyngoplasty for the surgical treatment of sleep apnea. Numerous studies have assessed tongue base procedures such as suspension or radiofrequency ablation; however there has not been an evaluation of tongue base reduction using coblation. Coblation allows the surgeon to remove bulky tissue in the tongue base under endoscopic visualization. Our preliminary data reveals that there is a significant improvement in the RDI after uvulopalatopharyngoplasty and tongue base coblation with an average improvement of 32 and one patient decreasing their index by 83. These preliminary results are promising, however we recognize that these results cannot be related to tongue base coblation alone, as the patients also underwent uvulopalatopharyngoplasty. We are currently beginning another project to objectively measure the tongue base before and after coblation. This may assist us in future evaluations and help us determine which patients are most appropriate for tongue base coblation.

23. The Use of SonicWeld Rx in Craniofacial Reconstruction: Preliminary Observations

Shari D. Reitzen, MD, New York, NY

David Conrad, BA, New York, NY

Anil R. Shah, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the use of a resorbable plating system in the setting of craniofacial reconstruction. Intraoperative and postoperative experiences and complications can be discussed.

Objectives: The SonicWeld Rx is a resorbable plating system recently introduced for use in craniofacial reconstruction. The SonicWeld Rx system utilizes ultrasound energy to fix resorbable pins and plates in a three dimensional manner. This technology has been explored as an alternative for titanium miniplates in craniofacial reconstruction. The purpose of this study was to examine the intraoperative and postoperative experience using SonicWeld Rx to reduce and fixate fractures of the orbit and midface. **Study Design:** Retrospective review/tertiary referral center. **Methods:** Nine patients underwent surgery using the KLS Martin Group SonicWeld Rx resorbable plate and screw system. Eight patients underwent reconstruction of the orbital floor, and one patient underwent repair of the zygomaticomax-

illary complex. All patients were followed postoperatively over a period of four weeks. **Results:** No intraoperative complications were observed including screw breakage, damage to the periosteum or cortical bone, thermal injury to surrounding tissues, or mechanical failure of the system. All plates were firmly approximated to cortical bone. Postoperative ophthalmologic examination of the orbits and eyes revealed no extraocular muscle entrapment, inflammation, or changes in intraocular pressure. Three patients complained of diplopia on extreme upward or downward gaze. Three patients noted significant conjunctival irritation that improved with artificial tears. Wound infection or postoperative orbital cellulitis was not seen. No patients required revisions or further intervention. **Conclusions:** Preliminary data reveal that the SonicWeld Rx system and biodegradable plates are a versatile and safe method for repair of orbital floor fractures and fractures of the midface.

24. A Novel Technique for Treating Auricular Hematomas in Mixed Martial Artists (Ultimate Fighters)

Soham Roy, MD, Miami, FL

Lee P. Smith, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to better understand a novel approach for the management of auricular hematomas.

Objectives: To describe a “bolsterless” technique for managing auricular hematomas in professional fighters. **Study Design:** Retrospective case series at a large urban tertiary care hospital. **Methods:** Eight auricular hematomas were drained under local anesthesia by incising along an anatomic auricular crease. After evacuation of the hematoma and copious irrigation, the resultant skin flap was replaced in anatomic position and through-and-through absorbable mattress sutures were utilized to secure the flap in place. Incision sites were left open and dressed with antimicrobial ointment. No bolsters were placed. The patients were given one week of oral antibiotic therapy. **Results:** All eight hematomas resolved without further intervention. All eight ears returned to their pre-injury cosmetic state. Fighters were able to return to training within a week of the initial injury. No postoperative infections or other complications were noted. **Conclusions:** In contrast to wrestlers mixed martial artists (also called “ultimate fighters”) do not routinely wear protective head gear. As a result they are at increased risk of recurrent auricular hematomas, often resulting in severe ear deformities (cauliflower ear). These patients are anxious to return to training and fighting and are reluctant to wear a bolster after repair. At their urging we agreed to attempt this “bolsterless” technique. Although two patients in this series already had a significant cauliflower ear prior to being treated for the current hematoma, in all cases the auricle returned to its pre-injury condition. “Bolsterless” treatment using mattress sutures and cosmetically placed incisions represents a successful technique for management of auricular hematomas in this population.

25. WITHDRAWN--Mouse Model of Adenoidectomy: Application for Intranasal Immunization Studies

Albert I. Sabirov, MD PhD, Rochester, NY

Educational Objective: This is the first study to demonstrate the surgical animal model which mimics adenoidectomy in humans. This model might be helpful in studying feasibility of mucosal vaccination and immunodeficiency after adenoidectomy.

Objectives: Murine nasal associated lymphoid tissue (NALT) is thought to be the analogue of adenoids in humans and an important inductive site for initiation of protective immunity in the respiratory tract. The aim of the present study was to develop a surgical technique to eliminate NALT and to assess the need for NALT in induction of protective immunity following intranasal (i.n.) vaccination of infant mice. **Study Design:** Following surgical elimination of NALT infant mice received i.n. vaccine and were challenged i.n. with *S. pneumoniae*. **Methods:** NALT was removed in infant (8 days old) mice. I.n. vaccination of NALT-deficient mice with pneumococcal conjugate vaccine plus interleukin-12 as a mucosal adjuvant (days 10 and 17 after birth) was followed by i.n. pneumococcal challenge (days 24-28). Mice were sacrificed on day 31 and nasal mucosal and systemic immune responses as well as pneumococcal colonization in the nasopharynx (NP) and middle ear (ME) were assessed. **Results:** After surgery there was no presence of NALT in the nasal cavity. Elimination of NALT did not impair the ability of infant mice to produce nasal or serum antibody responses following i.n. immunization, which provided the protection against pneumococcal infection in the NP and ME. **Conclusions:** These findings suggest that surgical removal of NALT tissue, at least in a mouse model, does not affect the ability to respond to subsequent i.n. vaccination. It is possible that cervical lymph nodes provide a compensatory immune response if NALT is absent, and that response is sufficient to reduce NP and ME bacterial colonization.

26. Use of Integra Artificial Dermis for Reconstruction of Radial Forearm Free Flap Donor Sites

Kapil Saigal, MD, Philadelphia, PA

Eli Gordin, BS, Philadelphia, PA

Edmund D. Pribitkin, MD, Philadelphia, PA*

Ryan N. Heffelfinger, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the role of advanced xenograft reconstruction as a therapeutic option in the management of radial forearm free flap donor sites.

Objectives: Donor site morbidity related to flexor tendon exposure, even following autologous skin grafting, is a known complication of radial forearm free flap reconstruction of head and neck defects. Integra artificial dermis (Integra Lifesciences, Plainsboro, NJ) is a bovine collagen based dermal substitute that functions as an alternative to autologous skin transplantation and allows for immediate coverage of radial forearm donor defects. **Study Design:** Illustrative case series. **Methods:** Review of literature. **Results:** In a series of 10 patients Integra was used effectively to facilitate closure of radial forearm donor sites rapidly and effectively with improved cosmesis in patients undergoing extirpative head and neck oncologic resection. Autologous split thickness skin grafting was performed at three weeks postoperatively with excellent functional results and minimal scar contracture. Healing fully occurred within 4-6 weeks with no donor site complications noted. **Conclusions:** Integra artificial dermis is an advanced reconstructive option for coverage of radial forearm free flap donor sites.

27. Excision of Periorbital Hemangiomas to Correct Vision Changes

Daniel S. Schneider, MD, Minneapolis, MN
Jim D. Sidman, MD, Minneapolis, MN*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss when excision of periorbital hemangiomas should be considered, realize that such excision is within the scope of practice of otolaryngologists, demonstrate the effectiveness of this approach for specific hemangiomas.

Objectives: Complicated periorbital hemangiomas can cause visual complications including amblyopia, induced astigmatism, strabismus or occlusion of the visual axis. We aimed to detect whether early surgical excision corrected refractive errors and prevented further visual complications. **Study Design:** Retrospective review of patient series. Few published studies document the safety and efficacy of surgical excision of complicated periorbital hemangiomas. None have a large series of surgically treated patients alone. **Methods:** 10 patients with complicated periorbital hemangiomas managed by otolaryngology and ophthalmology services with complete surgical excision. All patients were under 1 year old. **Results:** Comparison of pre- and postoperative refraction measurements indicates reduction of astigmatism and significant improvement in vision. **Conclusions:** Total excision of complicated periorbital hemangiomas is a safe and effective approach within a multidisciplinary team. When completed early, excision provides definitive therapy, can reduce or cure astigmatism and amblyopia in pediatric patients when these errors are due to hemangioma occlusive or mass effect.

28. Correlation of Quick Balance Assessment with Formal Balance Function Testing

Gale T. Tuper, MD, Detroit, MI
Lynn S. Alvord, PhD, Detroit, MI
Michael D. Seidman, MD, Detroit, MI*

Educational Objective: At the conclusion of this presentation, the participants should be able to identify individual components of a "quick vestibular assessment" and understand how they may aid in assessing the dizzy patient.

Objectives: Patients experiencing dizziness are often referred to otolaryngology/audiology for determination as to whether or not the patient's symptoms result from inner ear pathology. History and physical examination are important in diagnosing a vestibular origin, but in cases that may be unclear additional vestibular testing is warranted. This project is designed to assess the usefulness of components of a "quick vestibular assessment" that were accomplished in patients undergoing balance function testing (BFT). **Study Design:** A retrospective chart review was performed on all patients scheduled in BFT time slots between October 2006 and May 2007. **Methods:** The quick assessment components include Dix-Hallpike to assess for benign positional vertigo, standing on foam to assess unilateral or bilateral vestibulopathy, video goggle nystagmus screening and head shake test to assess unilateral vestibulopathy, and an audiogram to evaluate for asymmetric hearing loss (potential vestibulopathy). The results of these individual components were documented, and failure in any one component was considered a failure on the quick assessment as a whole. The result of the quick assessment was then compared to the result of the entire BFT. 159 charts were reviewed. Of these 30 appointments were not included because BFT was not actually accomplished within the specified timeframe, or the patient had already been included in a prior appointment. **Results:** 90 patients failed at least one component of the quick assessment. 73 of these 90 patients also failed the formal BFT. 16 of 17 patients who failed the quick assessment and passed the balance function test failed only 1 component of the quick assessment. 8 of 39 patients who passed all tested components of the quick assessment failed the formal BFT. Only 5 of 129 patients completed all 5 portions of the quick assessment with most being deficient in the standing on foam test. **Conclusions:** A "quick vestibular assessment" appears to be a good predictor of formal balance function testing and may be an effective tool in streamlining the evaluation of dizzy patients. Many of the patients who passed the quick assessment but failed the BFT may have been identified if the entire quick assessment had been completed. Patients would likely be best served by having a full quick assessment at the initial visit with selective use of additional BFT thereafter. Additional prospective studies of the quick assessment are recommended.

29. WITHDRAWN--Direct Excision of the Turkey Jowl Deformity: Lessons Learned after another 100 Cases

Philip E. Zapanta, MD, Washington, DC
William H. Lindsey, MD, Reston, VA*

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) describe the turkey jowl deformity; 2) describe patient selection for direct excision; and 3) understand the surgical technique.

Objectives: The triad of redundant cervical skin, platysmal banding, and excess submental fat plays a major role in the development of the classic turkey jowl deformity. Direct excision of the turkey jowl deformity in the male patient has been shown to be cosmetically pleasing with minimal cosmetic complications. This paper showcases our experience in additional 100 patients and the learning curve in developing this technique to obtain the optimum cosmetic result. **Study Design:** A retrospective review of 200 consecutive cases of the direct excision of the turkey jowl in male patients was performed. **Methods:** The second hundred cases were examined for surgical techniques related to surgical outcomes. All cases were performed under local anesthesia in the clinical setting, and each patient had at least an 8 month followup. **Results:** In this group of the second hundred patients only 1 patient complained of scar hypertrophy and this responded to steroid injection. No patients in this series required scar revision. Requiring patients to have a distinguishable "wattle" in order to have this surgery minimized poor candidate selection. One patient who removed his dressing had postoperative bleeding requiring needle aspiration. No infection or nerve injury was seen. **Conclusions:** Direct excision of the turkey jowl deformity remains a viable option for men who desire minimally invasive neck rejuvenation and are willing to accept a neck scar. From our experience with our subsequent 100 patients we have demonstrated the importance of utilizing the pinch technique and remaining conservative throughout the entire procedure.

30. The Role of Intraoperative PTH and Frozen Section during MIRP

Ninef E. Zaya, MD, Springfield, IL
James P. Malone, MD, Springfield, IL
Larry F. Hughes, PhD, Springfield, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the role of intraoperative PTH and frozen sections during minimally invasive radioguided parathyroidectomy.

Objectives: Minimally invasive radioguided parathyroidectomy (MIRP) may obviate the need for frozen sections (FS) and intraoperative parathyroid hormone (IOPTH) assays resulting in shorter operative times and reduced costs. The aim of this study was to determine if measurements of radioactivity alone eliminates the need for IOFS and IOPTH in patients undergoing MIRP. **Study Design:** Retrospective study. **Methods:** Thirty-one patients with primary hyperparathyroidism (pHPT) undergoing MIRP from December 2003 until November 2006 were studied. Ex-vivo radioactivity counts of the adenoma were compared to background counts obtained at the beginning of surgery. Specimens with counts $\geq 20\%$ of background were considered parathyroid adenomas. PTH levels were recorded preoperatively and 15 minutes after adenoma removal. Normalization and/or $> 50\%$ decrease in PTH resulted in conclusion of the procedure. FS or permanent histopathology was reviewed to confirm parathyroid tissue. Six month post-treatment calcium levels were obtained to assess cure rate. **Results:** Of the 31 patients undergoing MIRP 29 patients had parathyroid tissue with ex-vivo counts $\geq 20\%$ of background and normalization or $> 50\%$ decrease in IOPTH. The 2 patients with ratios $< 20\%$ had 4 gland hyperplasia. At 6 months followup, calcium levels were normal in 24 of 25 (96%) patients with 4 patients lost to followup. One patient had recurrent elevation of PTH and calcium by 6 months due to second adenoma. Gland weight did not correlate with radioactive counts ($p > 0.822$). **Conclusions:** For patients undergoing MIRP for pHPT parathyroid adenoma is confirmed when ex-vivo counts are $\geq 20\%$ of background eliminating the need for FS and IOPTH.

31. Facial Augmentation for Hemifacial Atrophy in Parry-Romberg Syndrome

Richard A. Zoumalan, MD, New York, NY
Samieh S. Rizk, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to know more about Parry-Romberg syndrome. It will provide information on Parry-Romberg syndrome and its associated comorbidities. It will provide information on various volume replacement options as well as recommendations on the appropriate timing of intervention. It will provide surgical technique of a less invasive/morbid surgical option.

Objectives: We present a technique of volume replacement in patients with hemifacial atrophy due to Parry-Romberg syndrome. **Study Design:** Parry-Romberg syndrome is a rare disorder characterized by slowly progressive atrophy of the skin and soft tissues of half of the face (hemifacial atrophy). The onset of the disease begins between the ages of 5 and 15 years. The progression of the atrophy lasts a decade. Treatment for the atrophy is recommended after the quiescence of disease progression. Microsurgical reconstruction is considered the gold standard to restore facial symmetry. Given a free-flap's morbidity and risk of complications, some patients opt for less extensive procedures. We present the case of a 30 year old male with a history of Parry-Romberg syndrome with resultant left hemifacial atrophy. Consistent with the usual pattern of atrophy, the onset of the patient's disease began at the age of 10 years. The progression of the atrophy lasted 12 years. At presentation his atrophy had been stable for the previous 8 years. **Methods:** The senior author used a combination of a stacked AlloDerm cheek implant and submalar silicon implanted intraorally to produce volume and symmetric contour on the affected side. He was discharged home from the recovery room without complication. **Results:** The patient was followed

for 8 years. He has had no complications and maintains excellent symmetric result. The patient is highly satisfied with his result and has not required any further procedures. Preoperative and postoperative photos are presented as well as diagrams of technique. **Conclusions:** Less invasive treatment options exist for hemifacial atrophy from Parry-Romberg syndrome.

HEAD & NECK

32. A Retrospective Outcome Study of Oral Cavity Squamous Cell Carcinoma in Young Patients

Maher D. Abu-Hamdan, MD, Detroit, MI

Ozlem E. Tulunay, MD, Detroit, MI

Ho-Sheng Lin, MD, Detroit, MI

Robert H. Mathog, MD, Detroit, MI*

Educational Objective: At the conclusion of this presentation, the participants should be able to gain an appreciation of oral tongue squamous cell carcinoma in young, female, nonsmoking patients as an aggressive unique subset of tongue cancer.

Objectives: Compare recurrence rates and overall survival in younger patients versus older patients with oral cavity cancer. **Study Design:** A single institution retrospective chart review. **Methods:** Patients were chosen from a time period ranging from 2000 to 2006. All patients were diagnosed and/or treated at a single institution. 20 control patients were selected with primary oral cavity squamous cell cancer with age greater than 55 years of age; 30 patients with oral cavity squamous cell cancer with age < 45 years. This group was further subdivided to 17 patients older than 35 years and 13 patients younger than 35 years. In addition patients were further stratified according to sex, smoking, alcohol intake and location of oral cavity cancer. **Results:** Recurrence rates were similar among all groups. 2 year survival was decreased in patients with oral tongue cancer younger than 35 years old. **Conclusions:** Young, nonsmoking female patients with squamous cell oral tongue cancer have a decreased 2 year overall survival.

33. Columnar Cell Variant Papillary Thyroid Carcinoma: Aggressive and Poor Prognosis

Tiffany A. Ainsworth, BS MA, Boston, MA

Scharukh Jalisi, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) explain the histological difference between columnar cell variant, usual variant, and tall cell variant papillary thyroid carcinoma; 2) explain the epidemiology, usual presentation, and natural history of columnar cell variant; and 3) discuss the current literature regarding the significance of columnar cell variant on disease prognosis and treatment.

Objectives: 1) Distinguish columnar cell variant (CCV) from usual variant (UV) and tall cell variant (TCV); and 2) describe presentation and clinical course of CCV. **Study Design:** Case series. **Methods:** We reviewed the medical center database for papillary thyroid carcinoma from 1997-2007. We found three patients with columnar cell variant. Two of these patients met inclusion and exclusion criteria. Inclusion criteria included 1) columnar cell variant diagnosis; 2) treated via total or subtotal thyroidectomy; 3) age greater than 18 years old and less than 65 year old; and 4) data accessible via electronic medical records. Exclusion criteria included (1) absent surgical data to confirm diagnosis of columnar cell variant. **Results:** Both patients presented with neck mass extending substernally. Fine needle aspiration was consistent with papillary thyroid cancer. Total thyroidectomy with level VI dissection was performed with final diagnosis of columnar variant papillary thyroid cancer. Postoperative radioactive iodine ablation was given. The younger patient remains alive without disease one year later while the older patient is alive with metastatic disease to the lungs and cervical spine one year after surgery. **Conclusions:** CCV is typically described as an aggressive variant of papillary thyroid carcinoma. We present two cases of columnar cell variant with two different outcomes based on age. We conclude that CCV is a distinct histological and clinical variant of papillary thyroid carcinoma that is particularly aggressive once extension beyond the thyroid capsule occurs. It is important to recognize CCV early so aggressive interventions can be initiated.

34. The Use of a Single Transcricothyroid Membrane EMG Electrode to Monitor Bilateral Recurrent Laryngeal Nerve Function

Eran E. Alon, MD, Rochester, MN

Michael L. Hinni, MD, Scottsdale, AZ

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the technique of using a single EMG electrode placed through the cricothyroid membrane to monitor bilateral recurrent laryngeal nerve function.

Objectives: Multiple methods for recurrent laryngeal nerve monitoring have been described for intraoperative recurrent laryngeal nerve monitoring during thyroid and parathyroid surgery. The initial continuous intraoperative recurrent laryngeal nerve monitoring was performed by placing EMG electrodes into vocal folds. Consequently an endotracheal tube with surface electrodes was utilized for recur-

rent laryngeal nerve monitoring. Subsequently another technique was described using a laryngeal mask with direct visualization of the vocal cords during the surgical procedure. Recently Petro et al. described the use of bilateral EMG electrodes placed through the cricothyroid membrane and into the thyroarytenoid muscles for intraoperative monitoring of the recurrent laryngeal nerve. We describe our experience with a modified approach to the transcricothyroid intraoperative monitoring using a single electrode placed in the midline through the cricothyroid membrane to allow reliable monitoring of the recurrent laryngeal nerves bilaterally. **Study Design:** Retrospective chart review. **Methods:** We performed a retrospective chart review of all thyroid surgeries performed by a single surgeon from January to October 2007. **Results:** Forty-three charts were reviewed of patients who either underwent total thyroidectomy or thyroid lobectomy. Of the forty-three patients 19 patients underwent total thyroidectomy or thyroid lobectomy using a single transcricothyroid EMG electrode for monitoring of the recurrent laryngeal nerve. These 19 patients consisted of 11 females and 8 males with an age range of 19 to 73 years of age (mean 54). The surgical pathology was reviewed: eight patients were operated for multinodular goiter, six patients for a follicular neoplasm, four patients for papillary thyroid cancer, and one patient for amiodarone induced thyrotoxicosis. Eleven patients underwent total thyroidectomy and eight patients underwent total thyroid lobectomy. Overall 30 nerves were stimulated at the end of each surgical procedure with an EMG nerve probe. 27 nerves stimulated adequately as demonstrated on the EMG nerve monitor. 3 nerves did not stimulate all of which were known to be paralyzed prior to surgery. One intraoperative complication related to placement technique resulted in an uneventful deflation of the endotracheal tube cuff. All the nerves that were adequately stimulated during surgery showed no clinical evidence of paralysis postoperatively. **Conclusions:** Our experience with a single EMG electrode placed centrally through the cricothyroid membrane and into the thyroarytenoid musculature is a safe and reliable technique for bilateral recurrent laryngeal nerve monitoring. It allows for a simple and inexpensive method to continuously monitor the recurrent laryngeal nerves bilaterally and document appropriate function at the end of the surgical procedure.

35. Lymphosonography of the Supraglottis: A Novel Approach to Sentinel Node Biopsy of the Head and Neck Using a Porcine Model

Joseph M. Curry, MD, Philadelphia, PA

Esa A. Bloedon, MD, Philadelphia, PA

Daniel A. Merton, RDMS, Philadelphia, PA

Barry B. Goldberg, MD, Philadelphia, PA

David Rosen, MD, Philadelphia, PA

Edmund A. Pribitkin, MD, Philadelphia, PA*

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) familiarize the reader with and to demonstrate a novel technique for sentinel node biopsy, lymphosonography, which has shown promise in animal studies as a possibly superior alternative to traditional techniques. This study compares lymphosonography to blue dye-guided sentinel node biopsy in the head and neck using a porcine model. Background: Lymphosonography is a recently described technique that has shown promise in animal studies as a potential agent for performing ultrasound (US) guided sentinel node biopsy (SNB). It also has an unparalleled ability to evaluate the lymphatic system by allowing direct, in vivo, nonsurgical visualization of lymphatic channels and nodes by using a Sonazoid, a microbubble ultrasound contrast agent.

Objectives: To demonstrate technical feasibility of lymphosonographic SNB of the supraglottis and to compare this to the traditional blue dye-guided technique using a porcine model. **Study Design:** Prospective, controlled animal study comparing lymphosonographic and blue dye-guided SNB. **Methods:** Four 50kg Yorkshire swine underwent injection of 1cc of methylene blue dye and 1cc of US contrast agent. Transcutaneous, contrast specific US was used to identify real time lymphatic flow of contrast through the lymph channels to the sentinel lymph node (SLN). SNB was then performed to identify a blue node which was extracted and examined for US contrast agent. Bilateral modified radical neck dissection was subsequently performed to search for residual US contrast-positive or blue stained SLNs. **Results:** Four procedures were performed in 4 animals which yielded 4 US contrast positive nodes that were also stained with blue dye. In all cases the US contrast-positive node and blue dye-stained node correlated. In one case a secondary node stained with blue dye was identified as a blue lymph channel flowing from the first echelon node was found, and this node contained no US contrast. No second echelon or non-sequential, nodal enhancement was demonstrated using the ultrasound guided technique. **Conclusions:** Lymphosonographic sentinel node biopsy of the supraglottis is technically feasible and provides results concordant with blue dye-guided SNB, additionally avoiding nonsequential nodal enhancement. This technique also offers the unique ability to noninvasively examine lymphatic flow through lymph channels in real time, providing valuable insight into lymphatic drainage patterns in the head and neck.

36. Treatment Patterns and Outcomes of Nasopharyngeal Carcinoma: A 20 Year Experience

Brad W. deSilva, MD, Columbus, OH

Bradley A. Otto, MD, Pittsburgh, PA

Ronald M. Glaser, PhD, Columbus, OH

Amit Agrawal, MD, Columbus, OH

David E. Schuller, MD, Columbus, OH*

Educational Objective: At the conclusion of this presentation, the participants should be able to compare the relative risk of recurrence and the overall disease free survival of patients treated for nasopharyngeal carcinoma based on varying histologic subtypes, treatment modalities used, and disease staging.

Objectives: The objectives of this study were to determine the various treatment modalities employed for nasopharyngeal carcinoma and to compare outcomes based on the different histologic subtypes and disease staging. **Study Design:** This study is a retrospective chart review of patients treated for nasopharyngeal carcinoma at a single academic institution over a 20 year period. **Methods:** A retrospective chart review was completed from an institutional cancer database of patients treated for nasopharyngeal carcinoma from 1988-2007. **Results:** There were 95 patients treated for nasopharyngeal carcinoma between 1988-2007. Chemoradiation was used to treat 33.7%, radiation alone for 22.1%, chemoradiation with surgery for 19%, and radiation with surgery for 13%. The average time to recurrence was 24.4 months in 23 patients. The average time to death of disease was 27.1 months in 56 patients. Overall duration of disease free followup in the survival group was 69.5 months for 39 total patients. 64% of patients with stage III/IV carcinoma died of their disease compared to 38% of patients with stage I/II disease. Death from disease occurred in 39% treated with combined chemoradiation with surgery versus 62% for chemoradiation patients and 57% for radiation alone patients. A multivariate analysis will be performed comparing outcomes such as disease free survival and time to recurrence amongst the various histologic subtypes, disease staging, and treatment modality employed. **Conclusions:** Nasopharyngeal carcinoma is often not diagnosed until it has reached advanced stage disease leading to a poorer prognosis as seen in this study. Combined chemoradiation with surgery may offer the best survival for these patients.

37. Endoscopic Infratemporal Fossa Approaches: Approach Analysis and Anatomic Considerations

Anand K. Devaiah, MD, Boston, MA

David Reiersen, BS, Boston, MA (Presenter)

Todd M. Hoagland, PhD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the relevant anatomy for endoscopic approaches to the infratemporal fossa, discuss approaches for endoscopic access, and compare the approaches with respect to access and visualization.

Objectives: While open anatomy and approaches to the infratemporal fossa (ITF) are understood, endoscopic anatomy and approaches are relatively new. Such endoscopic approaches demand new understanding of the anatomy. This study identifies relevant anatomy in the medial maxillectomy approach (MMA) and sublabial approach (SA) to the ITF and compares them with respect to access and visualization. **Study Design:** Human cadaver anatomic study. **Methods:** Zero and 30 degree endoscopes were used for endoscopic dissections. Five human cadaver heads (3 female, 2 male) for 10 dissection sides were used. Anatomic boundaries were the posterior maxillary sinus wall, temporomandibular joint, pterygoid plates, foramen spinosum, foramen ovale, and the plane of the maxillary floor. A SA and MMA were performed on each side. Confirmation of the anatomy was done by examining the anatomy through an open dissection. The SA and MMA were compared by looking at approach characteristics. **Results:** Average depth for dissection (from skin surface to depth of ITF) was 7.9 cm in MMA and 6.1 cm for SA. Average angle of approach (plane parallel to the posterior maxillary sinus wall) was 36.3 degrees in MMA and 57.9 degrees for SA. Visualization subtended 40.2 degrees for MMA and 126.5 degrees in SA. Both surgical approaches allowed endoscopic access to all targeted landmarks. Visualization and maneuverability were better in SA. **Conclusions:** Both the SA and MMA are feasible for ITF access. Visualization and access was better in SA. This study provides normative data valuable to the surgeon considering endoscopic approaches to the ITF.

38. Cigarette Smoking and Regulatory T Cell Subpopulations in Head and Neck Squamous Cell Carcinoma Patients

Jason M. Guillot, MD, Jackson, MS

Gailen D. Marshall, MD PhD, Jackson, MS

Karen T. Pitman, MD*, Jackson, MS

Jadrien A. Young, MD, Nashville, TN

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the significant role regulatory T cells (Treg) play in cancer immunosurveillance and that abnormalities exist in individual Treg subpopulations in the context of malignancy, specifically head and neck squamous cell carcinoma and cigarette smoking.

Objectives: Characterize subpopulations of regulatory T cells (Treg) in the peripheral blood of head and neck squamous cell carcinoma (HNSCC) patients and explore the effect of cigarette smoking on Treg subpopulations in HNSCC patients and controls. **Study Design:** Controlled, prospective, cross-sectional. **Methods:** Peripheral blood samples from 44 HNSCC patients with a significant cigarette smoking history (43.7 + 20.3 pack-years), 33 smokers (S) (39.4 + 20.8 pack-years), and 19 nonsmokers (NS) were obtained. HNSCC of various origins were studied at the time of diagnosis and prior to any treatment. Multi-color flow cytometry was performed on peripheral blood mononuclear cells (PBMC) which were stained for CD3, CD4, CD25, IL10, FoxP3, and TGF β . Tregs are CD3+CD4+CD25HIGH+FoxP3+. T regulatory type-1 (Tr1) cells are CD3+CD4+CD25HIGH+IL10+ and Th3 cells are CD3+CD4+TGF β +. Statistical significance was assessed using paired t tests. **Results:** Tregs were elevated in HNSCC versus NS 20.6vs13.4%,p=.009)and S(20.6vs16.0,p=.084). Tr1 was decreased in HNSCC compared to NS (4.2vs7.6%,p<.001), and S compared to NS(4.7vs7.6%,p=.003). There were no significant Th3 differences between groups (HNSCC:1.6;S:1.7;NS:1.1%,p=n.s.) **Conclusions:** Tregs were increased in HNSCC and less so in S. There was a significant decrease in Tr1 in both HNSCC and S compared to NS that appears to be related to

smoking. There were no differences in the Th3 subsets among groups. These data suggest that cigarette smoking, a primary risk factor for the development of HNSCC and its recurrence, may affect that risk by altering individual immunoregulatory balance among different Treg subpopulations. Specific Treg profiles may provide prognostic value in HNSCC and improve cancer risk assessment in S.

39. Swallowing Function after Nonsurgical Treatment for Advanced Base of Tongue Carcinoma

Thomas C. Kelly, MD, Detroit, MI
James P. Dworkin, PhD, Detroit, MI
Robert J. Stachler, MD, Detroit, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand outcomes of various treatment options for advanced base of tongue carcinoma; 2) state the risk of dysphagia and PEG tube dependence with chemoradiation for base of tongue carcinoma; and 3) understand and articulate serious adverse effects of chemoradiation.

Objectives: Evaluate preservation of swallowing function after organ preservation therapy for advanced based of tongue carcinoma. Document swallowing related complications of chemoradiation. **Study Design:** A retrospective chart review of 34 patients undergoing nonsurgical treatment for advanced base of tongue squamous cell carcinoma. **Methods:** The SEER database was searched for the CPT code for base of tongue carcinoma. Charts of patients treated nonsurgically were reviewed. Diet, and G-tube placement, utilization and removal were documented. Evaluation and treatment of dysphagia and its sequelae such as aspiration pneumonia were also documented to assess preservation of swallowing function. **Results:** Overall twenty-six patients required tube feeds (77%). Thirty-five percent of patients (12/34) had feeding tubes placed and removed. Forty-one percent of patients (14/34) did not have their feeding tubes removed after a mean duration of 19 months followup. Fifty-eight percent of patients with T3 and T4 primaries (11/19) required tube feeds on last followup compared to 20% of T1 and T2 primaries (3/15). Seven patients had aspiration pneumonia (21%) and two of these became septic and died (6%). Three patients developed an esophageal stricture (9%). **Conclusions:** Organ preservation therapy for advanced base of tongue carcinoma did not preserve swallowing function in forty percent of patients. Advanced T stage was a predictor of poor functional outcomes. The preservation of swallowing function for nonsurgical treatment was similar to that of surgical treatment plus reconstruction in some series. Better treatments are needed to cure advanced base of tongue cancer and preserve organ function.

40. Correlation of mTOR Activation and HIF-1 α in HNSCC Patient

Kavita Malhotra, MD, Shreveport, LA
Rong Xiaohua, Shreveport, LA
Cherie Ann O. Nathan, MD, Shreveport, LA*

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the correlation between mTOR and HIF-1 α .

Objectives: We have found that eIF4E is overexpressed in 100% of HNSCC and this overexpression is a result of functional activation of the mTOR pathway. mTOR functions as a positive regulator of HIF-1-dependent responses to hypoxic stress in human cancer cells. Although linkage between mTOR and HIF-1 α has been shown in HNSCC cells types, this correlation has not been studied in patient samples with HNSCC. **Study Design:** Patient samples showing activation of mTOR were assessed for expression of HIF-1 α using western blots. **Methods:** Protein extracts from twenty-five consecutive patients showing activation of mTOR were selected from our tumor bank based on protein available. Tumor and adjacent tissue were collected at the time of panendoscopy or surgical resection, protein extracted and stored -80°C. Western blots were used to determine expression of HIF-1 α in these samples using a rabbit polyclonal antibody. **Results:** HIF-1 α is a very unstable protein and was able to be detected in only 10/25 patients. All samples showed overexpression of HIF-1 in tumors and adjacent tissue. The average HIF-1 α level in tumor was higher than that of adjacent tissue. There appeared to be a significant correlation between the overexpression of HIF-1 α and activation of mTOR pathway in all ten samples in both tumor and adjacent tissue. **Conclusions:** We found that HIF-1 α overexpression in tumor and adjacent tissue correlates with mTOR activation in HNSCC patient samples. Future clinical trials targeting mTOR and HIF-1 α may present a valuable adjunct to cancer treatment.

41. Thyroglossal Duct Carcinoma

Richard Peter Manes, MD, Washington, DC
Stanley H. Chia, MD, Washington, DC
Leonard Wartofsky, MD, Washington, DC
Nikolaos A. Stathatos, MD, Washington, DC
Kenneth D. Burman, MD, Washington, DC
Ziad E. Deeb, MD, Washington, DC

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate an understanding of the presentation, workup and management of thyroglossal duct carcinoma, a rarely reported clinical entity.

Objectives: 1) Present a case series of thyroglossal duct carcinoma; 2) compare the aforementioned cases to the other reports in the literature of thyroglossal duct carcinoma; and 3) review the controversy surrounding the management of thyroglossal duct carcinoma. **Study Design:** Retrospective review. **Methods:** Case series and literature review. **Results:** We present three cases of thyroglossal duct carcinoma from a major metropolitan tertiary care center. Each patient presented with a midline neck mass, with one patient exhibiting a lytic lesion of the hyoid bone on CT scan. To our knowledge this is only the second case reported in the literature of thyroglossal duct carcinoma primarily involving the hyoid bone. Two patients underwent fine needle aspiration prior to excision which was positive for malignancy in only one patient. Each patient underwent excision of the thyroglossal duct cyst. Two underwent Sistrunk procedure and a total thyroidectomy at the time of surgery. The third underwent an excision of the thyroglossal duct cyst without excision of the central portion of the hyoid. None of the three patients have shown any evidence of recurrence on followup examination. **Conclusions:** Thyroglossal duct carcinoma is an uncommon yet important clinical scenario. It should be considered in patients presenting with a thyroglossal duct cyst. It is still unclear whether thyroglossal duct carcinoma represents multifocal disease or metastatic thyroid cancer arising from the thyroid gland. Therefore management strategies, including whether to perform a total thyroidectomy, remain controversial.

42.

Unusual Vascular Anatomy in Juvenile Nasopharyngeal Angiofibroma

Sarah E. Mowry, MD, Los Angeles, CA
Fernando Vinuela, MD, Los Angeles, CA
Elliot Abemayor, MD PhD, Los Angeles, CA*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the typical presentation of juvenile nasopharyngeal angiofibroma, explain the normal vascular supply to the nasopharynx, and identify abnormal patterns of blood supply to these tumors.

Objectives: 1) Describe unusual arterial anatomy in a case of juvenile nasopharyngeal angiofibroma (JNA) and its implications for treatment; and 2) review the literature regarding descriptions of arterial anomalies in these tumors. **Study Design:** Case report; review of the literature. **Methods:** A case report is described from a tertiary university hospital. Further evaluation was conducted using a PubMed literature search using terms such as “juvenile nasopharyngeal angiofibroma”, “anatomy”, “arterial supply”, “complications”, and “aberrant artery”. **Results:** A 17 year old male with an exclusively right sided JNA was seen. The tumor demonstrated distinctly unusual arterial anatomy. The patient underwent preoperative angiography where feeding vessels from the right internal maxillary artery were identified and embolized. Postembolization arteriography did not demonstrate any other feeding vessels. Intraoperative endoscopic resection was attempted. Copious bleeding was encountered which could not be controlled surgically. The patient was taken emergently to the interventional radiology suite where angiography demonstrated recruitment of feeding vessels from the left ascending pharyngeal artery which were then embolized to permit an uneventful full tumor resection. **Conclusions:** This case presents several unusual features: 1) the presence of feeding vessels from the contralateral external carotid system in an exclusively right sided lesion; and 2) the absence of angiographic visualization of these vessels until the tumor’s main blood supply had been embolized. We hypothesize that prior to embolization the contralateral feeding vessels were small but loss of the dominant blood supply resulted in arterial dilation, vessel recruitment and subsequent intraoperative hemorrhage. Our experience with this case and review of the literature on this subject will be presented.

43.

An Extended Endoscopic Approach for Resection of Clival Lesions

Aric K. Park, MD, Boston, MA
Elie E. Rebeiz, MD, Boston, MA
James Kryzanski, MD, Boston, MA
Carl B. Heilman, MD, Boston, MA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the feasibility, complications, and morbidity of an endoscopic approach to clival lesions.

Objectives: To review our experience with endoscopic endonasal approach for surgical management of clival tumors. **Study Design:** Case series involving 12 patients with clival tumors treated by endoscopic endonasal surgery between 11/9/97 and 10/2/05 were studied retrospectively. Discussion of surgical technique will be included. **Methods:** Patient demographics include age, gender, previous therapy, initial presenting symptoms, MRI and CT characteristics of lesions, and extent of the tumor. Outcome data will look at complications, hospital stay, management of lesion, mortality, and need for subsequent revision surgery. **Results:** Most patients presented with diplopia (5) or headaches (4). There were 5 chordomas, 1 ossifying fibroma, 1 chondrosarcoma, 1 hamartomatous lipoma, 1 cholesterol granuloma, 1 lymphoma, and 1 degenerative cyst. 9 patients had improvement in their presenting symptoms. 3 had no change. Length of stay varied from 1 to 5 days. Total tumor removal was performed in 10 cases, subtotal removal in 2 cases. Followup ranged from 3 to 48 months. Complications included 2 intraoperative cerebrospinal leaks which were repaired successfully during surgery, 1 episode of epistaxis managed with a nasal pack, 1 transient cranial nerve VI palsy that resolved spontaneously, and 1 nasal obstruction treated with observation. There was no postoperative bleeding, sinusitis or meningitis. **Conclusions:** Endoscopic endonasal surgery for clivus and anterior skull base lesions is a safe alternative to traditional open approaches and has several advantages including a low morbidity.

ity, quick recovery and limited complications. The use of endoscope to perform clival tumor surgery provides excellent visualization but requires a learning curve and team approach.

44.

Connexin Gap Junction Protein Expression in Benign and Malignant Thyroid Tissue

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Jan Geliebter, PhD, Valhalla, NY
Steven A. McCormick, MD, New York, NY
Stimsom P. Schantz, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the difference in expression of connexin gap junction proteins in benign and malignant thyroid tissue and the implications for its utility in fine needle aspirates. Such gap junctions are implicated in normal follicle formation and secretory function in thyroid tissue. Absence of such proteins in cancer has biologic plausibility and may aid in differentiating cancer from noncancer.

Objectives: To characterize the expression of connexin 43 gap junction proteins in normal, hyperplastic, adenomatous, and malignant thyroid tissue. **Study Design:** Retrospective study. **Methods:** Formalin fixed paraffin embedded human thyroid specimens were prepared and stained using standard immunohistochemical methods for connexin 43. Five specimens each of normal thyroid, hyperplastic goiter, follicular adenoma, follicular carcinoma, and follicular variant of papillary cancer were analyzed by light microscopy and assessed for cytoplasmic/membranous staining and gap junction plaques. Positive controls consisted of normal thyroid tissue within the same specimen. Negative control consisted of specimen without the application of anti-connexin 43 antibody. **Results:** All normal and hyperplastic specimens had HIGH expression of specific membranous gap junction plaques. All but one follicular adenoma specimen had HIGH expression of specific membranous gap junction plaques. All follicular variant specimens had LOW expression of specific membranous gap junction plaques. All but one follicular cancer specimen had LOW expression of specific membranous gap junction plaques. **Conclusions:** Thyroid cancer specimens tend to have decreased membranous expression of connexin 43 plaques as compared to benign tissue, especially regarding the presence of gap junction plaques. Degree of expression is correlated with the presence of well formed, well differentiated thyroid follicles. Future studies will elucidate whether such expression may be helpful for differentiating cancer from noncancer in suspicious fine needle aspirates.

45.

Microvascular Reconstruction of the Orbit

James M. Ridgway, MD, Orange, CA
Jason H. Kim, MD, Orange, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the basic principles of microvascular free tissue transfer; 2) compare advantages of free tissue transfer over more classic techniques of orbit reconstruction; 3) identify soft tissue and vascular anatomy relevant to microvascular techniques; and 4) discuss the relationship of a “viable” reconstructed orbit and its relation to end result prosthetic use.

Objectives: Reconstructive techniques of the head and neck have evolved considerably over the last decade with microvascular free tissue transfer at the forefront. The growth of such operative procedures has been driven by complex three dimensional defects and facial disfigurements created during primary tumor resection. Furthermore the creation of a viable orbital space with healthy tissues has proven to be paramount for the future use of orbital prosthetics. In this study we present a case series of three patients who have undergone microvascular free tissue transfer of surgical defects that required orbital exenteration and primary orbit reconstruction. **Study Design:** Prospective case series and current literature review. **Methods:** Three subjects underwent microvascular free tissue transfer for orbit reconstruction after primary surgical resection. Tissue flaps were harvested from the nondominant radial forearm and contoured to the site of surgical resection. Attention was dedicated to the creation of an orbital volume necessary for prosthetics. **Results:** In all subjects a viable reconstruction of the orbit, anterior skull base, and adjacent sinuses was observed. Each patient was serially evaluated after surgical reconstruction without evidence of flap failure or tissue compromise. Patients who underwent postoperative radiation therapy had predictable reduction in flap size but no associated sequelae. **Conclusions:** Microvascular free tissue transfer to the orbit offers an excellent reconstructive technique in the creation of a viable orbit for future prosthetic use. A comprehensive understanding of microvascular techniques, anatomy, and orbital prosthetics is essential for optimal outcomes.

46.

Surgical Management of Buccal Space Lesions

Sarah L. Rohde, MD, Nashville, TN
James L. Netterville, MD, Nashville, TN*

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the anatomy, surgical approaches to, and varied pathology of lesions arising in the buccal space.

Objectives: Discrete neoplastic or proliferative lesions arising from and limited to the buccal space are extremely rare. Through our experience of 6 lesions presenting within this space, we will review the transoral view of the facial nerve and the anatomy deep to the buccinator muscle, the surgical approach to, and pathology of buccal space lesions. **Study Design:** Case series of 6 patients undergoing excision of buccal space lesions at a tertiary referral center. **Methods:** Patients were obtained and followed from our oral cavity, salivary gland database, and further information was obtained through retrospective chart review from January 2004 to September of 2007. **Results:** Five lesions were excised via a transoral approach, and one lesion was resected with a combined hairline (facelift) approach due to its size. Five different pathologic diagnoses were obtained. Three of five lesions were of salivary origin (pleomorphic adenoma (2), polymorphous low grade adenocarcinoma). Two lesions were vascular in origin (cavernous hemangioma, vascular malformation). The remaining lesion was an embryonal rhabdomyosarcoma. The parotid duct was sacrificed in 1 of 5 patients undergoing transoral excision secondary to its proximity to a malignant tumor. There were no cases of facial nerve injury. **Conclusions:** A wide spectrum of lesions may present as buccal space masses. With an understanding of the facial nerve anatomy within the buccal space, transoral excision of buccal space lesions is safe with no instances of facial nerve injury in this series.

47. Neural Cell Adhesion Molecule Expression Does Not Correlate with Perineural Invasion in Cutaneous Squamous Cell Carcinoma of the Head and Neck

C. A. Solares, MD, Cleveland, OH

Ian Brown, MBBS, Brisbane, QLD Australia

Glenn Boyle, PhD, Brisbane, QLD Australia

Peter Parsons, PhD, Brisbane, QLD Australia

Benedict Panizza, MBBS MBA FRACS, Brisbane, QLD Australia

Educational Objective: At the conclusion of this presentation, the participants should be able to understand perineural invasion and the role of N-CAM in this phenomenon.

Objectives: Perineural invasion (PNI) in cutaneous squamous cell carcinoma of the head and neck (CSCCHN) is associated with decreased survival. Once the tumor invades the perineural space, it can extend proximally and/or distally in the nerve sheath and eventually reach the intracranial space. There is some evidence to indicate that neural cell adhesion molecule (N-CAM) confers capability of perineural spread. We analyzed our own patient population to determine if N-CAM predicted PNI in CSCCHN. **Study Design:** Laboratory setting. **Methods:** Tissue samples from patients with CSCCHN with PNI who underwent surgery between 1995 and 2005 were immunostained for N-CAM. In addition non-PNI CSCCHN and normal nerve sections were also stained. A section of neuroendocrine tumor was included in each slide as a positive control. In addition most of the sections also had an "inbuilt control" in the CD56 positive natural killer T cells (NK T cells) that formed part of the inflammatory reaction to the tumors. **Results:** Tissue was available in 14 PNI CSCCHN patients. The analysis was carried out in 14 non-PNI patients and 4 normal nerves. N-CAM was not expressed in any of our PNI CSCCHN specimens or controls. It was strongly expressed in the neuroendocrine tumors and positive in-built controls as well as in normal nerve tissue. **Conclusions:** N-CAM expression did not predict neurotropism in our patient population. Additional studies are required to identify cell surface markers expressed by CSCCHN that confer neurotropism capabilities.

48. Acinic Cell Carcinoma of the Salivary Glands: A Single Institution Experience 1985-2007

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Thomas L. Kennedy, MD, Danville, PA*

Waldemar L. Riefkohl, MD, Danville, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe acinic cell carcinoma, its typical course, and recommended treatment strategies.

Objectives: To describe the characteristics of acinic cell carcinoma including features that impact outcome and treatment strategies. **Study Design:** Retrospective chart review. **Methods:** The pathology department database was reviewed for all patients with histopathologic diagnosis of acinic cell carcinoma. Medical records were examined to gather information about patients' age, sex, disease characteristics, treatment modalities, and outcomes. **Results:** Eight males and eleven females were found to have acinic cell carcinoma. Seventeen cases were of the parotid with minor salivary gland origin in the buccal mucosa and the hard palate in the other two patients. Six patients are alive without disease with over five years of followup, and 5 are alive without disease with less than 5 years of followup. Four died from disease, one died with disease but from other causes, and two died without evidence of disease. One patient was lost to followup after 22 months. Disease free survival ranged from 4 to 134 months, with mean of 51 months. Postoperative radiation therapy was consistent with poor outcome, as four of the nine patients receiving radiation died of their disease, and only 2 of these nine were known to be alive without disease four or more years later. **Conclusions:** Acinic cell carcinoma is a malignant tumor that can be aggressive in as many as 20% of patients. Treatment should be altered accordingly and patients should be followed closely due to the possibility of late recurrence or metastasis.

OTOLOGY

49.

The Foreshortened Malleus: A Quantitative Analysis of Relevance

Lindsey A. Clemson, MD, Atlanta, GA
N. Wendell Todd, MD MPH*, Atlanta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) know a quantitative method of expressing foreshortened malleus; and 2) know that foreshortened malleus did not correlate with the small mastoid size.

Objectives: The appearance of the malleus, as viewed through the external ear canal clinically, is sometimes that of being shorter than usual. Such foreshortening has been associated with long duration otitis media. Metric determination of foreshortening is potentially useful for both clinical and investigative purposes. Hypothesis: Quantitative malleus foreshortening correlates with small mastoid size, itself a correlate of prior otitis media. **Study Design:** Postmortem study of 41 bequeathed adult crania (82 temporal bones). None had clinical otitis. **Methods:** On tympanic membrane photographs, distances from the malleus' lateral process to the umbo, and from the lateral process (across the umbo) to the annulus, were measured—ignoring pars flaccida retraction (five were onto the neck of the malleus). Mastoid areas were from plain law lateral radiographs. **Results:** Foreshortening was not associated with mastoid size. Bilateral symmetry was found for both foreshortened malleus and mastoid size ($r = .49$ and $.64$ respectively; each $P < .01$). **Conclusions:** These data suggest foreshortened malleus is not a correlate of prior otitis media. Rather foreshortened malleus may be a function of how the malleus is positioned in the ear.

50.

The Role of Parotidectomy in Patients with Occult Malignancy and Facial Nerve Paralysis: Analysis of 3 Cases and a Brief Literature Review

Kelly Cunningham, MD, Maywood, IL
Sam J. Marzo, MD, Maywood, IL
John P. Leonetti, MD, Maywood, IL

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the need to perform parotidectomies in the diagnosis and treatment of patients with a nondiagnostic MRI and progressive facial paralysis.

Objectives: Patients with progressive facial paralysis have a significant functional and social handicap. Radiographic imaging in conjunction with clinical findings can often help elucidate the etiological cause that will direct either medical or surgical intervention. When the radiographic evidence is equivocal, one must use good clinical jurisprudence to intervene. The purpose of this case series is to discuss the need to perform parotidectomies in the diagnosis and treatment of patients with a nondiagnostic MRI and progressive facial paralysis. **Study Design:** Retrospective case analysis and brief literature review. **Methods:** Three patients referred to a tertiary academic center with progressive unilateral facial paralysis and a nondiagnostic MRI. **Results:** Case 1 is a 57 year old male who initially presented with right eye fasciculations and a nondiagnostic MRI. Noteworthy, he had previously failed treatment for infectious causes of progressive facial paralysis. He presented to our center with a facial paralysis, House-Brackmann Grade 6, and was taken to the operating theater for a diagnostic biopsy which revealed a T4aN0M0 acinic cell carcinoma of the right parotid gland. Similarly, case 2 is a 58 year old female who presented with progressive right sided facial weakness, House-Brackmann Grade 6, with acute paresthesias over the right cheek and a nondiagnostic MRI. She was also taken to the operating room for parotid biopsy and was diagnosed with T4aN0M0 adenocarcinoma of the right parotid gland. Lastly, case 3 is a 78 year old female with a history of nasal cutaneous basal cell carcinoma that presented with 2-3 months of progressive facial nerve weakness, House-Brackmann Grade 3, preauricular pain and a nondiagnostic MRI. This patient was initially taken to the operating room for a left superficial parotidectomy which revealed metastatic basal cell carcinoma. These patients were subsequently taken back to the operating room for total parotidectomy and surgical investigation of the facial nerve. **Conclusions:** Patients presenting with progressive facial nerve paralysis, without signs of regeneration, and a nondiagnostic imaging study may be harboring an occult parotid malignancy. In these select cases surgical exploration of the parotid gland and facial nerve should be strongly considered for both diagnostic and therapeutic purposes.

51.

Retrospective Review of Steroid Sparing Treatment of Autoimmune Inner Ear Disorder

M. Jennifer Derebery, MD*, Los Angeles, CA
Janice Chung, MA, Los Angeles, CA
Katherine Green, BA, Los Angeles, CA
Laurel M. Fisher, PhD, Los Angeles, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to appreciate the range of short term usage medications that may be appropriate for patients with autoimmune inner ear disorder to spare them the lengthier prednisone treatment for hearing loss control.

Objectives: To describe medication related hearing changes in autoimmune inner ear disorder (AIED) patients. **Study Design:** A retrospective chart review of 118 patients with documented AIED treated between 2003 and 2007 in a tertiary care otologic practice. Twenty-one females and 21 males who had received prednisone, other immunomodulating treatment, and had followup audiology testing were included. Ten received multiple treatments, resulting in 52 patient/medication combinations. **Methods:** Charts were reviewed

for audiology data prior to treatment and 6 months and one year (or last available test) post-treatment. For this report hearing improvement was defined as: either 15 dB improvement at any one frequency in either ear or 10 dB at 2 consecutive frequencies and stable at all others. Patient reported subjective changes in hearing and dizziness were noted. **Results:** Twelve different medications were reviewed. Not all patients had all followups. The first followup visit occurred at an average of 6 months. Eleven of 48 (22.9%) showed improvement in hearing. No specific medication seemed to have a significant effect on hearing at first followup. Twenty-two patients of 52 (42.3%) had improved or stable hearing at the one year followup (average = 14 months). Imuran had the most positive effect on hearing outcome, with 6 of 9 patients (66.7%) treated with Imuran experienced improved or stable hearing at one year post-treatment. **Conclusions:** It appears that Imuran may be a short term medical treatment for AIED, sparing patients continuous or high dose prednisone treatment. Hearing and dizziness should be frequently monitored to determine when a medication has had a beneficial effect for a specific patient.

52. CT Venography: Utility in Selecting a Surgical Approach for Treatment of Petrous Apex Cholesterol Granulomas

Brandon R. Isaacson, MD, Dallas, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the utility of CT venography in selecting a surgical approach for petrous apex cholesterol granulomas.

Objectives: To demonstrate the utility of CT venography in selecting a surgical approach for petrous apex cholesterol granulomas. **Study Design:** Retrospective case review. **Methods:** CT venography was performed on each patient prior to selecting a surgical approach for drainage. The location of the jugular bulb in relation to the petrous carotid artery and basal turn of the cochlea was determined in each case. **Results:** Two patients with large symptomatic cholesterol granulomas were identified. Conventional computed tomography demonstrated extensive bone erosion involving the jugular fossa in each patient. The location of the jugular bulb and its proximity to the petrous carotid artery and basal turn of the cochlea could not be determined with conventional temporal bone CT and MRI. CT venography provided the exact location of the jugular bulb in both patients. The favorable position of the jugular bulb in both cases permitted drainage of these lesions using an infracochlear approach. **Conclusions:** CT venography provided invaluable information in two patients with large symptomatic cholesterol granulomas. Both patients were previously thought to be unsuitable candidates for an infracochlear or infralabyrinthine approach because of the presumed anterior-superior location of the jugular bulb.

53. 5-Fluorouracil Ointment Therapy for Otitis Media with Effusion in Clinical Study

Shin-Ichi Kanemaru, MD PhD, Kyoto, Japan

Koichi Omori, MD PhD, Fukushima, Japan

Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to know that repeated application of 5-FU ointment at the myringotomy site is an easy, safe, cost effective and useful treatment for otitis media with effusion.

Objectives: The aim of this study is to evaluate the combined effect of 5-fluorouracil (5-FU) and myringotomy for the treatment of otitis media with effusion (OME). We have already reported that a single application of small amount of 5-FU ointment was effective in prolonging the effect of myringotomy. However, a single application of 5-FU ointment is not enough to cure OME because only about 10% of the patients had a myringotomy patency time over 4 weeks. In this study we assessed whether repeated administration of 5-FU has the potentiality to maintain the patency of the myringotomy site for a much longer period of time or not. **Study Design:** Pilot study. **Methods:** 93 patients (50 males and 43 females) were randomly selected from patients with intractable OME. They were divided into 2 groups. Myringotomy with a single or repeated application of 5-FU ointment were performed in groups I (n=64) and II (n=29) respectively. The application dose of 5-FU ointment was about 0.1-0.3mg at a time. In group II all patients were treated every 2 weeks until perforation closing. Natural closure rates of tympanic membrane in both groups were assessed. **Results:** The average closure times of tympanic membrane were 18.6 days and 34.7 days in groups I and II respectively. There are significant differences between the two groups in the cure rates of OME. No adverse events were observed in both groups. **Conclusions:** Repeated application of 5-FU ointment and myringotomy is a possible treatment for OME.

54. Techniques and Implications of a Retrograde Otitis Media in the Chinchilla Model

Scott L. Lee, MD, Albany, NY

Huaiqing Chen, PhD, Albany, NY

Yueyun Ma, PhD, Albany, NY

Erik Steiniger, MD, Albany, NY

Steven M. Silver, MD, Albany, NY

Jing-Ren Zhang, PhD, Albany, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to explain how the eustachian tube per-

mits migration of *S. pneumoniae* to the nasopharynx then to the contralateral ear in a retrograde fashion. These findings may provide insight into other etiologies of otitis media and have significant influence on future experimental design.

Objectives: Chinchilla laniger is a rodent commonly employed for otologic experimentation because of its hypertrophied bulla, low incidence of natural otitis media, and the lack of streptococcus pneumoniae carriage in the external auditory canal, nasopharynx, and oropharynx. We refine the transcanal inoculation and lavage techniques of the chinchilla middle ear; demonstrate viable bacterial recovery from the middle ear and nasopharynx; and assess the status of the contralateral middle ear. **Study Design:** Prospective single arm cohort. **Methods:** 30 *C. laniger* right ears were inoculated with 10^3 - 10^4 CFU of *S. pneumoniae* through transcanal tympanotomies. Three days later tympanotomies were performed in both ears, lavaged, and cultured. Nasopharyngeal cultures were obtained before inoculation and again at day 3. Blood cultures were obtained at necropsy. **Results:** 28 chinchillas completed the experiment. Viable *S. pneumoniae* were recovered from 27 right ears (96%) and 6 left ears (21%). Nasopharyngeal cultures confirmed no native *S. pneumoniae* carriage but 19 (68%) became positive by day 3. All blood cultures were negative. **Conclusions:** Middle ear inoculation and lavage through transcanal tympanotomies are effective in inducing an acute otitis media and recovering viable bacteria in the chinchilla model. Isolation of *S. pneumoniae* in the nasopharynx and contralateral middle ear, in the absence of bacteremia, suggests a retrograde bacterial migration via the eustachian tube.

55. Bilateral Temporal Bone and Skull Base Osteomyelitis in an Immunocompetent Patient

Douglas D. Leventhal, MD, Philadelphia, PA
Thomas O. Willcox, MD, Philadelphia, PA
James J. Evans, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the clinical and radiologic presentation of skull base osteomyelitis. The participants should also understand the pathophysiology of the disease. Finally, the participants should be able to discuss the management of the condition.

Objectives: To describe the presentation and treatment course of skull base osteomyelitis in this patient; to review the existing literature. **Study Design:** Case report. **Methods:** This is a report of a 75 year old immunocompetent male with no history of ear disease who presented with intermittent right otalgia for 2 months. A CT was done and revealed right chronic mastoiditis. He then began to experience dysphagia and hoarseness and MRI showed an extensive inflammatory process involving the right temporal bone and jugular fossa. Further laboratory testing and bone scan confirmed right temporal bone osteomyelitis. **Results:** The patient was treated with IV antibiotics during which his symptoms resolved. In the ensuing weeks he began to experience left sided otalgia. He was diagnosed with left temporal bone osteomyelitis, which was again treated with IV antibiotics. He subsequently developed neck pain, upper extremity numbness, and sensory and gait disturbances. Repeat imaging revealed C1-C2 instability and a large C1-C2 pannus causing cervical medullary compression. The patient underwent endoscopic transoral odontoidectomy and resection of the anterior aspect of C1 vertebral ring and large ventral C1-C2 pannus. The ensuing week he underwent a posterior occipital to cervical fusion. The patient had full neurologic recovery following surgery. **Conclusions:** Osteomyelitis of the cranial base is an uncommon condition, particularly in immunocompetent patients, and is associated with a high morbidity and mortality. Typical cases are incited by ear infections in older diabetic patients, which was not the case in this individual. Prompt diagnosis, followed by surgical excision of the sequestra and systemic antibiotics are of utmost importance in managing this condition.

56. Connexin 26 Hearing Loss; V37I is the Leading Pathologic Mutation, and V27I+E114G/V37I Causes Hearing Loss

Lynne Hy Lim, MBBS, Singapore
L. Q. Xu, BSc, Singapore,
Evelyn Koay, PhD, Singapore
Denise L.M. Goh, MBBS, Singapore

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) connexin 26 hearing loss in Asian population differs from the West; 2) polymorphisms V27I/E114G with pathologic mutation like V37I cause hearing loss (HL).

Objectives: To determine the prevalence and genotypic-phenotypic correlation of connexin 26 (Cx26) hearing impairment (HI) an Asian population. **Study Design:** Prospective control study in referral hospital. **Methods:** Patients with idiopathic sensorineural hearing loss prior to 40 years old were recruited from the ENT clinic. Information of patient's race, age, medical history and audiometry were collected. Blood samples were analyzed for Cx26 mutations through PCR and DNA sequencing. **Results:** Prevalence of DFNB1-related HI was 38% (35/92). Carrier rate Cx26 mutation in control group was 59.1% (78/132). Pathologic mutations found: G12R, W24X, I30V, V37I, 235delC, R127H, R165W, and R184W. Leading Cx26 mutation is V37I with 32.6% (60/184) in HI group. No 35delG common to the West, and only 4 235delC alleles (common in China) amongst both affecteds and controls. Polymorphisms found: V27I, E114G, I203T, and V153I. V27I/E114G were found together often with 14.7% (27/184) in HI group and 20.4% (27/132) in control. Of significance for the first time study shows that V27I/E114G together with another pathologic Cx26 mutation likes V37I results in deafness. All 6 patients with V27I+E114G/V37I had HI. All 5 V27I+E114G/V27I had normal hearing. Novel mutations; I30V, 282(C-T), E120K, 558(G-A). A family pedigree study showed I30V likely to be pathologic. Audiometry of DFNB1 HL: mild 40.6% (26/64), moderate to moderately severe 54.7%

(35/64) and severe to profound 4.7% (3/64). **Conclusions:** Prevalence of DFNB1-related HI was 38%. Most common pathologic mutation is V37I. Polymorphisms V27I+E114G caused deafness together with a pathologic mutation like V37I. A novel mutation, I30V found in a family is likely to be pathologic.

57. Normal Acoustic Reflex Testing in MRI Confirmed Vestibular Schwannomas

Larry B. Lundy, MD, Jacksonville, FL
Jill M. Buckingham, MA, Jacksonville, FL
David A. Zapala, PhD, Jacksonville, FL
David B. Hawkins, PhD, Jacksonville, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the limitations of acoustic reflex testing in the evaluation for a vestibular schwannoma.

Objectives: To review false negative (i.e. normal) acoustic reflex testing and unremarkable audiograms in patients with magnetic resonance imaging (MRI) confirmed cerebellopontine angle tumors. **Study Design:** Retrospective chart review of six adults from 2003 - 2007 with unremarkable audiograms (pure tone thresholds and speech discrimination scores) who had MRI evidence of a vestibular schwannoma. **Methods:** Data from audiometric testing (pure tone thresholds, speech discrimination scores, and acoustic reflex testing), data from MRI scans, and key symptom or finding prompting MRI scanning. **Results:** Six patients (3 males, 3 females, ages 48 - 87) had unremarkable audiometric results (very symmetric to identical pure tones with appropriate speech discrimination scores) and normal acoustic reflex testing with MRI confirmed vestibular schwannoma. The key finding or symptom that prompted the MRI scan was subjective hearing loss only (n=1), imbalance only (n=3), both hearing loss and imbalance (n=1), and incidental finding (n=1). **Conclusions:** Unremarkable audiometric testing, including acoustic reflex testing, may be unreliable evidence to pursue imaging for vestibular schwannoma. Other symptoms and findings, such as imbalance, could be helpful in deciding whether or not to proceed with imaging studies.

58. Aquaporin 4, But Not Aquaporin 2, May Play a Role in the Etiology of Meniere's Disease

Pavan S. Mallur, MD, New York, NY
Adam Weisstuch, BS, New York, NY
Anil K. Lalwani, MD, New York, NY*

Educational Objective: At the conclusion of this presentation, the participants should be able to determine the role of aquaporin 2 (AQP2) and 4 (AQP4) as candidate genes for Meniere's disease.

Objectives: To determine if water channel proteins AQP2 and AQP4 are responsible for Meniere's disease. **Study Design:** Screening for mutations in AQP2 and AQP4 in purified human genomic DNA using both denaturing high performance liquid chromatography (DHPLC) and bidirectional nucleotide sequencing. **Methods:** Purified genomic DNA was isolated from the blood of 30 subjects diagnosed with Meniere's disease. Using primers incorporating splice site junctions of each exon, four AQP2 and five AQP4 exons were amplified. DHPLC was performed with spectral analysis to determine the presence of heteroduplex DNA that would suggest the presence of altered DNA sequence followed by bidirectional sequencing to define the altered sequence. **Results:** DHPLC of Meniere's disease patients was similar to control patients, with a single peak with or without a left shoulder suggesting absence of mutation. Sequence analysis identified one novel sequence variation not suspected on DHPLC screening, a G to A substitution, at the -41 base pair position upstream from the AQP4 exon 1 start codon in 11 of 30 patients. This was absent in normal controls. **Conclusions:** AQP4, but not AQP2, may be implicated in the etiology of Meniere's disease. The novel sequence alteration encountered in the 5' untranslated region of AQP4 exon 1 of eleven of thirty Meniere's disease patients may be involved in its transcription control or leads to altered splice site processing. The exact role of the mutation in AQP4 remains to be determined.

59. Hydroxyapatite Bone Cement Drying Times in Ossicular Reconstruction: A Cadaveric Study

Samuel M. Medaris, MD, Omaha, NE
Alexander G. Bien, MD, Omaha, NE
Gary F. Moore, MD, Omaha, NE*

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the appropriate time constraints for application and adequate setting time of hydroxyapatite used for ossiculoplasty.

Objectives: Our goals were to ascertain the appropriate drying time of hydroxyapatite when used for ossiculoplasty and to create a realistic environment for testing the hydroxyapatite in the cadaveric temporal bone. **Study Design:** Randomized study using cadaveric temporal bones. **Methods:** Twelve temporal bones were randomly divided into three groups and prepared by lifting a tympanomeatal flap and then exposing and disarticulating the incudostapedial joint. Ossiculoplasty with Mimix hydroxyapatite was then performed. The three groups of four temporal bones were exposed to water at four, seven and ten minutes. Specimens were then subjected to 1 atm pres-

sure. Palpation and visual inspection of each incudostapedial joint was undertaken 30 minutes post-exposure. **Results:** Group A (four minutes) had four failures, group B (seven minutes) had two failures, and group C (ten minutes) had no failures. Chi-squared testing showed significance when comparing all three groups ($p=0.007$), groups A and B ($p=0.001$) and group A and C ($p=0.0120$). Groups B and C failed to show statistical significance ($p=0.189$). **Conclusions:** The drying time for hydroxyapatite in ossiculoplasty is likely between seven and ten minutes but not four minutes as per manufacturer's current recommendations. This difference could be due to the increased surface area to volume ratio as it relates to this particular application as well as its use in reestablishing joint continuity. Further investigation with more specimens and more variation in time intervals may detect a significant difference between the seven and ten minute groups as well as a more precise drying time requirement.

60. Marrow-Tympanum Connections of Temporal Bone in Fetus and Infant

Tomohiro Miura, MD, Fukushima, Japan
Chiaki Suzuki, MD, Fukushima, Japan
Iwao Otani, MD, Fukushima, Japan
Koichi Omori, MD, Fukushima, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the three facts. First marrow-tympanum connections are normal structure in fetuses and infants. Second the connections reveal two types: one is mesenchymal type, another is direct type without mesenchyme. Third these structural disadvantages may induce the severe inflammation of otitis media such as osteomyelitis and/or mastoiditis. Marrow-tympanum connections alert that otitis media under two years old should be treated more attentively.

Objectives: "Marrow-mesenchyme connections" which means the direct connection between hematopoietic marrow and tympanum in the fetal and newborn including anomaly cases were reported by Linthicum et al. The purpose of this study is to investigate the marrow-tympanum connections of the temporal bone in normal cases. **Study Design:** 58 temporal bones of fetuses and infants from 20 weeks of gestation until the age of 3 years old were examined with light microscopy. **Methods:** All cases without anomaly were included in this study. The middle ear was histologically compartmentalized into thirteen portions to investigate the appearance of the connection. Furthermore the connections were classified into the mesenchymal type and the direct type according to remaining mesenchyme. **Results:** Marrow-tympanum connections were observed in 51 temporal bones of the cases from 20 weeks of gestation until the age of 14 months. Most cases showed mesenchymal type connections, while some cases without otitis media showed direct type connections from 1 month after birth. Both types of connections were mostly found in the antrum, facial recess and tympanic sinus. **Conclusions:** This study indicates that marrow-tympanum connections ordinarily exist on any temporal bones of normal fetuses and infants. We first found the direct type marrow-tympanum connection without mesenchyme. These structural disadvantages are supposed to have the potential to induce the severe inflammation of otitis media such as osteomyelitis and/or mastoiditis.

61. Vogt-Koyanagi-Harada (VKH) Syndrome: A Rare Cause of Vertigo, Tinnitus and Hyperacusis

Justin R. Moy, MD, Portsmouth, VA
Philip A. Gaudreau, BS, College Park, MD
Fred W. Lindsay, DO, Portsmouth, VA

Educational Objective: At the conclusion of this presentation, the participant should be able to discuss VKH syndrome as a possible cause of vertigo, tinnitus and hyperacusis.

Objectives: To understand VKH syndrome as a possible cause of vertigo, tinnitus and hyperacusis. **Study Design:** A case presentation. **Methods:** A comprehensive literature search (Ovid, Medline) for the presentation, diagnosis, and management of patients with VKH syndrome was performed. **Results:** A 36 year old female with a known history of vitiligo since childhood presented with a complex, insidious onset of ocular, auditory, and neurological symptoms beginning 3 years ago. Symptoms had become more severe for the past several months including multiple episodes of vertigo, tinnitus, and hypersensitivity to sound. She had no history of trauma. An audiogram performed was within normal limits but remarkable for discomfort during the exam. The patient was subsequently diagnosed with VKH syndrome and started on steroids. The patient's audiologic and vestibular symptoms have resolved. **Conclusions:** VKH syndrome is an uncommon cause of vertigo, and hearing loss and should be included on the differential diagnosis of a patient with autoimmune related inner ear symptoms. Management is conservative with oral steroids and observation. Patients diagnosed with VKH should undergo audiometric and vestibular testing and should be followed by an otolaryngologist.

62. WITHDRAWN--Osteoma of the Internal Auditory Canal

Amanda L. Muhs, MD, Orange, CA
Hamid R. Djalilian, MD, Irvine, CA

Educational Objective: To demonstrate the nature and incidence osteoma of the internal auditory canal, and to discuss this lesion as

part of the differential diagnosis for retrocochlear lesions.

Objectives: Osteomas are pedunculated bony tumors originating almost exclusively from bones of the skull. Within the temporal bone these lesions most commonly occur in the external auditory canal or mastoid cortex but may be detected in the internal auditory canal (IAC). Osteomas of the IAC are reportedly rare, with fewer than 30 cases currently reported in the literature. While IAC osteomas may be associated with sensorineural hearing loss, vestibular dysfunction and tinnitus, many of the reported lesions are asymptomatic and found incidentally on radiographic imaging. We hypothesized that the frequency of IAC osteoma is greater than suggested by the literature due to an often asymptomatic nature and incidental method of discovery. **Study Design:** To assess the incidence of IAC osteoma we performed a retrospective case review of computed tomography imaging (CT) of the temporal bone from inpatients and outpatients presenting to the otolaryngology department of a tertiary medical referral center with a variety of neurotological complaints. **Methods:** We reviewed computed tomography (CT) images of the temporal bone from a total 187 consecutive patients (374 temporal bones). These studies were examined for radiographic evidence of internal auditory canal osteoma which is the gold standard for diagnosis of this lesion. **Results:** We identified three new cases of IAC osteoma from this patient population. **Conclusions:** Our findings suggest that IAC osteoma, while rare, may occur with an incidence higher than currently accounted for in the literature. As such IAC osteoma should be considered in the differential diagnosis of patients identified with retrocochlear lesions.

63. Comparison of Critical Protein Kinase Expression in Schwann Cell, Schwannoma Cell and Malignant Schwannoma Cultures, and Benign Human Vestibular Schwannoma Tumors

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Stephen G. Voss, MS, Rochester, MN
Colin L.W. Driscoll, MD, Rochester, MN
Michael J. Link, MD, Rochester, MN
Hirohita Kita, MD, Rochester, MN

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the importance of an essential cell proliferation and growth pathway as well as an apoptosis pathway in vestibular schwannomas. Participants will also appreciate the differential expression of these key proteins in different schwannoma cell culture lines as well as schwannoma tumor specimens.

Objectives: The purpose of this study was to evaluate the phosphorylation status of several key proteins in the molecular pathways involved with Pak1 and PI-3K in cultured Schwann cells, schwannoma cells, malignant schwannoma cells, and patient tumors. **Study Design:** Prospective evaluation of multiple human cell lines and tumors. **Methods:** Schwann cells and schwannoma cells were cultured in similar media conditions. Total protein was extracted by standard methods from cultures as well as excised human vestibular schwannomas. Protein quantification was performed for each sample, and the same amount of total protein was loaded for each sample. Western blots were completed and band intensity measures were performed with NIH Image software. Relative ratios of phosphorylated protein to total protein were calculated. **Results:** NF2 protein (merlin) expression was greatly decreased in schwannoma cell lines and tumors compared with normal human Schwann cells. The ratio of phosphorylated Pak1 and ERK1 were elevated in schwannoma cell lines and tumors as compared to benign Schwann cell cultures. In the PI3K-AKT apoptosis pathway phosphorylated PI3K was overexpressed in schwannoma cell lines and tumors and was most significantly elevated in the malignant schwannoma cell line. Phospho-AKT expression was elevated in schwannoma tumors, but expression was not consistently elevated in schwannoma culture lines. Downstream effectors in this pathway such as p70S6 and BAD proteins showed similar expression profiles as AKT. **Conclusions:** There is overexpression of phosphorylated proteins in critical cell proliferation and apoptosis pathways in schwannoma cultures and tumors as compared to benign human Schwann cell cultures. Culture conditions may partially explain the differential expression seen in tumors and their counterpart schwannoma cell lines. Other regulatory pathways and proteins will need to be the focus of future studies.

64. Can Congenital Cytomegalovirus Infection Cause Auditory Neuropathy?

Hiroshi Ogawa, MD, Fukushima, Japan
Yoko Baba, MD, Fukushima, Japan
Naoko Yamada, PhD, Fukushima, Japan
Yukie Suzuki, MD, Fukushima, Japan
Tatsumi Suzutani, MD, Fukushima, Japan
Koichi Omori, MD, Fukushima, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the relation between congenital CMV-induced SNHL and auditory neuropathy (AN).

Objectives: Sensorineural hearing loss (SNHL) is one of the most frequent manifestations in patients with congenital cytomegalovirus (CMV) infection at birth. However, questions remain concerning the mechanism of the hearing loss. Though no reaction was observed during auditory brainstem response (ABR) testing, we identified cases of CMV-induced SNHL in which otoacoustic emissions (OAE) were

observed. Based on these results we investigated the mechanism by which CMV causes SNHL. **Study Design:** Focus group study. **Methods:** Using dried umbilical cord we recently developed a PCR based assay for the retrospective detection of congenital CMV infection. Four cases have been found to be CMV positive using this method. We performed ABR testing and OAE testing on these cases. **Results:** No neural responses were observed during ABR testing in all 4 cases; however, 2 of the 4 showed good responses during OAE testing. AN is a clinical syndrome characterized by the presence of OAEs and/or cochlear microphonics suggesting normal outer hair cell function in conjunction with absent or grossly abnormal ABRs. From our clinical observations it is thought that congenital CMV infection could be one of the causes of AN. **Conclusions:** We experienced cases of SNHL caused by congenital CMV infection in which OAEs were found to be normal in spite of the absence of ABRs. On the basis of these results it was supposed that SNHL due to congenital CMV infection could cause AN.

65. Partial Cochlear Ossification Mimicking Auditory Neuropathy/Dyssynchrony

Robert C. O'Reilly, MD, Wilmington, DE
Leela S. Lavasani, MD, Philadelphia, PA (Presenter)
Thiery T. Morlet, PhD, Wilmington, DE
Patrick C. Barth, MD, Wilmington, DE
James S. Reilly, MD, Wilmington, DE*
Shanda T. Morlet, CCC-A, Wilmington, DE

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the pathophysiology of auditory neuropathy and discuss the differential diagnosis of disorders that mimic auditory neuropathy.

Objectives: To present a novel case of cochlear ossification that mimicked the audiometric findings of auditory neuropathy/dyssynchrony and detail the specific disorders that can present as classic auditory neuropathy/dyssynchrony. **Study Design:** Retrospective chart review, case presentation. **Methods:** The audiometric profile, imaging studies and pathologic findings of a case of a 5 year old male presenting with a profile of auditory neuropathy were reviewed. **Results:** Auditory neuropathy/dyssynchrony (AN/AD) is found in up to 10% of pediatric patients with sensorineural hearing loss. Typical audiometric findings include intact otoacoustic emissions, absent or elevated middle ear muscle reflexes and absent or abnormal auditory brainstem responses. We present a novel case of a 5 year old patient with unilateral deafness and audiometric findings consistent with AN/AD whose temporal bone imaging revealed ossification of the middle and apical turns of the cochlea with sparing of the basal turn. MRI, CT scan imaging, and complete audiometrics will be reviewed and the pathophysiology of conditions mimicking AN/AD will be discussed. **Conclusions:** AN/AD is a common condition in the pediatric population but can be mistaken for other neurotologic abnormalities that require different forms of habilitation.

66. WITHDRAWN--Chitosan Glycerophosphate Hydrogel for Controlled and Sustained Local Delivery of Gentamicin to the Inner Ear

David P. Paulson, MD, Philadelphia, PA
Charles Askew, BS, Philadelphia, PA
Michael Anne Gratton, PhD, Philadelphia, PA
Waleed M. Abuzeid, MD, Philadelphia, PA
Bert W. O'Malley, MD, Philadelphia, PA*
Daqing Li, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss drug delivery to the inner ear and understand tests to evaluate the efficiency of drug delivery.

Objectives: Recent studies suggest that treating Meniere's disease with very low doses of gentamicin over a protracted time period controls vertigo and decreases the likelihood of cochleotoxicity. Presently there are no widely used systems for controlled drug delivery to the inner ear. Chitosan glycerophosphate (CGP) hydrogel is applied as a liquid and then becomes solid in situ. The solidified gel remains in the location in which it is placed and releases the drug it contains as the matrix is degraded in situ. CGP-hydrogel may be a safe and practical vehicle for controlled and sustained drug delivery to the inner ear. **Study Design:** Animal study involving local application of chitosan glycerophosphate (CGP) loaded with gentamicin providing controlled and sustained release of gentamicin into the inner ear. **Methods:** In vitro: Drug release was evaluated using ELISA. In vivo: We applied CGP-gentamicin-hydrogel to the round window niche in a murine model. Efficiency of gentamicin transmission into the inner ear was assessed by comparing pre-treatment hearing and vestibular function with post-treatment values. Cochleovestibular histology was evaluated. **Results:** In vitro: Observed controlled release of gentamicin over 4 days. In vivo: At six weeks post-treatment mice had significantly elevated hearing thresholds at 24 and 32kHz and exhibited behavior consistent with vestibular weakness. These findings suggest that focal lesions were induced in the mouse labyrinth; this was correlated with hair cell destruction on histology. **Conclusions:** CGP-hydrogel is capable of controlled and sustained delivery of gentamicin to the inner ear. Further refinement of this system may allow for hearing preservation with concurrent vestibular attenuation.

67. Treatment Outcomes for Temporal Bone Squamous Cell Carcinoma

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W. Patrick Devine, MD, San Francisco, CA
Tarik Tihan, MD PhD, San Francisco, CA
Ivan H. El-Sayed, MD, San Francisco, CA
Lawrence R. Lustig, MD PhD, San Francisco, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to identify the common presenting symptoms and signs of squamous cell carcinoma of the temporal bone and understand the current staging system as it relates to treatment options and prognosis.

Objectives: To review the experience of one tertiary referral center with temporal bone squamous cell carcinoma (TBSCC) over a 15 year period. **Study Design:** Retrospective case series. **Methods:** Thirty-two patients with TBSCC were reviewed. Data on demographics, clinical presentation, staging using the University of Pittsburgh system, surgical approach, adjuvant therapies, and survival outcomes are reported. Original pathology was reexamined to confirm staging. **Results:** The majority of patients (78%) underwent lateral temporal bone resection with subtotal temporal bone resection reserved for the most advanced stage tumors (13%). One case of sleeve resection with simple mastoidectomy was performed for early stage disease. No total temporal bone resections for advanced disease were identified. Detailed pathological review led to upstaging from T1 to T2 on the basis of bony erosion in one patient and confirmed staging for all others. Four of four patients (100%) with stage I tumors survived two years. Two year survival for stage II tumors was also favorable (3 of 4, 75%), with one patient dying from unrelated cerebrovascular disease at 11 months. The single stage III patient lived only 9 months after surgery. The two year survival for stage IV tumors, the majority of cases, was 37.5%. **Conclusions:** TBSCC remains a challenging disease for otolaryngologists to treat effectively. Survival decreases precipitously with full thickness involvement of the external auditory canal, the distinction between stage II and III disease. Diagnosis at an early stage and prompt referral offer the best hope of improving outcomes for treatment of this rare but aggressive malignancy.

68. Proximal Symphalangism (SYM1): A Cause of Stapes Fixation

Eric W. Sargent, MD, Farmington Hills, MI

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand the presentation of symphalangism and stapes ankylosis; and 2) recognize the spectrum of abnormalities caused by mutations of the NOG gene.

Objectives: This report reviews a case of proximal symphalangism and bilateral congenital conductive hearing loss caused by stapes ankylosis. **Study Design:** Case report and literature review. **Methods:** Setting: Office and operating room. Intervention: Stapes mobilization and stapedectomy. Outcome Measurements: Pre- and postoperative audiogram. **Results:** A 5 year old boy presented with severe bilateral conductive hearing losses for which he wore bilateral hearing aids. Other skeletal abnormalities included bilateral talo-navicular coalition and bilateral wrist and interphalangeal joint coalitions. Temporal bone CT was normal. With amplification his school performance was satisfactory. However, because of his joint abnormalities he could not manipulate his hearing aids, and at age 6 he and his family desired surgical treatment of his hearing loss. Middle ear exploration by another surgeon with attempted stapes mobilization was unsuccessful. At age 8 he underwent successful small fenestram stapedotomy with laser. Complete resolution of the conductive hearing loss was achieved. At surgery he was found to have the following middle ear abnormalities: ankylosis of the stapes without changes of otosclerosis, otherwise normal ossicular mobility, a bulbous lenticular process, and slightly widened incus-footplate distance (4.75mm). **Conclusions:** Although symphalangism is a rare cause of congenital conductive hearing loss caused by mutation of the NOG gene, it should be considered in such cases since peripheral skeletal abnormalities may be subtle. It is possible that cases of isolated congenital ossicular fixation may represent a forme fruste.

69. Ear Canal Exostoses: The Relationship between Surfing Footedness and Asymmetric Growth Severity

Jack A. Shohet, MD, Newport Beach, CA
Carolyn Nagel Lyn, MPAS, Newport Beach, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain that there is a relationship between surfing footedness and the severity of ear canal exostoses.

Objectives: The objectives of this study were: 1) to determine if there is a relationship between surfing footedness and the growth of exostoses between ears; and 2) to examine possible factors that play a role in the pattern of exostoses growth in southern California surfers. **Study Design:** Twenty-nine male southern California surfers, ages 16-61 years old, with bilateral exostoses growth were included in the study. The average amount of obstruction was 88.6% among subjects. Forty-eight percent of the surfing subjects were regular foot and 51% were goofy foot. All subjects were otologic patients seeking surgical management of their exostoses. **Methods:** Ear canals were examined under binocular microscopy by an experienced otologist and assigned a quantitative percentage of obstruction from 0 to 100%. Surfing footedness was obtained by direct patient interview. **Results:** There was a significant relationship between

the more severely affected ear and surfing foot stance ($P < 0.01$). **Conclusions:** Our research suggests that the ear toward the back of the surfboard becomes obstructed with exostoses more rapidly than the forward facing ear. In the southern California area these asymmetric changes may be due to the onshore wind patterns which more directly affect the growth of exostoses in the rear facing ear while surfing.

70. The Effects of Sound Conditioning on Gentamicin Induced Vestibulocochlear Toxicity in Gerbils

Amar C. Suryadevara, MD, Syracuse, NY
Hayes H. Wanamaker, MD, Syracuse, NY
Adam K. Pack, PhD, Utica, NY

Educational Objective: Despite its relative vestibular selectivity, varying degrees of sensorineural hearing loss can occur with transtympanic gentamicin usage. At the conclusion of this presentation, the participants should be able to demonstrate how sound conditioning may attenuate cochlear hair cell loss caused by gentamicin in an animal model.

Objectives: Recent studies in animal models have shown via physiologic and histologic measures that administration of exogenous antioxidants is protective against gentamicin induced oto-vestibulo toxicity. In addition studies have also shown that sound conditioning increases cochlear antioxidants. Our study looks to see if sound conditioning provides cochlear and/or vestibular protection against gentamicin. **Study Design:** Prospective animal study. **Methods:** Three month old gerbils were divided into 3 groups. The gerbils in group A were sound conditioned only ($n=3$). In group B the animals received gentamicin on the round window ($n=2$). Group C's gerbils were sound conditioned first and later received gentamicin to the round window ($n=2$). The animals were ultimately sacrificed and their right cochlea and posterior crista ampullaris processed and sectioned. They were analyzed for inner and outer hair cell loss (IHCs, OHCs) and vestibular supporting and sensory hair cell nuclei per micrometer of basal lamina. **Results:** The sound conditioned group (A) had no loss of cochlear hair cells. The gerbils treated with gentamicin only (B) had a 34% reduction of OHCs and 49% reduction of IHCs. The sound conditioned and gentamicin treated group (C) had a 5.5% decrease in OHCs and 12% decrease in IHCs. There were no trends or significant differences with regards to supporting nuclei within the posterior crista across all groups. Finally the gerbils in groups B and C did have a 23 to 42% decrease in the number of sensory nuclei per micrometer of basal lamina compared to group A. **Conclusions:** Sound conditioning does appear to attenuate the effects of gentamicin on the cochlea while not significantly altering its vestibulotoxicity. An upregulation of cochlear specific antioxidants is believed to be an important factor. As we did have a small sample size, we can only note trends in the data, but future studies with more animals and measurements of antioxidant levels after sound conditioning would be useful.

71. Silent Otitis Media with Normal Appearing Tympanic Membrane: Human Temporal Bone Study

Yukie Suzuki, MD, Fukushima, Japan
Hiroshi Ogawa, MD, Fukushima, Japan
Teruhisa Suzuki, MD, Fukushima, Japan
Koichi Omori, MD, Fukushima, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to explore the relationship between residual inflammation in the middle ear cavity and the development of mastoid based on the histopathological examination of human temporal bone.

Objectives: Silent otitis media with inflammation changes in the middle ear cavity was reported by Paparella based on the histopathological examination of temporal bones with an intact membrane (1980). In patients with a well pneumatized mastoid there were possible residual otitis media even if the tympanic membrane appeared normal. Histopathological examinations of human temporal bones are required for further understanding of silent otitis media. This study aimed to explore the relationship between residual inflammation in the middle ear cavity and the development of mastoid based on the histopathological examination of human temporal bone. **Study Design:** Temporal bone histopathological study. **Methods:** This study included 395 human temporal bones with an intact tympanic membrane. Histopathological findings of inflammatory localization and severity were examined in the middle ear cavity. We explored the relationship between residual inflammation and the development of mastoid. **Results:** Specimens were 344 temporal bones with a well pneumatized mastoid and 51 with a poorly pneumatized mastoid. Inflammatory findings were noted in 119 (34.6%) bones in the well pneumatized and in 9 (17.6%) in the poorly pneumatized group. In well pneumatized mastoids chronic inflammatory findings were frequently observed at the lower portion of the mastoid cells, the round window niche, and the tympanic sinus. In contrast no such inflammatory findings were noted in the poorly pneumatized mastoids. **Conclusions:** Our findings indicate that an intact tympanic membrane does not guarantee freedom from mastoid inflammation especially when the mastoid is well pneumatized. It is important to examine silent otitis media in patients with a well pneumatized mastoid even if the tympanic membrane appears normal.

72. Bilateral Profound Sensorineural Hearing Loss as the Initial Presenting Symptom from Chronic Myelogenous Leukemia

Ravi S. Swamy, MD MPH, Stanford, CA
Holbrook E. Kohrt, MD, Stanford, CA

Nancy Fischbein, MD, Stanford, CA
Nikolas H. Blevins, MD, Stanford, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the pathophysiology of this patient's hearing loss through clinical history and interesting radiographic evidence.

Objectives: To describe a very rare and interesting case of a patient with bilateral sudden sensorineural hearing loss. **Study Design:** Case report. **Methods:** The patient's clinical course will be described in detail and include audiograms and images from an MRI. **Results:** The patient presented with bilateral profound hearing loss documented by audiograms. A CBC revealed a leukocytosis of 75,000. The patient was started in systemic corticosteroid therapy and an MRI was completed. The MRI showed a high T1 weighted signal and low T2 weighted signal within the right and left cochlea and vestibular canals indicative of hemorrhage. **Conclusions:** This is a very interesting case of a patient with CML whose initial manifestation was bilateral hearing loss. This case report documents radiographic evidence for the loss. A review of the literature did show similar case reports, however, this is the first case report to describe bilateral hearing loss with radiographic evidence illustrating the pathophysiology.

73. Conductive Hearing Loss from Self-Induced Digital Manipulation of the External Auditory Canal

Elizabeth H. Toh, MD, Pittsburgh, PA
Barry E. Hirsch, MD, Pittsburgh, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential causes of conductive hearing loss resulting from digital manipulation of the ear canal in the setting of an intact tympanic membrane and discuss management options for these conditions.

Objectives: Finger manipulation of the external auditory canal alone rarely results in any clinically significant trauma to the hearing conduction mechanism. However, rapid removal of the finger from the canal may produce a large negative pressure on the tympanic membrane, resulting in distortion of the tympanic membrane structure, disruption of the ossicular chain or perilymph fistulae. This report describes two cases of conductive hearing loss resulting from digital manipulation of the ear canal and management of these injuries. **Study Design:** Case reports from a tertiary care academic practice and literature review. **Methods:** Two patients presented with sudden hearing loss and tinnitus after digital manipulation of the ear canal in an attempt to remove cerumen. In both cases, a small conductive hearing loss and a highly compliant type A tympanogram were demonstrated. Careful pneumatic otoscopy revealed a malleus handle fracture in one case. In the second case, the intact tympanic membrane was centrally stretched and no ossicular disruption was detected on pneumatic otoscopy and high-resolution CT imaging of the temporal bone. An extensive review of the literature revealed 4 reports of traumatic conductive hearing loss resulting from digital manipulation of the ear canal. In all 4 cases, a fracture of the malleus handle was diagnosed clinically and surgical repair was successful in 3 of the 4 cases. **Results:** In the case of the malleus handle fracture surgical exploration confirmed the diagnosis. Hearing was successfully restored by ossicular chain reconstruction using incus interposition. Postoperative audiometric testing demonstrated complete air bone gap closure and hearing remained stable for 5 years. Surgical management options for malleus handle fractures are reviewed. In the second case a paper patch was placed over the centrally distorted tympanic membrane. This resulted in subjective hearing improvement for 6 weeks. **Conclusions:** Digital manipulation of the external auditory canal may result in otitic barotrauma. While inner ear trauma resulting from this mechanism of injury is unlikely, fracture of the malleus handle with resultant conductive hearing loss has been reported in the past. Surgical options for hearing restoration in such cases include fracture immobilization, malleus-to-incus interposition grafting, incus interposition and fracture repair with bone cement. Distortion of the normal tympanic membrane anatomy without perforation may also cause a clinically significant conductive hearing loss. Consideration may be given to grafting the abnormal tympanic membrane segment if surgical treatment is desired. Careful pneumomassage using a Siegle speculum under binocular microscopy is critical in diagnosing injuries to the tympanic membrane and malleus when the tympanic membrane is grossly intact.

74. Nobel Therapeutic Device for Otitis Media with Effusion

Hiroo Umeda, Kyoto, Japan
Shin-Ichi Kanemaru, MD PhD, Kyoto, Japan
Masaru Yamashita, MD PhD, Kyoto, Japan
Atsushi Suehiro, MD, Kyoto, Japan
Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the existence of a new, easy and reasonable device for myringotomy tube (MT) insertion.

Objectives: To introduce the new therapeutic device for OME. Myringotomy tube (MT) insertion is well known therapy for otitis media with effusion (OME). A conventional procedure of the tube insertion consists of the following three steps. First an incision is made in the ear drum under anesthesia. Secondly fluid in the middle ear is removed by a suction instrument through the incision. At last a MT is attached into tympanic membrane by ear forceps and/or an exploratory needle. Therefore three or four instruments are needed in turn

to perform the above procedures. We sought a method to shorten the processes and the operation time. **Study Design:** A report for a new procedure and a device. **Methods:** The new device has the property to integrate all the mentioned treatments within the one action. A prototype is composed of two pieces. One is converted from an injection needle. At the adequate position a flange is added to the needle in order to keep a MT near the edge of the needle. The other is the connecting duct between the needle and a suction tube with a side hole. This is for being handled easily and controlling the suction pressure manually by closing the side hole. Manipulation of this device was checked by using the normal eardrum of adult beagle dogs. **Results:** The trials proved that this device made it possible to attach the MT in one action. **Conclusions:** Nobel therapeutic device for OME was invented and introduced as a prototype. This device may be useful to reduce the operating time and the complicated procedures of MT insertion.

75. Intracranial Complications of Otitis Media in Children

Jose P. Zevallos, MD, Houston, TX

John S. Oghalai, MD, Houston, TX

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the diagnosis and management of otogenic intracranial complications in children. Specifically, participants should be able to discuss surgical drainage of intracranial infection via the transtemporal craniotomy approach. Participants should also be able to explain the potential role of antibiotic resistance on the development of otogenic intracranial complications.

Objectives: To review the diagnosis and management of otogenic intracranial complications and to assess trends in antibiotic resistance associated with these complications. **Study Design:** Retrospective chart review. **Methods:** A retrospective chart review was conducted of patients with otogenic intracranial complications at a tertiary care pediatric hospital over four years. **Results:** Twelve patients were included in this study. The average age was 5 years. Ten patients had acute otitis media, 1 had chronic otitis media, and 1 had cholesteatoma. Five patients had multiple intracranial complications. Overall, the intracranial complications included epidural abscess (7), sigmoid sinus thrombosis (5), subdural empyema (2), meningitis (2), cavernous sinus phlebitis (2), and otitic hydrocephalus (1). Surgical drainage via a transtemporal craniotomy was performed in all cases in addition to long-term intravenous antibiotics. All patients were cured of their disease. Forty percent of intracranial cultures yielded no growth, and multidrug resistant organisms were found in 40% of cases. Importantly 60% of patients were seen by a physician in the week preceding admission and treated with oral antibiotics. All patients had been diagnosed with otitis media in the month prior to the development of a complication. **Conclusions:** This study demonstrates that intracranial complications of otitis media arise despite adequate access to care and that antibiotic resistance may play a role. A high index of suspicion is necessary when evaluating patients with otitis media refractory to antibiotic therapy, and the possibility of multiple simultaneous intracranial complications must be addressed. The transtemporal craniotomy is an effective approach to surgical drainage of otogenic intracranial infections.

SINUS & LARYNGOLOGY

76. Anatomical Variation between the Female and Male Larynx

Karen M. Bellapianta, MD, Albany, NY

Lisa T. Galati, MD, Albany, NY

Stanley M. Shapshay, MD, Albany, NY*

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the main anatomic differences between the female and male larynx at the level of the true vocal cords and understand the importance of knowing these differences with regards to percutaneous injection laryngoplasty.

Objectives: Define the anatomical differences between the female and male larynx at the level of the true vocal cords in order to better perfect transthyroid cartilage (TTC) percutaneous injection technique. **Study Design:** Retrospective review of CT imaging and human cadaveric study. **Methods:** A database of CTA of the neck was reviewed measuring larynges of 30 males and 30 females. Thyroid angle, length of the true vocal cords, and depth of the thyroid cartilage were measured. An anterior, percutaneous TTC approach was performed on six cadaveric larynges. Needle tip position was confirmed by direct visualization. **Results:** The angle of the thyroid cartilage at the true vocal cord level was a mean of 107° for females and 77° for males. The length of the thyroid cartilage was 31mm (R) and 30.65mm (L) for females, 40.96mm (R) and 40.94mm (L) for males. The length of the true vocal cords was 17.32mm (R) and 17.03mm (L) for females, 23.16mm (R) and 23.19mm (L) for males. All differences between males and females were statistically significant ($p < 0.001$). In the cadaveric larynx the average ideal angle of trajectory for the percutaneous TTC injection with respect to the thyroid cartilage was 45° for males and 65° for females. **Conclusions:** Vocal fold augmentation is reliant on intimate knowledge of laryngeal anatomy. The increase in size of the male larynx and paraglottic space implies a greater amount of injection material may be needed to appropriately augment a vocal cord. The male larynx also requires a more acute angle of TTC injection for appropriate needle placement.

77. Conceptualization and Development of Novel Surgical Techniques for Correction of Glottic Insufficiency: The Thyroid Ala Perichondrial Flap (TAP) and Composite Thyroid Ala Perichondrial Flap (C-TAP)

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Nathan V. Welham, PhD, Madison, WI
Seong H. Choi, MD, Madison, WI
Charles N. Ford, MD*, Madison, WI
Diane M. Bless, PhD, Madison, WI

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) understand what the TAP and C-TAP techniques entail; and 2) what the major limiting problems are in the surgical management of glottic insufficiency.

Objectives: Approaches for surgical management of glottic insufficiency are limited by durability, implant rejection and cost. Our objectives are to describe two novel tissue flaps (TAP and C-TAP) designed for surgical management of glottic insufficiency and to present anatomic measurements that evaluate their potential applications. The flaps are harvested from autologous thyroid ala perichondrium with (C-TAP) or without (TAP) contiguous pre-epiglottic space fascia and fat. These flaps retain intact blood supply and can be easily placed into the lamina propria or more laterally in the paraglottic space, depending on the cause of glottic insufficiency. Many applications may be possible. **Study Design:** Cadaveric, anatomic. **Methods:** With IRB approval six adult cadaveric larynges were dissected and the two flaps developed and described. The distance from a minityrotomy ostium to the ipsilateral vocal process was noted in each larynx. This distance was compared to the tissue flap lengths available for placement into the vocal fold. The three dimensional volume of the tissue flaps was documented using water displacement. **Results:** TAP and C-TAP were easily harvested in all cases. Both TAP and C-TAP were longer than the distance needed to medialize the musculomembranous vocal fold. The volume of the TAP is approximately that of the lamina propria while the volume of the C-TAP is substantially larger and can be tailored to paraglottic space defects. **Conclusions:** TAP and C-TAP are promising soft tissue flaps for correction of glottic insufficiency as they are autologous, easily harvested, low cost, and possess an intrinsic blood supply. They could be placed into the lamina propria or into the deeper paraglottic space.

78. Unusual Findings in Our Series of Fibrous Dysplasia of the Paranasal Sinuses

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Mansoor Mirfakhree, MD, Shreveport, LA
Jianxiung R. Bao, MD PhD, Shreveport, LA
Cherie-Ann O. Nathan, MD*, Shreveport, LA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the unusual findings and management in a series of patients with fibrous dysplasia (FD) of the paranasal sinuses.

Objectives: Review the unusual findings and management in a series of patients with fibrous dysplasia (FD) of the paranasal sinuses. **Study Design:** Retrospective review of a clinical case series. **Methods:** Medical records of patients referred to the senior author during the last 3 years with a diagnosis of FD of the paranasal sinuses were reviewed. **Results:** There were 3 females and 2 males with a mean age at presentation of 52 years (range 39-69 yo). Presenting symptoms included sinus related complaints, blurry vision, facial pain or asymmetry, with chronic headaches the most frequent feature (4/5 patients). Sphenoid sinus was the most common site (4/5 patients). Four patients had monostotic FD (3 sphenoid, 1 maxilla); one had polyostotic type (maxilla, sphenoid, ethmoid and calvarium). One individual had endocrinopathies not typical of McCune Albright syndrome (IDDM, Addison's disease). Characteristic radiographic findings included abnormally thickened bone, "ground glass" appearance, and sclerotic sinus walls. 2 cases required extensive resections. 3 patients underwent FESS for treatment of sinus disease including one patient with recurrent ethmoid mucocele. One patient with history of estrogen therapy for male to female transsexual change had focal fibrosarcoma arising from FD with stable PET/CT findings at one year following a debulking procedure. All have shown improvement in headaches and sinus related complaints. **Conclusions:** FD is an uncommon, benign bone disorder that typically manifests at an early age. We report a series of older patients (mean=52 yo) with predominantly sphenoid sinus involvement. Headaches were the most common feature. In majority of cases endoscopic decompression with close followup is sufficient.

79. Sinus CT Findings in Patients with Bronchiectasis

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Todd T. Kingdom, MD, Aurora, CO

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the potential link between chronic sinusitis and bronchiectasis.

Objectives: To explore the association between bronchiectasis and sinus mucosal disease based on computed tomography (CT).

Study Design: Retrospective review of a medical information database from a tertiary referral medical center. **Methods:** Study and control groups consisted of consecutive patients with diagnoses of bronchiectasis (n=110) and allergic rhinitis (n=122) respectively. All patients had sinus CT imaging available for review. The Lund-MacKay scoring system was used to grade the extent of sinus mucosal disease by CT scan, and mean Lund-MacKay scores were compared between groups. In addition we searched for objective clinical data which might predict the severity of sinus disease among bronchiectasis patients. These clinical data included pulmonary function test results, acid-fast bacilli (AFB) smear/culture data, cystic fibrosis (CF) genotype, and quantitative alpha 1-antitrypsin levels. **Results:** Mean Lund-MacKay scores were higher in the bronchiectasis group compared to the allergic rhinitis group (7.56 vs. 6.43, p=0.03). Lund-MacKay scores among bronchiectasis patients did not correlate with % predicted FEF25-75 (r2=0.00), % predicted FEV1:FVC (r2=0.00), or alpha 1-antitrypsin levels (r2=0.08). The differences in mean Lund-MacKay scores were not statistically significant between bronchiectasis patients who were carriers (6.50) vs. non-carriers (7.57) of CF mutations (p=0.49), or between bronchiectasis patients with a history of positive (7.23) vs. negative (7.65) AFB smear/culture (p=0.74). **Conclusions:** A diagnosis of bronchiectasis predicts more extensive CT evidence of sinus mucosal disease when compared to patients with allergic rhinitis. A search for objective clinical data which might predict severity of sinus CT findings among bronchiectasis patients did not yield significant correlations.

80. Minimal Bioavailability of Aerosolized Tobramycin in the Sinonasal Tract: A Safer Approach to Administration of Aminoglycosides for Sinusitis Exacerbations and Persistence in Patients Post-Endoscopic Sinus Surgery

David Greene, MD, Naples, FL

Educational Objective: At the conclusion of this presentation, the participants should be able to demonstrate the safety of nebulized tobramycin in the treatment of sinus infections in patients with a history of sinus surgery.

Objectives: Sinus infections post sinus surgery constitutes a major challenge in rhinology. Prior studies suggest that nebulized antibiotics constitute an effective treatment for these infections. Potentially toxic agents such as amphotericin B have been used topically in the sinuses for years. However the safety of these nebulized agents have not been adequately studied. The present study objectively assesses the safety of tobramycin nebulization using measurement of peak and trough blood levels (Aerosol Science Laboratories, Inc., Camarillo, CA). **Study Design:** Retrospective chart review. **Methods:** 17 chronic sinusitis patients with history of endoscopic sinus surgery, presenting with acute infection and failing oral medications, underwent endoscopy with cultures and CT scans and met established diagnostic criteria for CRS. The patients underwent a 21 day course of tobramycin, 125 mg TID, aerosolized to a particle size of 3.1 microns for specific deposition in the sinuses (Aerosol Science Laboratories, Inc., Camarillo, CA). Tobramycin peaks and troughs were obtained 30 minutes before and 1 hour after nebulization and compared to expected levels with intravenous administration and known data regarding toxicity. **Results:** Age ranged from 27 to 71 with a mean of 55 years old. 11 men and 6 women were included. 13 completed tobramycin peak and trough: the average peak was 0.28 +/- 0.2 SD and the average trough was < 0.15. These levels are well below the normal peak blood levels of 5-10 mcg/ml for IV therapy and troughs below 1 mcg/ml. These data demonstrate minimal bioavailability, and no risk of toxicity (which begins at a peak of 10 mcg/ml, and at a trough of 2 mcg/ml). **Conclusions:** Nebulized tobramycin (Aerosol Science Laboratories, Inc., Camarillo, CA) is present in only minimal amounts in the blood, far below the levels produced by IV administration and nowhere near toxicity. Favorable post-treatment outcomes are consistent with effectiveness; however, further study will be needed to establish this definitively.

81. Preoperative Magnetic Resonance Imaging Protocol for Endoscopic Cranial Base Image Guided Surgery

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Pamela Van Tassel, MD, Philadelphia, PA

James J. Evans, MD, Philadelphia, PA

Marc R. Rosen, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the rationale for developing a protocol for magnetic resonance imaging of cranial base lesions. Additionally participants should be able to identify sequences that are best suited for imaging of anterior cranial base lesions.

Objectives: Despite the increasing utilization of image guided surgery, no radiology protocols for obtaining magnetic resonance imaging of adequate quality are available in the current literature. At our institution over 300 endonasal cranial base procedures including pituitary, extended pituitary, and other anterior skull base procedures have been performed in the past 3 years. In order to facilitate and optimize preoperative evaluation and assessment, there was a need to develop a magnetic resonance protocol. **Study Design:** Retrospective technical assessment. **Methods:** Through a collaborative effort between the otolaryngology, neurosurgery, and neuroradiology departments at our institution, a skull base magnetic resonance (MR) image guided (IGS) protocol was developed with several ends in mind. First it was necessary to generate diagnostic images useful for the more frequently seen pathologies in order to improve workflow and limit the expense and inefficiency of case specific MR studies. Secondly it was necessary to generate sequences useful for IGS, preferably using sequences that best highlight that lesion. Currently at our institution all MR images used for IGS are obtained using this protocol as part of preoperative planning. **Results:** The protocol that has been developed allows for thin cut pre- and post-contrast axial cuts which can be used to plan intraoperative image guidance. It also obtains a thin cut T2 axial series which can be com-

piled separately for intraoperative imaging or may be fused with CT images for combined modality. **Conclusions:** The outlined protocol obtains image sequences effective for diagnostic and operative purposes for image guided surgery using both T1 and T2 sequences.

82. Alterations in Olfactory Receptor Gene Expression with Aging

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Radhika A. Vaishnav, PhD, Lexington, KY
Matthew A. Hersh, MA, Lexington, KY

Educational Objective: At the conclusion of this presentation, participants should be able to discuss the age related changes in olfactory epithelium as well as the changes in olfactory receptor gene expression that may account for these phenomena.

Objectives: It has been demonstrated that age related changes occur in the olfactory epithelium, specifically olfactory receptor neuron loss, as well as oxidative changes to proteins that are thought to account for decreased olfactory function in the elderly. This study examines gene expression to help reveal the mechanisms responsible for the age related decrease in the olfactory receptor field. **Study Design:** Microarray analysis of gene expression levels in a murine model. **Methods:** Olfactory epithelia from euthanized mice in 3 age cohorts (1.5, 6.0, and 20 months) were immediately microdissected and snap frozen in liquid nitrogen. Total mRNA from 3 animals in each age cohort was isolated and hybridized on separate Affymetrix Whole Mouse Gene Chips. Only those genes which met detection threshold criteria were included in the statistical analysis to identify significantly regulated genes. **Results:** Based on the set threshold levels 21,891 genes were identified as being clearly present on all gene chips and available for comparison, 41 of which were olfactory receptor (Olfr) genes. Statistical analysis identified seven olfactory receptor (Olfr) genes that had a significant ($p < 0.01$) difference in their mean expression levels among the three age cohorts, all demonstrating a systematic downregulation as a function of aging. **Conclusions:** There is an age dependent downregulation of olfactory receptor genes. Correlation of these changes to a decrease in the number of olfactory receptor neurons and the role of oxidative stress in this process require further study.

83. Endoscopic Transnasal Craniotomy for the Resection of Craniopharyngioma

Richard J. Harvey, MD, Charleston, SC
Aldo C. Stamm, MD PhD, Sao Paulo, Brazil
Eduardo A. Vellutini, MD, Sao Paulo, Brazil
João F. Flávio, MD, Sao Paulo, Brazil
Diego R. Hermann, MD, Sao Paulo, Brazil

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the current surgical management in endoscopic resection of large craniopharyngioma and its reconstruction from an institution with extensive endoscopic skull base experience.

Objectives: Describe the outcomes and utility of a large transnasal craniotomy and its reconstruction in the surgical management of a uniform group of patients with craniopharyngioma. **Study Design:** Observational retrospective cohort. **Methods:** Retrospective review of patients treated in an academic neurosurgical/rhinological service between 2000 and 2007. Patient factors (age, gender, followup), tumor factors (size, position extension, previous surgery), type of repair (pedicled mucosal flaps, free mucosal grafts) and outcomes (visual, endocrine and surgical morbidity) were defined and sought in patients having an entirely endoscopic resection of extensive craniopharyngioma (defined as requiring removal of the planum sphenoidale in addition to sella exposure in their approach). **Results:** Seven patients had an entirely endoscopic resection of extensive craniopharyngioma during the study period. Mean age was 23.4years (SD±16.3). Mean tumor size was 3.2cm (SD±2.0). The majority of these pathologies had extensive suprasellar disease and two (28.6%) had ventricular disease. CSF leak rate was 29% (2/7). These leaks occurred only in reconstructions with free mucosal grafts. There were no CSF leaks in those patients who had vascularized pedicled septal flap repairs. **Conclusions:** The endoscopic management of large craniopharyngioma emphasizes the recent advancements in endoscopic skull base surgery. The ability to provide exposure through a large (4cm+) transnasal craniotomy, near-field assessment of neurovascular structures and the successful reconstruction of a large skull defect have significantly advanced the field in the past decade. The use of a two surgeon approach and bilateral pedicled septal mucosal flaps has greatly enhanced the reliability of this approach.

84. Utility of Contrast Enhanced CT and MR Imaging for Acute Invasive Fungal Sinusitis

Jason P. Hunt, MD, Salt Lake City, UT
Frank M. Warren, MD, Salt Lake City, UT
H. Christian Davidson, MD, Salt Lake City, UT
Richard H. Wiggins, MD, Salt Lake City, UT
H. Ric Harnsberger, MD, Salt Lake City, UT

Educational Objective: At the conclusion of this presentation, the participants should be able to explain contrast enhancement characteristics of invasive fungal sinusitis so that diagnosis and surgical planning may be improved.

Objectives: To determine the utility of contrast enhanced computed tomographic (CT) and magnetic resonance (MR) imaging in patients with acute invasive fungal sinusitis (IFS) with relation to diagnosis and surgical planning. **Study Design:** A retrospective review of patients with invasive fungal sinusitis and related imaging characteristics. **Methods:** A retrospective review was performed of five patients with IFS who were evaluated with contrast enhanced CT and/or MR. The images were evaluated by a neuroradiologist and otolaryngologist with respect to pattern of enhancement and extent of disease. These findings were correlated with intraoperative findings. **Results:** Four of five patients were found to have decreased enhancement in the area of fungal invasion. The fifth patient's images were confounded by recent surgical debridement. In two patients surgical extent of disease was accurately predicted by the relative lack of enhancement of mucosal tissues involved by IFS. **Conclusions:** Contrast enhanced CT or MR is helpful in the evaluation of individuals suspected of harboring IFS. The relative lack of enhancement of infected tissues can be utilized to predict the diagnosis of IFS and assist in planning the extent of surgical debridement. However biopsy remains the gold standard in diagnosis.

85. Regeneration of Canine Larynx Using Tissue Engineered Composit Scaffold with Fascia Lata

Yoshiharu Kitani, Kyoto, Japan

Shin-Ichi Kanemaru, MD PhD, Kyoto, Japan

Hiroo Umeda, MD, Kyoto, Japan

Atsushi Suehiro, MD, Kyoto, Japan

Yo Kishimoto, MD, Kyoto, Japan

Juichi Ito, MD PhD, Kyoto, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize the availability of the composit scaffold for the regeneration of larynx and discuss the efficacy of the scaffold, wrapped with autologous fascia, against infection. The use of our composit scaffold for the defect of larynx may make it possible to reduce the disorder of phonation.

Objectives: To examine the availability of laryngeal regeneration using fascia lata wrapped composit scaffold. In early stage of laryngeal cancer it is treated with radiation therapy or laser excision. But sometimes an additional surgical excision is needed because of radiation failure or recurrence. The defect of larynx is usually reconstructed by local flaps, artificial materials, and so on. However no ideal treatment has been found. Our group has reported tissue engineered laryngeal regeneration using a composit scaffold: polypropylene mesh with collagen sponge. But there were some problems such as infection and outflow of the scaffold. So to prevent these issues scaffold was wrapped with autologous fascia lata. **Study Design:** In vivo animal study. **Methods:** Six adult beagle dogs were used. A left partial hemilaryngectomy was performed on each dog. The defect size was about 1.8 cm × 1.0 cm. The sheet of polypropylene mesh coated with collagen sponges was prepared. In operation the scaffold was preclotted with arterial blood and trimmed to fit on the defect size. This scaffold was wrapped with fascia lata harvested from left thigh. It was anastomosed with 3-0 absorbable sutures. Fiberscopic examinations periodically and histological examination were performed. **Results:** In 4 of 6 cases we observed the good epithelialization at the operated site and there were no major troubles. **Conclusions:** This study suggests that our composit scaffold, wrapped with autologous fascia, may be useful material for laryngeal regeneration. In the future we will plan to regenerate vocal folds simultaneously after this partial hemilaryngectomy model.

86. In-Office Transnasal Flexible Laryngoscopy with Biopsy: Outcomes and Safety

Tali Lando, MD, New York, NY

Sabrina Cukier-Blaj, MS, Sao Paulo, Brazil

Jonathan E. Aviv, MD, New York, NY*

Tom Murry, PhD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the utility and range of applications of in-office transnasal flexible laryngoscopy with biopsy and to demonstrate its efficacy and safety in obtaining pathologic diagnosis of lesions and avoiding general anesthesia.

Objectives: To study the safety and efficacy of in-office transnasal flexible laryngoscopy (TFL) with biopsy. **Study Design:** A prospective case series of patients undergoing in-office TFL by a single otolaryngologist between July 2004 and July 2007. **Methods:** Patients were scheduled for an in-office TFL with biopsy and video documentation. Specimens were analyzed using standard laboratory protocol to obtain a pathologic diagnosis. Data were analyzed for complications and pathologic consistency with operative specimens when applicable. **Results:** Sixty-five patients underwent 76 in-office procedures. Biopsies were successfully obtained at initial procedure in all patients except one. Repeat biopsies were necessary in ten patients because of recurrent pathology or ongoing clinical observation. From the total number of procedures biopsy specimens consisted of brush alone (15.8%), cup alone (34.2) or cup and brush biopsies (50%). Location of lesions ranged from palatal to base of tongue to various laryngeal subsites. The majority of lesions were benign and 14.5% were malignant. Twenty-four patients (37%) were subsequently taken to the operating room for direct laryngoscopy. The patho-

logic specimens obtained in the operating room were compared to the specimens from the in-office procedures. In 95% of cases the office and operative final diagnoses were in agreement. No major complications were recorded in the in-office procedures. Several patients had persistent gagging and two patients reported dysphonia at followup exam. **Conclusions:** TFL with biopsy is a safe, well tolerated and effective diagnostic procedure. This study demonstrates that benign pathology may be accurately identified without the need for operative biopsy and its incumbent risks.

87. Our Experience Using the Neodymium: Yttrium-Aluminum-Garnet (Nd:YAG) Laser to Treat Patients with Subglottic Stenosis

Douglas D. Leventhal, MD, Philadelphia, PA

Elizabeth A. Krebs, BS, Philadelphia, PA

Marc R. Rosen, MD, Philadelphia, PA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the pathophysiology of subglottic stenosis. The participants should also be able to discuss the various treatment modalities and understand the benefits of flexible laser bronchoscopy.

Objectives: We describe our technique of treating adult subglottic stenosis using the neodymium: yttrium-aluminum-garnet (Nd:YAG) laser through a flexible bronchoscope via a flexible fiberoptic delivery system. We discuss our experience and the efficacy of this treatment modality. **Study Design:** Description of clinical technique and retrospective chart review. **Methods:** A retrospective chart review was conducted of all patients with subglottic stenosis presenting to the senior surgeon for laser bronchoscopy from January 2000 to December 2006. Pre- and postoperative symptomatology, specifically dyspnea at rest, dyspnea on exertion, and stridor were assessed. Patients who initially required a tracheostomy tube were evaluated in terms of their progression towards decannulation. Intraoperative photographs were taken before and after the procedure. **Results:** Sixteen patients with subglottic stenosis that underwent one or more treatments with the Nd:YAG laser were identified. Seven patients had tracheostomy tubes at the start of laser bronchoscopy therapy. After serial treatments, four patients were able to be decannulated. None of the remaining nine patients required tracheostomy tubes during treatment. All patients had improvement in symptomatology following each laser treatment. Complications of the procedure were minimal. **Conclusions:** Nd:YAG laser bronchoscopy is a well tolerated and effective treatment for subglottic stenosis. Since the procedure is done under sedation and the patients are spontaneously breathing, laryngotracheal trauma caused by endotracheal intubation is avoided. This procedure can be extremely useful in motivated patients who are willing to undergo serial laser bronchoscopies as needed to achieve and maintain a patent airway.

88. The Initial Evaluation and Management of the Nonlethal Hanging Patient

Fred Y. Lin, MD, New York, NY

Madeleine R. Schaberg, MD MPH, New York, NY

George A. Agriantonis, MD, New York, NY

Edward J. Shin, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to have a clear understanding of the role of the otolaryngologist in the initial evaluation and management of near-hanging patients. By discussing a case series of patients who presented to our emergency room after suicide attempts by hanging, we offer an algorithm specific to the care of nonlethal hangings.

Objectives: To offer otolaryngologists a guideline for the evaluation and management of nonlethal hanging patients. **Study Design:** Retrospective chart review of all patients who presented to our level one trauma service with nonlethal hangings and were evaluated by the otolaryngology service between 2002 and 2007. **Methods:** A retrospective chart review was performed for 66 patients that presented with nonlethal hangings. 46 patients were evaluated by the otolaryngology service. These cases were reviewed for clinical presentation, diagnostic workup, findings on imaging and physical examination, treatment, and survival. **Results:** During the 5 year study period 46 cases of near hanging were evaluated by the otolaryngology service with 40 patients (86.9%) presenting with physical findings or pain. The most common physical exam findings were neck erythema (84.8%) and altered voice (26.1%). 43 patients (93.5%) were examined with flexible fiberoptic rhinolaryngoscopy and 36 patients underwent computed tomography (CT) or computed tomography with angiography (CT-A) of the neck. 9 (19.6%) of these patients had significant findings including glottic edema and decreased vocal cord mobility. The majority of cases (93.5%) were managed with observation alone while 3 (6.5%) cases necessitated intubation and 1 (2.2%) patient underwent a direct laryngoscopy in the operating room. **Conclusions:** The otolaryngology service is often consulted on patients presenting to emergency rooms with nonlethal hangings. Examination through a thorough history and physical exam as well as fiberoptic rhinolaryngoscopy and CT or CT-A when deemed necessary are vitally important. Although the majority of cases can be managed with observation alone, there is a low threshold for intubation and tracheostomy on patients with significant findings on exam. Herein we present an algorithm for the evaluation and management of these patients based on our experience at a level one trauma center.

89. Predictors of Olfactory Dysfunction in Patients with Chronic Rhinosinusitis

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Karen J. Fong, MD, San Ramon, CA

Jess C. Mace, MPH, Portland, OR
Susan E. Griest, MPH, Portland, OR
Kenneth E. James, PhD, Portland, OR
Timothy L. Smith, MD MPH*, Portland, OR

Educational Objective: At the conclusion of this presentation, the participants should be able to identify clinical characteristics associated with poor olfactory function in patients with chronic rhinosinusitis. Participants will also be able to compare the results of olfactory testing with other objective measures of chronic rhinosinusitis in this patient population.

Objectives: To measure the prevalence of olfactory dysfunction in a large cohort of patients with significant chronic rhinosinusitis (CRS). To identify clinical measures associated with poor olfactory function in this patient population. **Study Design:** Multi-institutional, cross-sectional analysis. **Methods:** An objective measure of olfactory dysfunction, the Smell Identification Test (SIT), demographic data, clinical factors and comorbidity data were collected from a cohort of 367 patients who presented with CRS at three tertiary care centers. Data was analyzed using univariate analysis and multivariate logistic regression models. **Results:** Sixty-four percent of men and women aged 18 to 64 had olfactory dysfunction whereas 95% of patients 65 years old or greater had olfactory dysfunction ($p < 0.001$); no significant difference was noted by gender. Patients with nasal polyposis (OR 2.4, 95% confidence interval (CI) 1.3, 4.2; $p = 0.003$) and patients over 65 years (OR 10.0, 95% CI 2.3, 43.7; $p = 0.002$) were more likely to have hyposmia than non-polyp patients or patients under 65 years. Patients with nasal polyposis (OR 13.2, 95% CI 5.7, 30.7; $p < 0.001$), asthma (OR 4.2, 95% CI 1.8, 9.8; $p = 0.001$), over 65 years old (OR 15.6, 95% CI 2.3, 104.9; $p = 0.005$), and/or current smokers (OR 7.6, 95% CI 1.8, 31.6; $p = 0.005$) were more likely to have anosmia than patients without polyps, non-asthmatics, those under 65 years old and nonsmokers. **Conclusions:** Olfactory dysfunction is common in patients with significant CRS. Age, nasal polyposis, smoking, and asthma were significantly associated with olfactory dysfunction in patients with CRS. Neither prior endoscopic sinus surgery nor a history of allergies was associated with olfactory dysfunction. Septal deviation and inferior turbinate hypertrophy were associated with normal olfactory function.

90. The Role of Intranasal Budesonide Irrigations in the Treatment of Chronic Hyperplastic Rhinosinusitis

Patricia A. Maeso, MD, Augusta, GA
John D. Prosser, BS, Augusta, GA
Subinoy Das, MD, Augusta, GA
Stilianos E. Kountakis, MD PhD*, Augusta, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to determine whether high dose intranasal budesonide irrigations (HDB) improve subjective and objective patient outcomes in chronic hyperplastic rhinosinusitis (CHRS).

Objectives: To correlate subjective and objective clinical parameters with the use of HDB and to correlate these parameters with the degree of tissue eosinophilia at presentation. **Study Design:** Analysis of prospectively collected data between 2003 and 2007 of 62 patients with CHRS who underwent endoscopic sinus surgery (ESS) and were treated with HDB. **Methods:** Patients with CHRS including non-eosinophilic chronic hyperplastic rhinosinusitis (NECHRS), eosinophilic chronic hyperplastic rhinosinusitis (ECHRS), allergic fungal sinusitis (AFS) and Samter's triad (ST) were stratified according degree of tissue eosinophilia at presentation into high degree (more than 5 per HPF) or low degree (less than 5 per HPF). All patients were placed on a regimen of HDB for at least 3 months. Pre- and post-treatment Sinonasal Outcome Test (SNOT)-20 and Kennedy-Lund endoscopy scores were obtained for all patients. **Results:** All subgroups of patients with CHRS showed statistically significant reductions in their post-treatment SNOT-20 and endoscopy scores. Patients with Samter's triad showed the most significant difference between pre and post SNOT-20 scores with a mean difference of 17.1. Endoscopy scores greatly improved in the AFS group with a difference of 2.6 between pre- and post-treatment endoscopy scores. A trend was observed in patients with a high degree of eosinophilia showing greater improvement in both SNOT-20 and endoscopy scores. **Conclusions:** HDB offer a valuable alternative to the standard medical management of patients with CHRS. This analysis may lead to earlier identification of patient groups that will benefit from this therapy and allow for more tailored medical management.

91. Office Management of Frontal Ostium Stenosis

Christopher T. Melroy, MD, Savannah, GA
Yvonne Chan, MD, Savannah, GA
Frederick A. Kuhn, MD*, Savannah, GA

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss methods to relieve postoperative frontal ostium stenosis. A management algorithm will be discussed and the participant should be able to compare the differences between office management and formal surgical management in the operating room.

Objectives: To report a new method of frontal ostium stenosis management and its outcomes. A secondary objective is to compare the cost difference between office and formal hospital surgical management. **Study Design:** Seven consecutive patients with frontal ostium stenosis in a tertiary rhinology practice were followed prospectively. **Methods:** All patients were treated with balloon catheter frontal sinusotomy and silastic frontal sinus stent placement in the office or operating room. Photodocumented nasal endoscopy and RSOM-31

questionnaires were collected before and after frontal ostium stenosis repair. The total charge to the patient for the procedure was also collected. **Results:** 3 patients were treated in the operating room; 4 patients were treated in the office under no or local anesthesia. Office management was tolerated by 3 of these 4 patients; one eventually required management under general anesthesia. All frontal sinuses were patent at their most recent followup (average 9.25 months). The average RSOM improved by 9 ($p < 0.05$). Billed charges (including hospital supplies, anesthesia charges, and O.R. time) were \$19,000 less for patients managed in the office compared to those in the operating room. **Conclusions:** Frontal sinus scarring with stenosis can be successfully treated with a balloon dilating catheter and stent placement. This procedure can be performed successfully in the office without anesthesia at a great cost savings.

92. A Case of Laryngeal Myxoma Presenting as Chronic Dysphonia: A Case Report and Review of the Literature

Daniel L. Monin, MD, Oakland, CA
Balaram Puligandla, MD, Oakland, CA
Raul M. Cruz, MD, Oakland, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to explain the common clinical presentations of laryngeal myxomas. Participants should also be able to explain the abnormal findings present in laryngeal videostroboscopy studies when a mass is present within the vocal fold. Participants should also be able to explain the proper treatment of laryngeal myxomas.

Objectives: To describe a case of a patient with a rare laryngeal myxoma presenting deep to the vocal ligament with review of the literature. **Study Design:** Single case report with review of 9 cases of laryngeal myxoma previously reported in the literature. **Methods:** Case report. **Results:** We report a rare case of laryngeal myxoma in an otherwise healthy 60 year old male that presented as chronic dysphonia unresponsive to antireflux therapy. Laryngeal videostroboscopy (LVS) showed a mass within the right true vocal fold that disrupted normal vocal fold vibratory patterns. The lesion was noted to be deep to the vocal ligament and was debulked using an external thyrotomy approach in order to preserve vocal function. The patient had immediate improvement in his voice following the procedure, but reports a slow return of progressive hoarseness that fatigues with daily use. LVS performed 18 months postoperatively reveals a persistent erythemic right vocal fold with slow progression of mass effect and stiffness. Additional surgery is being considered if function continues to worsen. **Conclusions:** Laryngeal videostroboscopy can be an instrumental tool in the identification of tumors presenting deep to the vocal fold. Incomplete excision of myxomatous lesions can result in recurrence; however, in the larynx this concern must be balanced with an attempt to preserve vocal function.

93. Tracheal Rupture in a Child Caused by Vomiting

Thomas C. Mullis, MD, Jackson, MS
Jeffrey D. Carron, MD, Jackson, MS

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the common and uncommon causes of pediatric tracheal rupture; discuss the diagnosis and management of pediatric tracheal rupture.

Objectives: To present a pediatric case of tracheal rupture caused solely by vomiting and to discuss its diagnosis and management. **Study Design:** Case presentation and literature review. **Methods:** Case report. **Results:** A 13 year old girl with a recent diagnosis of type I diabetes presented with respiratory distress. History was significant only for 4 days of violent vomiting and she was diagnosed with diabetic ketoacidosis. Examination revealed tachypnea and considerable subcutaneous air overlying the upper chest and neck; chest X-ray showed pneumomediastinum. A swallow study showed no evidence of an esophageal tear. CT of the chest showed a posterior tracheal tear 4 cm distal to the cricoid cartilage. The patient's ketoacidosis was controlled and supplemental oxygen was administered temporarily to promote absorption of the extravasated air. Serial chest X-rays showed complete resolution within 5 days and intubation was not required. **Conclusions:** To our knowledge this is the first reported case of tracheal rupture secondary to vomiting. Previous reports of spontaneous tracheal rupture have been related to paroxysmal coughing. In similar cases of subcutaneous emphysema and pneumomediastinum following retching an esophageal rupture should be ruled out. Conservative management was successful in this case.

94. The Prefabricated Sternohyoid Myocartilagenous Flap: A Reconstructive Option for Treating Recalcitrant Adult Laryngotracheal Stenosis

Reza S. A. Nouraei, MD, London, UK
Mahmoud S. Nouraei, MD, Sari, Mazandran Iran
Tahwinder Upile, MD, London, UK
David J. Howard, MD, London, UK
Guri S. Sandhu, MD, London, UK

Educational Objective: At the conclusion of this presentation the participants should be able to appreciate the role of a new surgical procedure, the prefabricated myocartilagenous flap, for reconstructing recalcitrant long segment tracheal stenosis.

Objectives: To evaluate the results of treating adult recalcitrant laryngotracheal stenosis with a prefabricated composite pedicled sternohyoid myocartilagenous flap. **Study Design:** Prospective observational study. **Methods:** We have developed a two stage procedure for treating recurrent long segment laryngotracheal stenosis unresponsive to other therapies. In the first stage costal cartilage is harvested and fashioned into a three dimensional onstruct which is sutured onto sternohyoid muscle. The muscle and cartilage integrate to form a composite myocartilagenous flap. During the second stage the flap is elevated, a tracheo-fissure or a laryngo-tracheo-fissure is performed, the stenosis is excised, and the flap is rotated onto the airway over a skin graft covered silastic stent. **Results:** In 2006 one male and two females, aged 30, 20 and 18 years were treated. One patient had concomitant anterior glottic webbing and subglottic collapse. The second patient had two discontinuous lesions with intervening tracheomalacia, and the third patient had a peristomal tracheal stenosis with tracheomalacia up to cricoid cartilage and tracheal ring collapse below the lesion. Medical Research Council (MRC) Dyspnea grades of the patients were 2 (n=1; with tracheocutaneous fistula) and 4 (n=2). All patients achieved and maintained prosthesis-free airways and maintained MRC dyspnea grades of 1 (n=2) and 2 (n=1). Vocal function remained stable and there were no cases of dysphagia. **Conclusions:** The sternohyoid myocartilagenous flap can be a successful operation for highly selected cases of recalcitrant laryngotracheal stenosis and is a useful option for patients in whom other reconstructive procedures are unavailable or have been unsuccessful.

95. The Posterior Hypopharyngeal Flap for Treatment of the Persistent Posterior Glottic Gap

James M. Pearson, MD, New York, NY
Jamie A. Koufman, MD, New York, NY*

Educational Objective: At the conclusion of this presentation, the participants should be able to 1) explain the limitations of standard techniques to restore the voice in the setting of vocal fold paralysis; 2) describe a new technique that may be employed when standard techniques fail; and 3) discuss the limitations and greatest potential hazard of this new technique.

Objectives: To describe a novel endoscopic surgical technique for treatment of dysphonia caused by incomplete closure of the posterior glottis. **Study Design:** Case study. **Methods:** A novel endoscopic surgical technique was employed to restore voice capability to a patient with bilateral vocal fold paralysis. This patient had failed prior attempts at voice restoration employing traditional surgical methods including medialization thyroplasty and arytenoid adduction. On exam a posterior glottic gap persisted despite prior surgery. The patient possessed no usable voice despite these prior interventions. The novel posterior hypopharyngeal flap was employed and is described in detail. After suspension in typical fashion for direct suspension microlaryngoscopy, a local microflap is created using the posterior hypopharyngeal mucosa. This flap is advanced anteroinferiorly in a V-to-Y fashion into the posterior glottic gap. Sutures are placed endoscopically to stabilize the flap in position and to close the donor site. This flap effectively narrows the anteroposterior diameter of the glottis, obliterating the posterior glottic gap, thus enabling the vocal fold interaction required for voice production. **Results:** The posterior hypopharyngeal flap has been performed by the senior author on several patients with success. In the subject of this study prior medialization thyroplasty and arytenoid adduction was unsuccessful in restoring useful vocalization to this patient. After undergoing the intervention described herein, the voice was significantly improved. The patient was discharged home on the first postoperative day. The most significant potential morbidity of airway compromise was not encountered. **Conclusions:** In patients with persistent dysphonia caused by incomplete closure of the posterior glottis despite standard therapy, the posterior hypopharyngeal flap may be employed.

96. Transnasal Balloon Dilation of the Esophagus

Catherine J. Rees, MD, Winston Salem, NC
M. Taylor Fordham, BA, Winston Salem, NC
Peter C. Belafsky, MD PhD, Sacramento, CA

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the technique and safety of transnasal balloon dilation of the esophagus.

Objectives: To describe the safety and efficacy of transnasal balloon dilation of the esophagus using topical anesthesia or conscious sedation. **Study Design:** Retrospective case series. **Methods:** The charts of all patients undergoing transnasal balloon dilation of the esophagus at two tertiary care institutions were reviewed for demographics, indications, and complications. The level of dilation and diameter achieved were noted. **Results:** Fifty-four transnasal esophageal balloon dilations were performed in 38 patients (mean age 65.3, range 13-88, 76% male). Twenty procedures were performed utilizing topical anesthesia only in the office setting. Seven patients (18%) were post-laryngectomy and 15 patients (39%) had a history of head and neck radiation therapy. The upper esophageal sphincter (UES) was the most frequent dilation site (63%), followed by proximal/mid-esophagus (26%), lower esophageal sphincter (LES) (7.4%), and both the UES and LES (3.7%). Indications included cricopharyngeal dysfunction, benign stricture, web, and Schatzki's ring. Two procedures (3.7%) were aborted secondary to laryngospasm or severe gagging. There were no other complications. **Conclusions:** Transnasal esophageal balloon dilation can be performed via a transnasal esophagoscope in unsedated or sedated patients with a very low complication rate. This technique, formerly available only through larger caliber oral gastroscopes under sedation, allows for office based esophageal balloon dilations in an otolaryngology practice.

97.

Nasal Septal Deviation in the Adult and Pediatric Populations

Shari D. Reitzen, MD, New York, NY
Wayne Chung, BA, New York, NY
Anil R. Shah, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss differences in nasal-septal deviation between pediatric and adult patients. The measure of “tortuosity” can also be discussed in terms of its utility in obtaining a standardized measurement of nasal-septal deviation between populations.

Objectives: A significant portion of the population suffers from nasal-septal deviation of varying degrees. Recent demonstration of nasal-septal deviation occurring at younger ages suggests that this may have a congenital etiology. However, to our knowledge, there have been no studies directly comparing pediatric and adult populations with a uniform measure of degree of deviation. The purpose of this study was to use the measure of “tortuosity” to examine and compare nasal-septal deviation in different age groups. **Study Design:** Retrospective review/tertiary referral center. **Methods:** Eighty-one adult/pediatric patients were studied. The tortuosity of the septum was measured at four different standardized points along the length of the septum on thin section sinus CT and MRI. Tortuosity was defined as the “actual” length of the septum over the “ideal” length, or the length of a straight line from starting to ending points. **Results:** Patients less than five years of age exhibited less tortuosity as determined by radiographic imaging when compared to older pediatric patients and adult patients. These results were found to be statistically significant when compared using a student’s t-test. **Conclusions:** Nasal-septal deviation occurs at a higher frequency in older pediatric/adult patients when calculated using tortuosity as a measure. This data may support a non-congenital etiology for nasal-septal deviation. However, given that the growth of the septum continues throughout childhood, these results do not preclude the possibility of a genetic predisposition to the later development of a deviated nasal septum.

98.

The Role of Atopy and Asthma Status in Chronic Rhinosinusitis (CRS) in Adults

Mahdi A. Shkoukani, MD, Detroit, MI
John H. Krouse, MD PhD, Detroit, MI*

Educational Objective: At the conclusion of this presentation, the participants should be able to discuss the role of asthma and atopy in predicting the radiologic severity and outcomes of sinus surgery in patients with CRS.

Objectives: The aim of this study was to assess the role of atopy and asthma status in predicting both the outcome of surgically treated chronic rhinosinusitis (CRS) and the severity of disease as assessed by radiologic findings. **Study Design:** Retrospective chart review. **Methods:** Medical records of adults with CRS who failed medical therapy and underwent functional endoscopic sinus surgery (FESS) between 2001 and 2006 were reviewed. All patients were included who had complete documentation for specific inclusion criteria: gender, age, asthma status, allergy testing results (IDT or MQT), surgical revision rate, Lund-Mackay (LM) score, presence/absence of polypoid, and disease recurrence within the first year following FESS. **Results:** Fifty-three adult patients met the inclusion criteria. Positive inhalant allergy skin tests were noted in 66% of patients. Both atopic patients and asthmatic patients in the study population had statistically significantly higher Lund-Mackay scores than their nonatopic/nonasthmatic counterparts. There were no significant differences between atopic/asthmatic and nonatopic/nonasthmatic patients in one year surgical outcome and surgical revision rate. **Conclusions:** Adults with CRS who require surgical intervention have higher rates of atopy when compared with the general population. Atopy and asthma are good predictors of more severe radiologic findings. Neither atopic status nor asthma however predicts surgical outcome or revision rate. These findings support the unified airway model of generalized airway inflammation.

99.

Endoscopic Versus Open Surgical Management of Paranasal Schwannomas: A Comprehensive Review and Analysis of the Literature

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Seth M. Brown, MD, Hartford, CT
Abtin A. Tabaee, MD, New York, NY
Vijay K. Anand, MD, New York, NY*
Theodore H. Schwartz, MD, New York, NY

Educational Objective: At the conclusion of this presentation, the participants should be able to describe the epidemiology, pathogenesis, clinical presentation, histopathology, imaging characteristics, surgical treatment and recurrence patterns for paranasal schwannomas.

Objectives: Surgical management of paranasal schwannomas. **Study Design:** Literature review. **Methods:** A literature review for all paranasal schwannomas was performed. Patient demographics, clinical presentation, tumor characteristics, surgical approach, and outcomes for the reported lesions were collected and analyzed. **Results:** Our review identified 109 paranasal schwannomas reported in the English literature. There was a slight female predominance (55% to 45%) and the mean age at presentation was 41.5 years. The most

common presenting symptom was nasal obstruction (63%), followed by epistaxis, and rhinorrhea. Most paranasal schwannomas arose in the ethmoid region (44%), followed by the septum (15%) and maxillary sinus (13%). The absence of encapsulation, hypercellularity and submucosal extension dominated the histology of these lesions. Transfacial approaches were utilized to resect 52% of paranasal schwannomas. Endoscopic techniques were used to remove 18% of these lesions. Skull base erosion was present in 22 schwannomas, of which 17 extended intracranially. Of the 7 cases reported with skull base erosion in the era of endoscopic surgery 3 were resected endoscopically. The remaining four cases had intracranial extension and were resected with an open approach. Recurrence was attributed to incomplete resection and occurred in 12% of cases. Although the recurrence for endoscopic approaches was half (4%) that for open approaches (8%), this could be secondary to a selection bias. **Conclusions:** Paranasal schwannomas are rare neurogenic tumors. Cumulative histopathologic analysis suggests that these lesions may signify a distinct clinical entity. Endoscopic techniques may represent an alternative to the transfacial approaches in the treatment of paranasal schwannomas even in the presence of skull base erosion.

100. Mucosal Regeneration of Trachea Using Cell-Sheeted Bacterial Cellulose Scaffold

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Educational Objective: At the conclusion of this presentation, the participants should be able to know the effectiveness and convenience of new tissue engineered material—cell-sheeted bacterial cellulose for regeneration of tracheal mucosa.

Objectives: To evaluate the potentiality of cell-sheeted bacterial cellulose (BC) as a biomaterial for mucosal regeneration of the trachea. It is very important for tracheal regeneration to accelerate mucosal regeneration free from the risks of air leakage and infection. BC consists of pure cellulose nanofibrils synthesized by *Acetobacter xylinum*. The mechanical strength and hydrophilic property of BC can reduce above risks. In our previous canine study a BC membrane was implanted to the tracheal defect with resected cartilage. But the implanted BC membrane dropped off because of local infection about 15 days after implantation. **Study Design:** In vivo canine studies.

Methods: Fibroblasts harvested from subcutaneous tissue were cultured on BC membrane. 20 days after cell seeding this “cell-sheeted BC” was implanted to a round defect (1.5cm in diameter) that was created on the cervical trachea of beagles. The postoperative status was evaluated both endoscopically and histologically. **Results:** Endoscopically the luminal surface of trachea was covered with regenerated mucosa. Obvious complications, such as local infection, air leakage or stenosis, were not observed. Histologically though mild capsule formation around BC and ingrowth of inflammatory cells into BC were observed, complete epithelization was observed.

Conclusions: The cell-sheeted BC had a good affinity to the host tissue and had an inflammatory tolerance. This cell-sheet method was very simple and safe because it did not require detachment from a culture membrane. This tissue engineering technique was a possible treatment for regeneration of tracheal defect.

101. Evaluation of Bi-Potential Scaffold for Regeneration of the Trachea—In Vitro and In Vivo Studies

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Teruhisa Suzuki, MD, Fukushima, Japan

Ken Kobayashi, PhD, Tokyo, Japan

Tatsuo Nakamura, MD, Kyoto, Japan

Koichi Omori, MD, Fukushima, Japan

Educational Objective: At the conclusion of this presentation, the participants should be able to understand to evaluate the effectiveness of a bi-potential scaffold, composed of vitrigel and collagen, for regeneration of the tracheal epithelium.

Objectives: The purpose of the present study is to evaluate the effectiveness of a bi-potential scaffold, composed of vitrigel and collagen, for regeneration of the tracheal epithelium. **Study Design:** A bi-potential scaffold was developed by conjugating a collagen vitrigel membrane to a collagen sponge in order to promote both epithelial cell growth. **Methods:** In vitro study histological examinations were undertaken in order to evaluate the effectiveness of the bi-potential scaffold for epithelial regeneration. Furthermore configuration of the surface was observed with scanning electron microscope. In vivo study the bi-potential scaffold was implanted into tracheal defects of rats as vitrigel model, while a conventional collagen sponge scaffold was implanted as control model. Histological examinations were undertaken. **Results:** In vitro study the vitrigel infiltrated into the collagen fibers in the bi-potential scaffold. The surface of the bi-potential scaffold was considerably smooth. Histological findings indicated that the vitrigel contributed to epithelial cells growth from outside. In vivo study at 7 days post-implantation the bio-engineered trachea was covered with epithelium in the vitrigel model but not in the control model. At 14 days post-implantation in the vitrigel model the epithelium involving the basal cell layer was observed. At 28 days post-implantation columnar ciliated epithelium was observed in the vitrigel model. The bi-potential scaffold was favorable for the formation of the epithelium. **Conclusions:** Tissue engineering using a bi-potential scaffold is feasible for accelerating epithelial regeneration on the

102. Evaluation of Recurrent Laryngeal Nerve (RLN) Injury and Recovery Using a Rat Model

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Rick M. Roark, PhD, New York, NY
Sansar Sharma, PhD, Westchester, NY
Steven D. Schaefer, MD, New York, NY*

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the utility of a rat laryngeal model in the study of recurrent laryngeal nerve injury and recovery. This model demonstrates the effect of severity of injury on recovery using a new minimally invasive transoral electromyography supported with histologic data.

Objectives: To evaluate controlled recurrent laryngeal nerve (RLN) injuries using a rat model via minimally invasive transoral electromyography (ToL EMG) and histologic studies. **Study Design:** Prospective animal study. **Methods:** 42 female Sprague Dawley rats weighing 200-250 grams underwent crush injury to the right RLN using a calibrated pressure clamp (0.61 N or 1.19 N) for 60 seconds and sharp transection without approximation. Following injury serial ToL EMGs were performed during spontaneous, unevoked phasic respiratory cycles on selected laryngeal muscles on day four and weekly for six weeks. Vocal fold motion was graded from 0 - 4 during spontaneous respiration. Rats were sacrificed at different time point for histologic evaluation of injured nerves. **Results:** EMG signals showed fibrillation potentials on day 4 consistent with complete axonal injury across all experimental conditions. Crushed RLN, regardless of force, exhibited polyphasic potentials two weeks post-injury. Normal motor unit potentials and recruitment patterns were seen on EMG signals four weeks following crush injury with 0.61N clamp. Six weeks following crush injury normal motor unit potentials with synkinetic EMG signals were consistently recorded with 1.19N clamp while transected nerves had giant recovery potentials. Endoscopic evaluation of vocal fold mobility was consistently normal at six weeks only following 0.61N crush injury. **Conclusions:** This model is intended to simulate intraoperative RLN injury and to better understand the electrophysiologic events during nerve recovery. The severity of injury to the RLN dictates functional recovery of vocal fold motion. We can apply this model to evaluate the efficacy of systemic and local neurotropic agents on functional recovery.

103. Age Related Changes in Gene Expression in the Murine Olfactory Bulb (OB)

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Radhika A. Vaishnav, PhD, Lexington, KY
Thomas V. Getchell, PhD, Lexington, KY
Marilyn L. Getchell, PhD, Lexington, KY

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the genes and pathways that are modulated during aging in the OB.

Objectives: Olfactory dysfunction commonly occurs in elderly patients. The OB is a site of adult neurogenesis and early Alzheimer's related neurodegeneration. The objective of this study was to identify significant changes in levels of expression of OB genes and key pathways that are modulated during aging. **Study Design:** Controlled laboratory study. **Methods:** Nine C57BL/6 mice, three litter mates each at 1.5, 6, and 20 months of age, were euthanized. OBs were rapidly microdissected and frozen in liquid nitrogen. Total RNA was extracted and hybridized on Affymetrix Mouse Genome 430 2.0 GeneChips. Statistical (F tests and pair-wise comparisons) and categorical (EASE) analyses were performed. **Results:** A total of 4,088 genes (18.5% of annotated genes expressed in the OB) had significant differences ($P < 0.01$) in mean expression levels between groups. Categories significantly ($P < 0.05$) upregulated at 1.5 v. 6 mo and downregulated at 6 v. 20 mo included mitochondrial activity, cell cycle regulator activity, and actin cytoskeleton. Key genes included 6 COX subunits, Rbbp4, and Cdc42. Categories significantly downregulated at 1.5 v. 6 mo and upregulated at 6 v. 20 mo included chromatin remodeling/transcriptional regulation, cell cycle/apoptosis regulation, and microtubule/synapse genes. Relevant genes included Notch1, Apc2, and Dtna. **Conclusions:** Microarray analyses of OBs from aging mice revealed complex patterns of gene regulation. Pathways implicated in aging may underlie olfactory dysfunction and serve as substrates for age related neurodegeneration.

104. Subepithelial Hemorrhage Causes Persistence of Laryngeal Granuloma

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Yoshihiko Kumai, MD, Boston, MA (Presenter)
Tetsuji Sanuki, MD, Kumamoto, Japan
Satoru Miyamaru, MD, Kumamoto, Japan

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

siderin accumulation within laryngeal granuloma tissue as one of important factors contributing to the persistence of laryngeal granuloma.

Objectives: To determine the incidence of black spots after resolution of laryngeal granuloma (LG), to compare the disease duration from the beginning of treatment to resolution between patients with and without black spots, and to assess the histological findings of LG in resected or biopsied specimens. **Study Design:** Retrospective. **Methods:** Forty-six patients with LG on the cartilaginous portion of the vocal fold were included. Their clinical records were reviewed. Histological specimens were reexamined. **Results:** Causes of LG were postintubation in 10 patients, unilateral vocal fold immobility in 1, candida infection in 1, and were not specified in 34 (either hyperfunctional vocal abuse, laryngopharyngeal regurgitation or both). Of the 10 patients with postintubation LG 9 resolved; of the 33 patients with LG from other causes 21 resolved. Of the 28 resolved patients 12 developed a black spot at the previous lesion site. Of the 18 patients whose LG resolved without surgical intervention 11 developed a black spot at the previous lesion site, and the remaining 7 patients did not develop any black spots. The treatment period until LG resolution was significantly longer among patients with a black spot than those without a spot ($p=0.0372$). Histological examination revealed the presence of hemosiderin accumulation accompanied by infiltration of lymphocytes and macrophages in 8 of the 16 patients who had their LGs resected or biopsied. **Conclusions:** Accumulation of hemosiderin in the subepithelial layer, together with little blood flow and dense connective tissue in the cartilaginous portion of the vocal fold, are important factors contributing to the persistence of LG.
