

**THE TRIOLOGICAL SOCIETY
106TH ANNUAL MEETING PROGRAM**

**SUNDAY, MAY 4, 2003
DELTA BALLROOM C**

- 7:00 Reception for New Fellows**
- 7:30 Business Meeting (Members Only)**
- 8:00 Welcome and Presidential Address - Roger L. Crumley, MD***, Irvine, CA
- 8:15 Introduction of Guest of Honor - Brian F. McCabe, MD***, Iowa City, IA
- 8:20 Presidential Citations**
Richard L. Goode, MD*, Stanford, CA
Charles J. Krause, MD*, Marco Island, FL
W. Fred McGuirt, Sr., MD*, Winston-Salem, NC
Ernest A. Weymuller, Jr., MD*, Seattle, WA

JOINT SESSION WITH AMERICAN NEUROTOLOGY SOCIETY

- 8:30 Invited Presidential Speaker - Mr. Richard Teske**, Arlington, VA
When the Chip Marries the Cell

MODERATOR: C. PHILLIP DASPIT, MD*, PHOENIX, AZ

- 9:00 MOSHER AWARD WINNER - TRIOLOGICAL SOCIETY THESIS**
The Mechanism of Hearing Loss in Paget's Disease of Bone
Edwin M. Monsell, MD PhD, Detroit, MI

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants will be able to identify, diagnose, and manage hearing loss in Paget's disease of bone in accordance with a new understanding of the mechanism of hearing loss.

OBJECTIVES: The mechanism of hearing loss in Paget's disease of bone was investigated. The present study was a systematic, prospective, controlled set of clinical investigations to test the hypothesis *that there is a general underlying mechanism of hearing loss in Paget's disease of bone* and to gain additional insights into the auditory and otologic dynamics of this disease. Specific questions were: 1) whether the mechanism is cochlear or retrocochlear, and 2) whether the bone mineral density of the cochlear capsule is related to hearing levels. **STUDY DESIGN:** Several double-blinded, cross-sectional, prospective, correlational studies were conducted in a population of elderly human subjects with skull involvement with Paget's disease versus a control population of elderly subjects free of Paget's disease. Demographic and clinical data were recorded. Longitudinal observations were made in subjects under treatment. **METHODS:** Subjects were recruited from a Paget's disease clinic. Pure tone auditory thresholds, word recognition, and ABRs were recorded. The dimensions of the internal auditory canals were measured using CT images and digital image analysis. The precision, accuracy, and temporal stability of methods to measure the bone mineral density of the cochlear capsule and an adjacent area of non-otic capsule bone were validated and applied. Correlations were sought between hearing levels and cochlear capsule bone mineral density. **RESULTS:** Auditory brainstem responses (ABRs) were recorded in 64 ears with radiographically confirmed Paget's disease involving the skull. Responses were absent in 8 ears, all of which had elevated high pure tone thresholds. ABRs were interpreted as normal in 56 ears; none were abnormal. The mid-length diameter and minimum diameter of the internal auditory canal of 68 temporal bones from subjects with Paget's disease were found to have no statistically significant relationship to hearing thresholds. The Pearson product-moment correlation coefficients (age- and sex- adjusted) in the group with Paget's disease involving the temporal bone were -0.63 for left ears and -0.73 for right ears for high-frequency air conduction pure-tone thresholds (mean of 1, 2, and 4 kHz) versus cochlear capsule density. Correlation coefficients (age- and sex- adjusted) between cochlear capsule density and air-bone gap (mean at 0.5 and 1 kHz) for the affected group were -0.67 for left ears and -0.63 for right ears. All correlations between hearing thresholds and cochlear capsule density in pagetic subjects were significant at $p < 0.001$. The regressions were consistent throughout the ranges of hearing level. There were no significant correlations between cochlear capsule mean density and hearing level in the volunteer subjects. **CONCLUSIONS:** The evidence supports the existence of a general, underlying, cochlear mechanism of pagetic hearing loss that is closely related to loss of bone mineral density in the cochlear capsule. This mechanism accounts well for both the high-frequency sensorineural hearing loss and the air-bone gap. Early identification, radiographic diagnosis of temporal bone involvement, and vigorous treatment with third generation bisphosphonates are important to limit the development and progression of pagetic hearing loss.

- 9:12 FOWLER AWARD WINNER - TRIOLOGICAL SOCIETY THESIS**
Platelet-Activating Factor-Induced Hearing Loss Medicated by Nitric Oxide
Chung-Ku Rhee, MD PhD, Cheonan, Choongnam, Korea

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants will be able to recognize the hearing loss induced by platelet-activating factor in otitis media is mediated by nitric oxide and its blocker can block the hearing loss.

The purpose of this study is to investigate the role of nitric oxide (NO) in the mechanism of PAF-induced hearing loss in otitis media. Guinea pigs were divided into 3 groups: PBS, PAF, and L-NAME. The PBS group received phosphate buffered saline (PBS) and the PAF groups received 10, 20, and 40 µg of PAF on the round window membrane (RWM). NG-nitro-L-arginine-methylester (L-NAME) were injected intraperitoneally prior to PAF 20 µg application on the RWM. Hearing was tested with an auditory brainstem response (ABR) test, cochlear hair cells were examined by scanning electron microscopy (SEM), and immunohistochemistry was carried out on the cochlea to test the expression of inducible nitric oxide (iNOS). The PAF groups developed significant elevation of ABR threshold and cochlear hair cell damage in SEM. The L-NAME group did not show significant elevation of ABR threshold and cochlear hair cell damage. Strong expression of iNOS on cochlea was observed in the PAF group while lighter expression was seen in PBS and L-NAME groups. These findings suggest that the PAF-induced hearing loss caused by cochlear hair cell damage may have been mediated by NO. The L-NAME may have future therapeutic implications in preventing sensorineural hearing loss associated with chronic otitis media. The results of this study have significant potential clinical application.

9:24 Relationship Between Middle Ear Pressure Changes Following Nitrous Oxide Anesthesia and Its Effect on Postoperative Nausea and Vomiting (PONV)

Nader D. Nader, MD, PhD, Buffalo, NY
George T. Simpson, MD, MPH, Buffalo, NY (*Presenter*)
Roberta R. Reedy, CRNA, Buffalo, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand and explain how nitrous oxide anesthesia contributes to postoperative nausea and vomiting (PONV) through its effects on middle ear pressure changes.

OBJECTIVES: To establish a relationship between middle ear pressure changes following nitrous oxide anesthesia and its effect on postoperative nausea and vomiting (PONV). **STUDY DESIGN:** Prospective blind randomized study of adult patients receiving general anesthesia for arthroscopy. All received identical isoflurane inhalant anesthesia but were randomized into a group receiving inhaled Nitrous oxide and a control group receiving inhaled air. **METHODS:** Middle ear pressures were measured bilaterally with tympanometry before the surgery and every 15 minutes during the surgery and in the recovery room by recovery room nurses, blinded for the study, who recorded symptoms of nausea and episodes of vomiting. Pearson regression analysis was used to analyze the data. The incidence of PONV associated with nitrous oxide was analyzed using Fisher's exact test and Chi Square values were obtained to check the significance. **RESULTS:** Patients in both groups were comparable with regard to age, weight, and duration of anesthesia. A positive correlation between the maximum positive pressure (MPP) to maximum negative pressure (MNP) gradient and PONV was demonstrated. The incidence of PONV in the nitrous oxide group was 5/11 patients, while only 2/10 patients in the control group developed vestibular symptoms. This signifies a 50% increase in the incidence of PONV in the treatment group. Those patients that did not experience PONV demonstrated a median MPP of 155 with a MNP of -59. The patients that experienced PONV exhibited a median MPP of 199 with a median MNP of -183. In nitrous oxide group, P value was 0.04, which was statistically significant. **CONCLUSIONS:** We conclude that barometric changes in the middle ear contribute to the incidence of PONV induced by N2O.

9:32 Hearing Results: Vestibular Nerve Section vs. Intratympanic Gentamicin for Meniere's Disease

Todd A. Hillman, MD, Pittsburgh, PA
Douglass A. Chen, MD, Pittsburgh, PA
Moises A. Arriaga, MD, Pittsburgh, PA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to compare the hearing loss produced by vestibular nerve section or intratympanic gentamicin when used for vertigo control in Meniere's disease.

OBJECTIVES: Vestibular nerve section and transtympanic gentamicin administration are procedures with proven efficacy in the treatment of vertigo associated with Meniere's disease refractory to medical management. Hearing loss is a known complication of each of both procedures; however there has not been a report of hearing results of both treatments from a single institution. **STUDY DESIGN:** Retrospective review. **METHODS:** Review of 25 patients undergoing gentamicin injection and 39 patients undergoing vestibular nerve section for Meniere's disease. Rate of vertigo control, pre- and post-procedure pure tone averages (PTA), and speech discrimination scores (SDS) are reported. **RESULTS:** The mean preoperative PTA for nerve section patients was 47.2 dB with an SDS of 75.4%. The postoperative PTA was 49.1 dB and the SDS 75%. Patients undergoing gentamicin injection had a mean pre-procedure PTA of 55.9 dB and a SDS of 62%. The post-procedure PTA and SDS for the gentamicin group was 68.8 dB and 49.3%. Four out of 25 patients (16%) in the gentamicin group and 2/39 (5%) in the nerve section group had a > 20 dB increase in nerve threshold. The amount of post-procedure hearing loss was significantly greater in the gentamicin group (p=0.006). Control of vertigo was good to excellent in 95% of the nerve section patients and 80% of the gentamicin patients. **CONCLUSIONS:** While both vestibular nerve section and transtympanic gentamicin are both acceptable treatment options for vertigo associated with Meniere's disease, gentamicin can be expected to cause a higher level of hearing loss related to treatment.

9:40 Discussion

9:45 Break

MODERATOR: PAUL R. LAMBERT, MD*, CHARLESTON, SC

10:15 Choice of Ear for Cochlear Implantation in Asymmetric Hearing Loss

Howard W. Francis, MD, Baltimore, MD
Jennifer D. Yeagle, MEd, CCC-A, Baltimore, MD
Toni Renna, CCC-A, Baltimore, MD
Holly Venick, MS, CFA, Baltimore, MD
John K. Niparko, MD*, Baltimore, MD

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the rationale for implanting the worse hearing ear in patients with residual hearing in one ear.

OBJECTIVES: To determine whether or not there is an audiological advantage to implanting the better hearing ear in patients with asymmetric hearing loss. This study tested the hypothesis that among patients with similar levels of residual hearing in the non-implanted ear, speech perception outcome is the same whether or not the implanted ear has profound or severe levels of hearing loss. **STUDY DESIGN:** Retrospective study of post-lingually deafened adults implanted between 1992 and 2002. **METHODS:** Subjects were classified according to their pure-tone averages as: bilateral severe (group 1), asymmetrical severe/profound (group 2) and bilaterally profound (group 3). Group 2 patients were all implanted in the ear with profound hearing loss. Speech perception performance was evaluated using CNC words, HINT in quiet sentences and CID sentences. **RESULTS:** At 6 and 12 months post-implantation all 3 groups showed a significant increase in open set speech perception ability. There was no significant difference in performance between patients belonging to groups 1 and 2. Group 3 patients had significantly lower scores than patients with residual hearing in both groups 1 and 2. **CONCLUSIONS:** These results suggest that residual hearing is associated with improved speech perception outcome with the cochlear implant. This benefit is realized even when the implanted ear is profoundly deafened suggesting that central auditory benefits of residual hearing are more influential to outcome than the hearing level in the implanted ear.

10:23 Cochlear Implantation Outcome in the Elderly

Veronique Chatelin, MD, San Francisco, CA
Jannine Larky, MA, San Francisco, CA
Colleen Polite, MD, San Francisco, CA
Anil K. Lalwani, MD*, San Francisco, CA

OBJECTIVES: A cochlear implant is designed to provide individuals with severe or profound hearing loss, access to sound and improved perception of speech

via electrical stimulation of the auditory nerve. While the FDA regulates the lower age limit for implantation, there is no upper age limit as long as one is in good health. The purpose of this study was to determine if surgical outcome and auditory performance was adversely affected by older age. **STUDY DESIGN:** Retrospective chart review. **SETTING:** Tertiary care medical center. **PATIENTS:** Thirty-seven patients age 70 or older at the time of implantation. **INTERVENTIONS:** Cochlear implantation with either the Clarion or the Nucleus device. **MAIN OUTCOME MEASURES:** Surgical and auditory outcomes. **RESULTS:** There were no surgical complications or deaths in the older patients undergoing cochlear implantation. Significant improvement in sound detection and speech understanding was found for both groups of adults. When compared to younger implant recipients (< 70 years at implantation), there was no significant difference in performance on auditory-only sentence comprehension ($p > .05$). **CONCLUSIONS:** Cochlear implantation in older adults with profound SNHL is not associated with greater surgical morbidity or mortality and is associated with significant rehabilitative benefit. Therefore, older age should not be a contraindication to cochlear implantation.

10:31 Revision Cochlear Implant Surgery

Craig A. Buchman, MD, Chapel Hill, NC
Carol Gilmer, MS, Chapel Hill, NC
Harold C. Pillsbury, MD*, Chapel Hill, NC

OBJECTIVES: To report the outcomes of patients that have undergone revision cochlear implant surgery. **STUDY DESIGN:** Retrospective case series. **SETTING:** Academic medical center. **PATIENTS:** Adult patients with previously placed cochlear implants that have undergone revision surgery at our institution. **INTERVENTIONS:** Cochlear reimplantation. **MAIN OUTCOME MEASURES:** Demographics, presenting signs and symptoms, surgical findings, complications, audiological performance. **RESULTS:** To date, 25 patients have undergone revision cochlear implant surgery. Sixteen (80%) patients presented with new-onset auditory symptoms and 21 (84%) presented with non-auditory symptoms. At least 16 (80%) patients had some decrement in auditory performance while 4 (16%) had a failure to lock (i.e., hard failure). Revision surgery resulted in resolution of the patients presenting signs and symptoms in nearly all cases and some significant improvements in auditory performance. Perioperative complications were uncommon. **CONCLUSIONS:** Revision cochlear implantation should be considered in patients significantly affected by intolerable auditory and/or nonauditory symptoms or when a significant decrement in auditory performance has been documented.

10:39 Histopathology of Cochlear Implant: Case Report with Long-Term Follow Up

Holger G. Gassner, MD, Rochester, MN
Jon K. Shallop, PhD, Rochester, MN
Colin L. Driscoll, MD, Rochester, MN

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to explain changes in temporal bone histology associated with cochlear implantation. Participants should understand the difference between acute, chronic, traumatic and nontraumatic changes. Participants should be able to understand how insertional trauma can best be avoided.

OBJECTIVES: Insertion of an electrode array into the cochlea may be associated with acute and chronic damage to the inner ear. Minimal data are available to describe occurrence and pattern of such damage and to correlate histologic findings with the clinical course. The present case was studied to better understand microscopic changes in temporal bone anatomy and to correlate these findings with the clinical course and audiometric data. **STUDY DESIGN:** Case report with retrospective chart review. **METHODS:** A patient with bilateral sensorineural hearing loss is presented. He received a unilateral multielectrode cochlear implant at the age of 77 years. Pre- and post-operative audiometric test results covering a period of 38 years are available. Both temporal bones were harvested at the time of death. **RESULTS:** Histologic findings consistent with acute insertional trauma and chronic posttraumatic changes were identified. Spiral ganglion cell counts revealed abnormal findings. Audiometric testing revealed significant benefit after implantation on the open set NU-6 word test and sentence recognition tests. **CONCLUSIONS:** Post mortem histologic examination of temporal bone histology may be helpful to understand specific audiometric findings, both before and after cochlear implantation. Intracochlear placement of an electrode array can be associated with acute and chronic traumatic changes. Present and future research efforts will help to minimize damage to the cochlea.

10:47 Discussion

MODERATOR: JOHN K. NIPARKO, MD*, BALTIMORE, MD

10:55 Cochlear Changes in Chronic Otitis Media

Sebahattin Cureoglu, MD, Minneapolis, MN
Patricia A. Schachern, BS, Minneapolis, MN
Michael M. Paparella, MD*, Minneapolis, MN

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to better understand inner ear pathology secondary to chronic otitis media.

OBJECTIVES: To describe the morphological changes in the cochlea in chronic otitis media. **STUDY DESIGN:** Comparative histopathology of human temporal bones. **METHODS:** 15 temporal bones with unilateral chronic otitis media were selected and compared with contralateral normal temporal bones. Standard cytochleograms and spiral ganglion cell reconstructions were done on all temporal bones. The spiral ligament was divided into four segments according to the locations of different types of fibrocytes. The average loss of fibrocytes in each segment was estimated. Morphometric measurements of area counts of stria vascularis and spiral ligament were made in all turns of the cochlea on mid-modiolar sections. **RESULTS:** Outer hair cells were decreased in the basal turn of the cochlea in temporal bones with otitis media compared to control ears. There was no difference in the number of spiral ganglion cells in the otitis media and contralateral ears. The areas of stria vascularis and spiral ligament in the basal turn decreased significantly in the ears with otitis media compared to control ears. No difference was observed in the numbers of types I, II, III, and IV fibrocytes in the spiral ligament. **CONCLUSIONS:** The results of this study are consistent with the hypothesis that chronic otitis media causes cochlear pathology.

11:03 Ossicular Reconstruction Using Bone Source

Michael D. Seidman, MD*, West Bloomfield, MI

OBJECTIVES: To describe our results of ossicular reconstruction using a bone substitute. **STUDY DESIGN:** Retrospective review of 264 patients with chronic suppurative otitis media operated on since 1999. **SETTING:** Academic tertiary referral center. **PATIENTS:** 264 patients with chronic suppurative otitis media underwent mastoidectomy with tympanoplasty. 80 patients had incudostapedial disarticulation secondary to infection and or cholesteatoma and were reconstructed using either an incus interposition graft (n=30), a partial ossicular prosthesis (n=31) or more recently bone source (n=19). This study evaluates the results of the ossiculoplasties using bone source. **INTERVENTIONS:** Ossicular discontinuity was repaired using bone source. **MAIN OUTCOME MEASURES:** Audiometric studies pre- and post-intervention were compared. 1-3 years of follow-up are provided. **RESULTS:** Pre-operative air-bone gaps ranged from 25

dB to 50 dB and averaged 35 dB. Post-operative air-bone gaps ranged from 0-25 and averaged 10 dB. No patients have experienced any increase in their persistent conductive hearing loss. The pre-post operative hearing loss comparisons showed statistically significant hearing improvement. There were no complications. **CONCLUSIONS:** The use of partial and total ossicular prosthesis as well as incus interposition grafts is fraught with the possibility of migration and resultant recurrent conductive hearing loss. Using bone source to reconstruct the ossicular chain restores the integrity of the ossicular chain in the most natural of ways. This reconstruction technique provides an excellent alternative to currently accepted methods and should be considered for incus/stapes disarticulation. There has been no dissolution of the bone source and the results have persisted thus far. A video will be presented.

11:11 The Management of Otogenic Lateral Sinus Thrombosis: Experience with 16 Patients

Walter J. Kutz, MD, Houston, TX
Spiros Manolidis, MD, Houston, TX
George Blake, MS, Houston, TX

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants will better understand the presentation and effective management of lateral sinus thrombosis.

OBJECTIVES: To define the contemporary management of septic otogenic lateral sinus thrombosis. **STUDY DESIGN:** Retrospective case series identified through database search of otologic surgical cases in four teaching hospitals over a period of four years. **METHODS:** Fifteen patients presenting with septic lateral sinus thrombosis of otogenic etiology were the subjects in this study. Patients with incomplete medical records and unknown outcome were excluded. Lateral sinus thrombosis was the result of chronic otitis media in 73%. Cholesteatoma was found in 53%. The majority of these patients had associated intracranial and intratemporal complications as a result of their primary problem. **RESULTS:** All patients underwent medical and surgical treatment. Aggressive and early surgical treatment was tailored to the degree of preoperative findings and the underlying etiology for the lateral sinus thrombosis. The sigmoid sinus was resected in 100% of patients, the internal jugular vein was resected in 70% and a transverse embolectomy was required in 70%. Rapid recovery was seen in all patients following definitive surgical treatment of the lateral sinus thrombosis. **CONCLUSIONS:** Early and aggressive surgical intervention of this otogenic complication minimizes morbidity, hospital stay and length of medical treatment.

11:19 Intralabyrinthine Schwannomas—The Chameleon of the Inner Ear

Richard J. Kennedy, MBBS FRACS, Salt Lake City, UT
Clough Shelton, MD*, Salt Lake City, UT
H. Christian Davidson, MD, Salt Lake City, UT

OBJECTIVES: To describe the clinical features, evaluation and management of a large series of intralabyrinthine schwannomas and to create guidelines for the diagnosis and management of these rare tumors. **STUDY DESIGN:** Retrospective case review. **SETTING:** The study was conducted at a tertiary referral center at a university medical center. **PATIENTS:** Twenty-one patients seen at the institution with intralabyrinthine schwannomas between 1990 and 2002 were included in the study. **INTERVENTIONS:** Diagnosis was made on MRI scanning in all cases. Our ability to diagnose these tumors has been greatly improved with the introduction of the fast spin echo MRI (FSE-MRI). In the past it was difficult to differentiate intralabyrinthine inflammation from tumor on gadolinium enhanced MRI FSE-MRI routinely shows intralabyrinthine anatomical detail and in tumor cases, a filling defect in the intralabyrinthine fluid is demonstrated. Treatment options were observation with serial MRI scanning versus complete surgical removal through a translabyrinthine approach. Surgery was indicated because of dizziness caused by the tumor or extralabyrinthine growth of tumor. **MAIN OUTCOME MEASURES:** Clinical features, audiology, radiology and management outcomes were evaluated. **RESULTS:** Five patients required surgical removal of their tumors for intractable symptoms, tumor growth or intracranial involvement. The remainder as yet have been successfully managed with observation and serial MRI scanning. We have observed an interesting audiometric pattern of mixed hearing loss in some of these cases and theorize that the conductive component is caused by intracochlear fluid blockage by the tumor. In all cases with dizziness, removal of the tumor has led to resolution of their symptoms. **CONCLUSIONS:** Intralabyrinthine schwannomas are rare tumors that mimic the clinical features of many other neurotological conditions. A high index of suspicion and precise imaging is often required to detect these tumors. Surgical treatment is indicated for very specific indications and will be needed in the minority of patients with this disorder.

11:27 Discussion

MODERATOR: NEWTON J. COKER, MD*, HOUSTON, TX

11:35 Otologic Manifestations of Malignant Osteopetrosis

Irene M. Duncan, MD, Charleston, SC
Thomas S. Dozier, BS, Charleston, SC
Paul R. Lambert, MD*, Charleston, SC
Alan Klein, PhD, Charleston, SC

OBJECTIVES: To determine the incidence of hearing loss and describe the neurotologic manifestations over time in a large series of patients with malignant osteopetrosis. **STUDY DESIGN:** Prospective cohort. **SETTING:** Tertiary care international referral center. **PATIENTS:** Thirty-two patients including 19 infants (< 1 year) and 13 children (1-10 years) with osteopetrosis were followed during a ten-year period from January 1991 to October 2001. The average length of follow-up was 2.5 years (range 0-9 years). **INTERVENTIONS:** All patients underwent annual otologic evaluations including clinical examination, audiologic evaluation (ABR thresholds and waveform latencies, pure tone averages, speech discrimination scores, and tympanograms) and computed tomography (CT) of the temporal bone. **MAIN OUTCOME MEASURES:** Incidence of otitis media, hearing loss and facial paralysis. Serial changes in temporal bone anatomy by CT scan. **RESULTS:** The incidence of hearing loss was 26% in infants and 88% in children. Of the children with hearing loss, 100% had a conductive component and 40% also showed sensorineural hearing loss. Eighth nerve conduction was normal in 100% of infants and 78% of children. Three patients (9%) developed progressive unilateral facial nerve palsy. Common temporal bone findings included thickening and sclerosis of the calvarium, poor pneumatization of the mastoid bone, and narrowing of the external auditory canal, eustachian tube and internal auditory canal. **CONCLUSIONS:** Otologic manifestations are common in malignant osteopetrosis secondary to the formation of dense, brittle bone. This series of patients represents the largest reported in the otolaryngology literature and is the first to include comprehensive audiologic data on these patients.

11:43 Chondrosarcomas Involving the Temporal Bone

Lawrence R. Lustig, MD, Baltimore, MD
James Sciubba, MD, Baltimore, MD
Michael Holliday, MD, Baltimore, MD

OBJECTIVES: To evaluate the clinical presentation and outcomes of surgery for patients with chondrosarcomas involving the temporal bone. **STUDY DESIGN:** A retrospective review. **SETTING:** Tertiary academic medical center. **PATIENTS:** Histologically confirmed chondrosarcomas that involved the temporal bones. **INTERVENTIONS:** All patients underwent surgical resection of tumor. **MAIN OUTCOME MEASURES:** Demographic features of presenting patients, presenting

symptoms and signs, surgical approach employed, histologic grade of tumor, and interval of post-operative follow-up. **RESULTS:** 10 patients were identified with chondrosarcomas involving the temporal bone. The average age at presentation was 39 years (range = 6 to 67 years). Extension into the temporal bones occurred from the following regions: petroclival skull base (n=5) ethmoid/sphenoid bones (2), maxilla/TMJ (2), and sellar/suprasellar region (1). The most common presenting symptoms were VI nerve palsy/diplopia (6), decreased visual acuity (4), Vth nerve dysesthesias and headaches (3). Tumors were approached surgically from either anteriorly or laterally. Histologically, tumors were grade I (n=4), grade II (n=4) and grade III (n=2). Post-operative follow-up ranged from 3-21 years. In patients with grade I tumors, 4/4 are free of disease (3-21 years). In grade II tumors, 2/4 are free of disease (4 and 21 years), 1 is alive with disease (4 years), and 1 is dead from disease. In grade III tumors, 1 is free of disease (7 years) and one is alive with disease (3 years). **CONCLUSIONS:** Patients with chondrosarcomas involving the temporal bone may present in a variety of ways. Surgical resection, even subtotal, can often provide good tumor control over many years for these low-grade tumors.

11:51 Transjugular Craniotomy for the Management of Jugular Foramen Tumors with Intracranial Extension

John S. Oghalai, MD, San Francisco, CA
Man-Kit Leung, San Francisco, CA
Robert K. Jackler, MD, San Francisco, CA

OBJECTIVES: To elucidate indications and outcomes with the transjugular craniotomy for resection of jugular foramen tumors with intracranial extension. The transjugular approach is a lateral craniotomy conducted through a partial petrosectomy traversing the jugular fossa combined with resection of the sigmoid sinus and jugular bulb, which often have been occluded by disease. **STUDY DESIGN:** Retrospective review. **SETTING:** University medical center. **PATIENTS:** 28 patients with intracranial jugular foramen tumors. **MAIN OUTCOME MEASURES:** Pathology, surgical approach, extent of tumor resection, rate of facial nerve mobilization and ear canal closure, facial and lower cranial nerve outcomes, hearing preservation. **RESULTS:** Tumors included schwannoma (11/28), meningioma (9/28), glomus jugulare (6/28) and chordoma (2/28). The surgical approaches used were transjugular (18/28), translabyrinthine (4/28), retrosigmoid (4/28) and far lateral (2/28) craniotomies, tailored to maximize functional preservation. Translabyrinthine (1/18) or far lateral (1/18) approaches were occasionally used in combination with the transjugular approach. Most patients were managed with one procedure (23/28), but five patients with massive tumor in the neck required two stages. Microsurgical gross total (12/28) and near total (10/28) tumor removal were commonly achieved, although sub-total resections (6/28) were occasionally performed. In only a minority of cases was facial nerve mobilization (2/28) or ear canal closure (5/28) required. Grade I facial nerve function was usually maintained (23/26) and hearing class A or B was often maintained (7/13). As expected, new lower cranial nerve dysfunction was common (11/20). **CONCLUSIONS:** Most patients with jugular foramen tumors with intracranial extension can be managed with a single-stage transjugular craniotomy. Facial nerve mobilization or ear canal closure is usually not required.

12:00 Adjourn

6:00 - TRIO/ASPO/AHNS Poster Session and TRIO COSM Resident Reception

7:30

SUNDAY, MAY 4, 2003
OTOLOGICAL SOCIETY CONCURRENT SESSION
DELTA BALLROOM B

MODERATOR: STANLEY M. SHAPSHAY, MD*, BOSTON, MA

9:00 Frontal Sinus Rescue and Extended Frontal Sinus Rescue Procedure—Long Term Endoscopic Follow Up and Outcomes: An Alternative to Frontal Sinus Obliteration

Frederick A. Kuhn, MD*, Savannah, GA
Boris I. Karanfilov, MD, Savannah, GA (*Presenter*)

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to 1) explain the Extended Frontal Sinus Rescue Procedure (ExFSR), 2) demonstrate the role of frontal sinus rescue procedures in the management of chronic frontal sinusitis, and 3) discuss the effect of co-morbid diseases on long term frontal sinus patency and outcomes.

OBJECTIVES: 1) to present a new alternative to frontal sinus obliteration, 2) to present the long-term endoscopic patency and outcome of this procedure, and 3) to report the effect of associated diseases (allergic fungal sinusitis and aspirin sensitive asthma) on the outcomes. **STUDY DESIGN:** Retrospective chart review of 41 patients who underwent either Frontal Sinus Rescue (FSR) or Extended Frontal Sinus Rescue (ExFSR) between July 1996 and May 2002. **METHODS:** The charts and archived endoscopic images from each office visit were reviewed and outcomes data were collected for number of procedures, patency rates, number of revisions, co-morbid conditions (allergic fungal sinusitis [AFS] and aspirin sensitive asthma), and average length of follow-up. **RESULTS:** Thirty-three patients underwent FSR, several had bilateral procedures with thirty-six FSR procedures performed and eight patients had a unilateral ExFSR. Endoscopic patency rate was greater than 90% at an average follow-up of 18 months. 40% of patients had either AFS or aspirin sensitive asthma. Eight patients frontal sinus ostia were patent, however, their frontal sinus mucosa was polypoid above the ostium. All 8 of these patients had either AFS or aspirin sensitive asthma. **CONCLUSIONS:** FSR and Extended FSR offer a viable alternative to either frontal sinus obliteration or frontal sinus drill out, when the frontal sinus drainage pathway has scarred, because of a resected middle turbinate or a narrowed frontal recess. Co-morbid conditions, i.e., AFS or aspirin sensitive asthma, adversely affect outcomes in frontal sinus surgery.

9:08 Chondroitin Sulfate Hydrogel and Wound Healing in Maxillary Sinus Mucosa

M. Erik Gilbert, MD, Salt Lake City, UT
Richard R. Orlandi, MD, Salt Lake City, UT
Kelly R. Kirker, PhD, Salt Lake, UT
P. Daniel Ward, MS, Salt Lake City, UT
Steven D. Gray, MD*, Salt Lake City, UT

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to explain the biologic properties of glycosaminoglycan hydrogels, discuss the advantages of hydrogel versus no treatment in wound healing, and understand the potential clinical applications of hydrogels in sinonasal wound healing.

OBJECTIVES: To compare the wound healing properties of chondroitin sulfate hydrogel versus no treatment in wounds of the maxillary sinus mucosa. **STUDY DESIGN:** Prospective investigation in an animal model. **METHODS:** A wound was created in the bilateral maxillary sinuses of 17 New Zealand white rabbits. Chondroitin sulfate hydrogel (case) and no dressing (control) were randomly assigned to one side each as wound treatment. Wounds were examined ex vivo at 2, 4, 6, 10, and 14-day post-injury intervals. Wound contracture was measured microscopically by a blinded investigator. For each time endpoint, representative sections were stained and prepared for descriptive histologic analysis. **RESULTS:** The chondroitin sulfate disc was observed to be partially integrated into the wound at the 4-day interval and completely integrated at the 6-day interval and beyond. The average reduction in wound diameter for the case versus control side was 2.86 vs. 3.80 mm ($p = 0.006$) at the four day interval. **CONCLUSIONS:** The New Zealand white rabbit is an effective model for the study of wound healing in sinus mucosa requiring survival surgery. In the rabbit model, chondroitin sulfate hydrogel accelerates wound contracture in sinonasal mucosa at a 4-day endpoint. The mechanism by which this occurs is unknown. It is theorized that the hydrogel acts as a surrogate extracellular matrix, serving as a repository for cytokines and growth factors produced by the regenerating mucosa. Further study is necessary to establish this relationship.

9:16 Treatment of Human Olfactory Dysfunction

Robert C. Kern, MD*, Chicago, IL
David B. Conley, MD, Chicago, IL
Alan M. Robinson, PhD, Chicago, IL
G. Kenneth Haines III, MD, Chicago, IL

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the mechanisms of olfactory dysfunction at the cellular level as well as the therapeutic implications.

OBJECTIVES: The most common causes of clinical olfactory dysfunction appear to be associated with a decline in the number of functioning mature olfactory receptor neurons (ORNs). ORNs undergo apoptotic cell death at a baseline rate likely secondary to their exposed location in the nose, with regeneration from precursors in the epithelium. This allows the animal to maintain an adequate number of ORNs for olfactory sensation. In most cases of olfactory dysfunction, the capacity for replacement is apparently overwhelmed, in part through an increase in the rate of ORN death. The current study will present data demonstrating that the preferred mechanism of ORN cell death is apoptotic in both health and disease. **STUDY DESIGN:** Histologic and molecular analysis of human and animal olfactory tissue. **METHODS:** RT-PCR and immunocytochemical studies of animal models of olfactory dysfunction, as well as olfactory biopsies taken from patients with smell loss were analyzed for expression of apoptotic proteins. **RESULTS:** Increased expression of the pro-apoptotic Bax protein and the apoptotic effector enzyme caspase-3 were demonstrated in diseased olfactory mucosa in comparison with normal controls. **CONCLUSIONS:** Taken together, these data imply that a common pathway may mediate ORN cell death from a diverse set of pathologic insults including aging, trauma and sinusitis. Interference with this pathway of cell death is currently the subject of intense pharmaco-therapeutic research for the management of stroke and meningitis. Anti-Bax therapy and caspase inhibitors will likely prove useful in the treatment of clinical olfactory dysfunction.

9:24 Management of Cerebrospinal Fluid Rhinorrhea: The Medical College of Wisconsin Experience

Dean R. Lindstrom, MD, Milwaukee, WI
Joseph K. Han, MD, Portland, OR
Robert J. Toohill, MD*, Milwaukee, WI
Todd A. Loehrl, MD, Milwaukee, WI

Timothy L. Smith, MD*, Milwaukee, WI

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the expected results of endoscopic transnasal repair of CSF rhinorrhea and discuss scenarios when endoscopic repair alone may not be adequate.

OBJECTIVES: The management of cerebrospinal fluid (CSF) rhinorrhea has improved in recent years. The purpose of this comprehensive retrospective study is to assess factors associated with resolution of CSF leaks. **STUDY DESIGN:** This study is a retrospective case series. **METHODS:** A retrospective review of CSF rhinorrhea management was conducted. This study included all patients with CSF rhinorrhea managed by the Department of Otolaryngology from 1992 to 2002. Data collected included surgical approach and number of recurrences. **RESULTS:** Fifty-one patients had CSF rhinorrhea originating from the nose or paranasal sinuses. Nine patients responded to conservative management with bed rest with or without lumbar drains. Forty-two patients had surgical repair with ultimate resolution of CSF rhinorrhea. Twenty-six of the forty-two had iatrogenic injuries resulting in CSF rhinorrhea, eleven developed spontaneous CSF leaks, and five sustained gunshot wounds to the skull base. A total of four patients developed recurrent CSF leaks at the repair site. Of these, two initially presented with spontaneous CSF leaks, one patient had a gunshot wound with massive skull base injury, and one recurred after repair of an iatrogenic injury. In these forty-two patients, forty-three endoscopic and six open or combined repairs were performed. **CONCLUSIONS:** Multiple approaches to the management of CSF rhinorrhea can be successful. A transnasal endoscopic repair results in resolution of CSF rhinorrhea in the majority of cases. Patients with spontaneous CSF rhinorrhea and extensive skull base injuries are at increased risk for recurrence. Alternative management options may need to be considered in these cases.

9:32 Incidence of Serious Complications After Uvulopalatopharyngoplasty

Eric J. Kezirian, MD, MPH, Seattle, WA
Edward M. Weaver, MD, MPH, Seattle, WA
Bevan Yueh, MD, MPH, Seattle, WA
Richard A. Deyo, MD, MPH, Seattle, WA
Jennifer Daley, MD, Boston, MA
William G. Henderson, PhD, Aurora, CO

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the incidence and types of serious complications after uvulopalatopharyngoplasty.

OBJECTIVES: UPPP is the most common surgical treatment for obstructive sleep apnea (OSA). Anatomic and physiologic abnormalities associated with OSA can make perioperative management difficult. Only single-site case series at non-VA hospitals provide current estimates of the incidence of perioperative complications with a pooled crude serious complication rate of 2.9% (28/974) and a crude mortality rate of 0.41% (4/974). The primary objective of this study was to calculate the incidence in a large, multi-site cohort of UPPP patients. **STUDY DESIGN:** Retrospective cohort study of adults undergoing inpatient UPPP with or without other concurrent procedures. **METHODS:** The serious complication and 30-day mortality rates were calculated from the Veterans Affairs (VA) National Surgical Quality Improvement Program database of prospectively collected outcomes of all VA inpatient surgeries nationally 1991-2001. Serious complications were defined by 16 specific life-threatening complications explicitly captured prospectively in the database (e.g., reintubation, emergent tracheotomy, myocardial infarction, >4-unit hemorrhage, death, etc.). Deaths were captured prospectively whether the patient was in the hospital or discharged. **RESULTS:** Veteran patients (N = 3191) were 50+-11 years and predominantly male (97%). The serious complication rate was 1.7% (54/3191) [95% confidence interval 1.2%, 2.1%]. The 30-day mortality rate was 0.22% (7/3191) [95% confidence interval 0.06%, 0.38%]. **CONCLUSIONS:** The incidence of serious complications and 30-day mortality after UPPP are 1.7% and 0.22%, respectively, in a large cohort of UPPP patients at veteran hospitals.

9:40 Discussion

9:45 Break

MODERATOR: MICHAEL S. BENNINGER, MD*, DETROIT, MI

10:15 Lessons for the First 200 Arytenoid Adductions

Nicolas E. Maragos, MD*, Rochester, MN
Edythe A. Strand, PhD, Rochester, MN

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the improvements made in preoperative diagnosis, surgical approach, and postoperative management of patients undergoing an Isshiki arytenoid adduction procedure.

OBJECTIVES: To review the senior author's surgical experience with the Isshiki arytenoid adduction, highlighting changes over time in preoperative counseling, surgical planning and approach, result expectations, and complication prevention. **STUDY DESIGN:** Retrospective chart review of 200 consecutive patients, including available videostroboscopy and objective voice analysis with pre- and postoperative comparison. **METHODS:** We reviewed preoperative clinical notes, surgical reports, hospital course, and postoperative reevaluations to determine overall responses and operative outcomes. We captured and stored audio and video data using a Hopkins 70 rod or Pentax L3 fiberscope, a Bruel and Kjaer or Kay stroboscope, and a Sony Hi-8 video recorder or Kay Elemetrics RLS 9100 digital video system. Two observers performed video analysis of pre- and postoperative available data. Voice analysis was done using the Kay Elemetrics CSL 4400. **RESULTS:** Improvement in objective voice data (jitter, shimmer, harmonic-to-noise ratio) was observed in 90-95% of patients. Better postoperative results were obtained by combining unilateral Type I thyroplasty with the arytenoid adduction. Development of a standardized posterior thyroplasty window prevented cricothyroid joint destabilization, lessened thyroid cartilage traction fractures, and aided in normal structure identification. Changing the vector of adduction suture pull from straight anterior to one in the normal direction of the lateral cricoarytenoid muscle gave better medialization of the arytenoid base. Use of a single tacking suture for piriform sinus mucosa stabilization prevented postoperative airway compromise at the operative site. **CONCLUSIONS:** Review of 200 arytenoid adduction procedures has improved preoperative patient counseling, surgical approach to the posterolateral larynx, and prevention of postoperative complications.

10:23 Evaluation of a Novel Internal Microlaryngeal Instrument Stabilizer

William B. Armstrong, MD, Irvine, CA
Amir M. Karamzadeh, MD, Irvine, CA
Timothy F. Kelley, MD, Irvine, CA
Roger L. Crumley, MD, MBA*, Irvine, CA
Ryan Jackson, BS, Irvine, CA
Brian J. T. Wong, MD, PhD, Irvine, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to demonstrate knowledge of design requirements and methods for evaluating a novel device for instrument stabilization during micro laryngoscopic procedures.

OBJECTIVES: To evaluate and optimize the design of a removable and inexpensive internal stabilization device for use in commercially available laryngoscopes during operative micro laryngoscopic procedures. **STUDY DESIGN:** Laboratory investigation. **METHODS:** Stabilizers were designed and constructed to meet the following design requirements: non-obstructing visual profile, stability, durability, easy insertion and removal, stable platform, and ability to accommodate microlaryngeal instruments. Prototypes were tested in a laboratory setup consisting of a Dedo microlaryngoscope, intraluminal stabilizer, measurement grid, and video-documentation equipment. Instrument motion was recorded on videotape for analysis. Physicians also rated instrument stability, mobility, visualization, and ease of use on a survey form. **RESULTS:** Tremor at the end of the microlaryngeal instruments was significantly reduced using each configuration of the intraluminal stabilizer, and unobstructed visualization was maintained. The stabilizer configurations produced varying limitations on instrument maneuverability. The vertical height of the stabilizer bar, and the distance from the distal end of the endoscope both affected instrument maneuverability, but had no noticeable effect on the ability to decrease tremor or ability to see beyond the device. **CONCLUSIONS:** Use of an internal stabilization device decreases the natural tremor present when surgical instruments are held by the surgeon and has the potential to aid the surgeon during micro laryngoscopic surgical procedures. Further testing in vivo is planned to assess the clinical utility of the laryngeal microinstrument stabilizer.

10:31 Videostrobolaryngoscopy in a Residency Training Program

C. Michael Haben, MD, Montreal, PQ Canada
Karen Kost, MD, Montreal, PQ Canada
Eduardo Franco, PhD, Montreal, PQ Canada
Marie Desy, MSc, Montreal, PQ Canada

EDUCATIONAL OBJECTIVE: Participants should be able to predict the strengths and weaknesses of resident interpretation of stroboscopic findings. Areas of weakness will be highlighted so that audience members may approach them in their own resident training programs with targeted teaching.

OBJECTIVES: Increasing availability of videostrobolaryngoscopy (VSL) in most academic centers has provided otolaryngology residents with increasing exposure to this diagnostic methodology. Concurrent with this exposure is the obligation to become proficient in the difficult task of accurate interpretation of stroboscopic findings. This study examines the applicability of VSL in a residency program. **STUDY DESIGN:** Reliability study, using a fellowship trained, senior laryngologist as the gold standard. **METHODS:** Blinded to patient symptoms to eliminate potential examiner bias, kappa analysis is used to determine inter-rater reliability. Sensitivity, specificity and accuracy of the resident's findings are also computed. **RESULTS:** Analysis reveals that several VSL parameters, that of phase and amplitude determination and glottic closure, were made with strong correlation [$\kappa = .86, .69, 1.0$, respectively]. Perfect agreement was found for the presence of benign masses (i.e. vocal nodules). Other parameters, such as the presence of posterior glottic erythema and hypertrophy exhibited greater discordance [$\kappa = .18, .48$, respectively]. High resident sensitivity and specificity for most of the standard VSL parameters are found. Accuracy ranged between 88% and 97%. **CONCLUSIONS:** The results indicate that residents may become proficient in VSL interpretation with a high degree of inter-investigator agreement and accuracy. Lower correlations predict areas of potential weakness. These areas correspond to the most subjective of the VSL parameters, where considerable difficulty has been encountered in formulating precise rating schemes and historically the lowest intra- and inter-investigator reliabilities. This is clinically significant, as the subjective VSL findings of posterior glottic erythema, edema, and hypertrophy are those encountered most frequently with commonly diagnosed laryngo-pharyngeal reflux.

10:39 Adult-Onset Recurrent Respiratory Papillomatosis: The Saint Louis University Experience

Todd C. Huber, MD, Saint Louis, MO
John F. Eisenbeis, MD, Saint Louis, MO

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to demonstrate a basic knowledge of adult-onset recurrent respiratory papillomatosis (AORRP), discuss treatment options and compare the results of the treatment options.

OBJECTIVES: To define 1) the natural history of adult-onset recurrent respiratory papillomatosis (AORRP), 2) the effects of demographics on disease severity, and 3) the results of different operative techniques. **STUDY DESIGN:** Retrospective chart review. **METHODS:** The medical records of all patients diagnosed as an adult with respiratory papillomatosis and treated by the senior author (J.F.E.) were examined. **RESULTS:** Twelve patients were identified with AORRP with an average age at diagnosis of 39 years. The mean modified Derkay score at the time of operation was 6.1. Thirty-five operations were performed with the microdebrider, 27 with CO2 laser, 5 with cold steel and 5 with a combination. The difference in operative intervals was not significant based on gender ($p>0.05$). The difference in operative intervals was significant when correlated with age at operation ($p=0.009$). This finding was confirmed with multivariate analysis. The difference in mean operative times between microdebrider ($t=59.8$ min) and laser ($t=61.8$ min) was not significant ($p>0.05$). The difference in mean operative intervals between microdebrider ($t=172.9$ days) and laser ($t=307.2$ days) was significant ($p=0.046$). Cox regression analysis shows that patients treated with laser were 2.5 times more likely to relapse within the first 180 days after surgery whereas those treated with micro debridement were 10 times more likely to relapse after 180 days. **CONCLUSIONS:** In one of the first studies looking specifically at AORRP, we provide data concerning disease onset, severity and surgical management. A randomized, prospective trial would shed further light on this highly morbid disease.

10:47 Discussion

MODERATOR: GERALD S. BERKE, MD*, LOS ANGELES, CA

10:55 Clinical Predictors in Obstructive Sleep Apnea Patients with Computer-Assisted Quantitative Video Endoscopic Upper Airway Analysis

Pon P. Hsu, FRCS, Singapore
Barrie Y. Tan, MBBS, Singapore
Yiong H. Chan, PHD, Singapore
Hin N. Tay, MRCS, Singapore
Peter K.S. Lu, FRCS, Singapore
Robin L. Blair, FRCS, Dundee, Scotland UK

EDUCATIONAL OBJECTIVE: In conclusion, with these OSA predictive values and this innovative clinical method, we hope to provide surgeons with an accurate, objective, quantitative clinical method of assessment of upper airway, and to assist surgeons in their diagnosis, upper airway evaluation, surgical planning and surgical outcome assessment for patients with obstructive sleep apnea.

OBJECTIVES: Prospective study with an innovative method to analyze the differences in static and dynamic upper airway morphologies between patients with obstructive sleep apnea and normal subjects and to identify the clinical predictors of OSA and postulate possible pathogenesis. **STUDY DESIGN:** Prospective controlled study in a general hospital. **METHODS:** Quantitative computer-assisted videoendoscopy (validated with upper airway MRI) was performed in 49

(43 males, 6 females) patients with OSA and compared with 39 (22 males, 17 females) controls (AHI<5). Absolute cross-sectional areas, transverse and longitudinal diameters at retro-palatal and retro-lingual levels were measured during end of quiet respiration and during Mueller's maneuver at erect and supine positions, allowing us to study static and dynamic morphology (collapsibility) of the upper airway. 3744 parameters were analyzed. **RESULTS:** In males, retro-palatal and retro-lingual areas during supine Mueller's of 0.7981 cm² (ROC = 0.9284, PPV = 86.05%, NPV = 84.62%) and 2.0648 cm² (ROC = 0.8183, PPV = 76%, NPV = 83.33%) respectively were found to be good predictors for OSA. In females, we found area measured during Mueller's in supine position of 0.522 cm² at retro-palatal level (ROC = 1, 100% PPV and NPV) and transverse diameter at retrolingual level during erect Mueller's of 1.1843 cm (ROC = 0.9056, PPV = 100%, NPV = 83.33%) to be predictive. All measurements in supine position had higher predictability than at erect position. Parameters obtained during Muller maneuver were more predictive (ROC > 0.9910) than resting areas (ROC > 0.8371). **CONCLUSIONS:** Measurements obtained during dynamic study are more predictive and useful than during resting area. With these OSA predictive values and this innovative clinical method, we hope to assist other surgeons with quantitative clinical upper airway assessment, surgical planning and surgical outcome assessment for OSA patients.

11:03 Time Scale for Periosteal Readhesion After Browlift in New Zealand White Rabbits

Jenny C. Kim, MD, New Orleans, LA
J. Crawford Downs, PhD, New Orleans, LA
Maria E. Azuola, MD, New Orleans, LA
H. Devon Graham, MD, New Orleans, LA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss different measures of strength of periosteal adherence to the skull and explain the relationship of these strength measures to healing time after surgical elevation of periosteum.

OBJECTIVES: To determine the time interval after browlift required to achieve periosteal readhesion to the skull with preoperative strength. **STUDY DESIGN:** Randomized prospective analysis of variance with repeated measures. **METHODS:** Eighteen New Zealand White rabbits, each serving as its own control, underwent subperiosteal elevation on one side of the skull. The elevated periosteum was lifted and fixed to a resorbable screw, and the contralateral periosteum was left untouched. Adhesion characteristics were subsequently examined at postoperative days 5, 6, 7, 8, 10, 12, and 17. Seven subjects were assessed histologically to determine attachment of periosteum to underlying bone. Eleven subjects underwent biomechanical analysis utilizing the following three measures of periosteal readhesion strength. Ultimate shear strength is a measure of the maximum shear force necessary to separate the periosteum from the skull, shear stiffness is a measure of the stiffness of the periosteal attachment, and shear energy is a measure of the energy absorbed by the periosteal attachment prior to failure. **RESULTS:** Blinded histological analysis showed a qualitative increase in the number of markers of periosteal healing in days 8-12 for the operated sides. Analysis of ultimate shear strength and shear stiffness demonstrated a significant relationship to postoperative day (P<0.001). The ultimate shear strength and shear stiffness of the operated side approached that of the non-operated side by postoperative days 12 and 8, respectively. Shear energy was significantly lower for all time points on the operated side as compared to the control (P<0.01). **CONCLUSIONS:** Periosteal readhesion after surgical elevation approaches preoperative strength by the twelfth postoperative day.

11:11 Fully-Coupled Microvascular Free Tissue Transfer in Head and Neck Reconstruction

Reza Momeni, MD, New Haven, CT
Joseph H. Shin, MD, New Haven, CT
Douglas A. Ross, MD, New Haven, CT
Richard J. Restifo, MD, New Haven, CT
Stephan Ariyan, MD, New Haven, CT

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the use of microvascular coupling devices to form not only venous, but also arterial anastomoses, demonstrate the efficacy and benefits of coupling devices over other techniques and compare complication rates of free tissue transfer with regards to anastomotic technique.

OBJECTIVES: Microvascular coupling devices have been successfully used in forming venous anastomoses in reconstruction of head and neck, hands, and lower extremities. Their routine use in the creation of arterial anastomoses, however, has been limited. We set out to demonstrating the efficacy of coupling of arterial and venous anastomoses. **STUDY DESIGN:** We report our recent experience with a coupling device in performing all arterial and venous anastomoses in head and neck reconstruction. Data were collected in a consecutive series of 25 patients undergoing composite resection of head and neck tumors, followed by free tissue transfer. **METHODS:** The Unilink/3M coupling device was used in this case series. Each arterial and venous anastomosis was performed with the coupling device. Flaps were monitored clinically and outcome was recorded. **RESULTS:** Arterial anastomoses size ranged in size from 1.5 to 3.0mm. Flaps included the radial forearm free flap and the fibular osteocutaneous flaps. All completed arterial anastomoses were successful with no thromboses. There was one venous thrombotic complication. There were no complications related to technical performance of the coupling device. **CONCLUSIONS:** While hand-sutured anastomoses in free tissue transfer remain the "gold standard", newer microsurgical techniques have the ability to limit complications related to sutured anastomoses. As well, the use of microvascular couplers may greatly reduce ischemia time as well as total operative time and may be beneficial to patient outcome. Potential cost-savings may also be demonstrated with the use of coupling devices.

11:19 Discussion

11:27 HONORABLE MENTION FOR CLINICAL RESEARCH - TRIOLOGICAL SOCIETY THESIS

Directed Parathyroid Exploration: Evolution and Evaluation of This Approach in a Single Institution Review of 346 Patients
Phillip K. Pellitteri, DO, Danville, PA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, participants should be able to determine and implement the appropriate surgical approach for patients with hyperparathyroidism.

OBJECTIVES: Critical evaluation of a directed exploration protocol utilized by a single surgeon in the management of surgical parathyroid disease. **STUDY DESIGN:** Retrospective chart review of patients surgically managed for hyperparathyroidism at an academic tertiary care center. **METHODS:** Three hundred forty-six patients were evaluated for biochemically proven hyperparathyroidism between March 1995 and February 2002. A directed exploration protocol was implemented in appropriately selected patients with primary hyperparathyroidism and in those patients with secondary or tertiary hyperparathyroidism requiring re-operation. The protocol included: pre-operative technetium-99m sestamibi imaging for hyperfunctional parathyroid localization, targeted neck exploration, rapid intra-operative parathyroid hormone (IOPTH) determination and limited stay discharge from the ambulatory surgical recovery unit. Data collection was obtained by entering patient evaluation, management and outcome information prospectively into collective case report forms. A retrospective analysis of the data was conducted for the purpose of evaluating the effectiveness of the protocol. **RESULTS:** Sustained normocalcemia beyond 6 months postoperatively was achieved in 323 of 327 (99%) with primary hyperparathyroidism. Eighty-four percent (84%) of patients with secondary or tertiary hyperparathyroidism achieved normocalcemia or experienced resolution of symptoms as a measure of therapeutic success. The complication rate for the entire series of patients was 2.8%. **CONCLUSIONS:** The directed exploration protocol for surgical management of hyperparathyroidism generated surgical rates of

success which were as good and, in most cases, improved over that of traditional bilateral exploration. This achievement was associated with low morbidity and reduced time and facility utilization, conveying improved cost effectiveness. This surgical strategy should serve to enhance the capability of the surgeon to safely and efficiently manage the majority of patients with surgical parathyroid disease.

11:39 TRIOLOGICAL SOCIETY THESIS

Expiratory Pharyngeal Airway Obstruction During Sleep: A Multiple Element Model

B. Tucker Woodson, MD, Milwaukee, WI

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participant will be able to describe common patterns of pharyngeal airway collapse during expiration and to compare collapse during obstructed and non-obstructed breaths.

OBJECTIVES: Obstructive sleep apnea and snoring are associated with inspiratory and expiratory obstruction during sleep. This study's aim was to assess segmental expiratory mechanics. **DESIGN:** Experimental study of 20 patients with snoring and mild obstructive sleep apnea. **METHODS:** During sedated sleep, airflow, airway pressure measurements (supraglottic, oropharyngeal, nasopharyngeal, and nasal mask), and area (supraglottic/retroglossal, retropalatal) were simultaneously measured. Collapse on expiration was evaluated during single breath changes in nasal CPAP pressures. **RESULTS:** The predominant level of expiratory obstruction was supraglottic/retroglossal level alone (65%) or combined supraglottic/retroglossal and retropalatal (17.6%). Compliance curves derived from supraglottic/retroglossal and retropalatal pressures were similar in non-obstructed breaths but not obstructed breaths. Compliance during expiration was greater in the supraglottic/retroglossal segment than the retropalatal segment. Retropalatal cross sectional size independent of airway pressure measures was smaller during early and late expiration on obstructed breaths. The rate of expiratory collapse was increased ($p < 0.005$) in the retropalatal segment on obstructed compared to non-obstructed breaths. **CONCLUSIONS:** The supraglottic/retroglossal level obstructs and has greater compliance than the retropalatal segment during expiration. Patterns of obstruction support a multi-element model of collapse. Augmented collapse of the retropalatal segment on expiration provides a mechanism for progressive obstruction on subsequent inspiratory breaths.

11:51 The Macro and Microscopic Effects of Radiofrequency Injury in Porcine Tongue Treated with Entec Radiofrequency Ablation—A Porcine Pilot Study for the Treatment of Obstruction Sleep Apnea

Norman N. Ge, MD, Sacramento, CA

Craig W. Senders, MD, Sacramento, CA (*Presenter*)

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the macro and microscopic effects of radiofrequency injury in porcine tongue, the predictable results of the treatment using different duration and energy levels and the impact of local anesthetic and saline injection to the treatment site.

OBJECTIVES: Current accepted treatment protocols for obstructive sleep apnea syndrome with radiofrequency ablation (RFA) are based empirically with little data regarding the number of treatment sites or energy levels per treatment site. Injecting local anesthetics and saline into the treatment site is believed to shorten treatment duration and improve results from RFA. Our objective is to compare the lesions with different energy levels delivered, which is adjusted by the duration of the treatment, via macroscopic and histologic analysis. **STUDY DESIGN:** Porcine model was used to compare the macroscopic characteristics and histology of the lesions created by using an Entec radiofrequency generator. **METHODS:** Entec radiofrequency generator with needle electrodes and energy algorithm specifically designed for tongue tissue was used. Five animals each received 8 treatments, 4 on each site of the tongue. The 4 treatments include 3 different radiofrequency energy levels (duration: 60, 30, and 15 seconds) and one with 1cc local anesthetics and saline injection prior to a 15-second-treatment. They were sacrificed on post-treatment-day 3. Macroscopic measurements for each lesion were obtained and analyzed, and histologic comparison was performed. **RESULTS:** Histologically, there is consistent cell necrosis at all treatment sites. One out of 40 sites (2.5%) developed infection where the lateral mucosal surface of the tongue was violated. The volume of the lesions created by three energy levels were 57.80, 65.15, and 60.55 mm³ corresponding to the treatment duration of 60, 30, and 15 seconds. There is no statistically significant difference among these 3 energy levels. However the lesions at sites where local anesthetics and saline were injected were significantly smaller, with a volume of 41.67 mm³ ($p=0.00015$). **CONCLUSIONS:** The injuries created with Entec RFA were consistent and predictable. The volumes of the lesions do not significantly differ with the 3 different energy levels. Contrary to the current believes the lesion is significantly smaller with the injection of local anesthetics and normal saline at the treatment site.

12:00 Adjourn

MONDAY, MAY 5, 2003
JOINT SESSION WITH AMERICAN SOCIETY
OF PEDIATRIC OTOLARYNGOLOGY
DELTA BALLROOM C

7:45 Announcements

SESSION 1: TONSILLECTOMY AND ADENOIDECTOMY
MODERATOR: LINDA BRODSKY, MD*, BUFFALO, NY

7:50 Impact of Adenotonsillectomy on Health Related Quality of Life for Children

Madan N. Kandula, MD, Oklahoma City, OK
Greg A. Kreml, MD, Oklahoma City, OK

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the impact of adenotonsillectomy on the Health-Related Quality-of-Life of children with sleep disordered breathing and adeno tonsillar hypertrophy.

OBJECTIVES: Tonsil & adenoid hypertrophy causing Sleep Disordered Breathing (SDB) has become the most common indication for adenotonsillectomy in young children. The current algorithm for performing adenotonsillectomies in children with histories suggestive of SDB is based on clinical symptoms such as snoring, paradoxical chest movements, mouth breathing, and excessive daytime sleepiness. Franco, et. al. developed and statistically validated an 18-item (OSA-18) health-related quality-of-life survey that measures the impact of SDB in children. The OSA-18 has not been tested to determine the change in score after intervention to address SDB in children. We hypothesize that adenotonsillectomy performed on children with symptoms suggestive of SDB results in a significant improvement in Health-Related Quality-of-Life as measured by the OSA-18. **STUDY DESIGN:** Prospective, single-arm clinical trial. **METHODS:** The OSA-18 was administered at the Children's Hospital of Oklahoma to the caregivers of 54 children with adeno tonsillar hypertrophy scheduled for adenotonsillectomy due to symptoms of SDB. The survey was administered three times: 1) initial evaluation, 2) date of surgery, and 3) 6-week postoperative visit. **RESULTS:** The OSA-18 survey demonstrated adequate test-retest reliability ($P < 0.05$). 98% of subjects demonstrated a clinically significant improvement in the mean summary score after adenotonsillectomy. Clinically significant improvements were shown in each of the five survey domains after intervention (96%-Sleep disturbance, 98%-Physical symptoms, 74%-Emotional symptoms, 91%-Daytime function, 96%-Caregiver concerns). **CONCLUSIONS:** In children with symptoms of SDB and adeno tonsillar hypertrophy, adenotonsillectomy results in a clinically significant improvement in Health-related Quality-of-Life as measured by the OSA-18.

7:59 Effect of Adenotonsillectomy for Obstructive Sleep Apnea on Quality of Life

Ron B. Mitchell, MD, Albuquerque, NM
Ellen Call, MS cFNP, Albuquerque, NM

OBJECTIVES: To use the OSA-18 quality of life instrument to assess long-term improvements in sleep disturbance, physical suffering, emotional distress, daytime problems and care giver concerns after adenotonsillectomy in children with polysomnography-proven obstructive sleep apnea (OSA). **DESIGN AND SETTING:** Prospective study in tertiary care children's hospital. **PATIENTS:** Twenty-six males and 6 females. All had a respiratory distress index (RDI) > 1 . The mean age was 7 yr.; range 1-16 yr. Children with craniofacial, neurological and chromosomal abnormalities were excluded. **INTERVENTIONS AND OUTCOME MEASURE:** Adenotonsillectomy, the OSA-18 instrument before and after surgery and full night polysomnography-proven OSA. **RESULTS:** The mean RDI for the children was 26; range 4-110. The mean duration between completion of the two OSA-18 instruments was 16 months; range 8-26 months. The mean total OSA-18 score was 73 before surgery and 43 after surgery. A power analysis indicated a sample size $n = 17$ was adequate to detect a change of 20 points in the total OSA-18 score with 80% power and $\alpha = .05$. The results of a paired Student's t-test show that the scores for each domain of the OSA-18 instrument were lower after surgery at the $p = .05$ level, and the total score was lower at the $p = .001$ level. **CONCLUSIONS:** Adenotonsillectomy for OSA in children produces a significant long-term improvement in quality of life. This provides additional evidence that adenotonsillectomy is the surgical therapy of choice for OSA in children.

8:08 Cost Benefit Analysis of Coagulation Studies in Patients with Post-Tonsillectomy Hemorrhage

Vijay K. Nayak, MD, Boston, MA
Christopher Hartnick, MD, Boston, MA
Michael Cunningham, MD, Boston, MA
Leila A. Mankarious, MD, Boston, MA
Mark Volk, MD, Boston, MA
Roland Eavey, MD*, Boston, MA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the issues surrounding coagulation testing in patients who experience post-tonsillectomy hemorrhage.

OBJECTIVES: Post-tonsillectomy hemorrhage is the most common serious complication following tonsillectomy. Currently, there is no standardized protocol regarding the hematologic evaluation for these patients. We attempt to identify the value of hematologic tests in patients who experience a post-tonsillectomy hemorrhage. **STUDY DESIGN:** Retrospective chart review. **METHODS:** We retrospectively reviewed 4015 pediatric tonsillectomies performed at our institution over a 5 year period. 442 were performed as the primary procedure and 3573 were done in conjunction with adenoidectomy. **RESULTS:** 47 children (1.2%) required operative intervention for bleeding (mean age 10.2 years, 60% male). Nine of these patients experienced hemorrhage within 24 hours of the operation (19.1%) whereas 38 (70.9%) had delayed hemorrhage (mean 8.1 days postoperative). One of 16 patients (6.3%) tested had an abnormal PTT and none of 18 tested had an abnormal PT. The one patient with an abnormal PTT presented with delayed hemorrhage, had a total of three hemorrhagic events requiring intervention, and was ultimately diagnosed with von Willebrand's disease. **CONCLUSIONS:** Had coagulation tests been obtained in all 47 patients with a postoperative hemorrhage then this would have cost \$2438, compared to \$216,810 that would have been required to test all 4015 patients pre-operatively. Although the etiology of post-tonsillectomy hemorrhage is multi-factorial there is the possibility of an underlying coagulopathy. Given the impact such a disorder plays in the treatment of a child with a post-tonsillectomy hemorrhage, as well as the comparatively low cost of coagulation testing, routine PT/PTT appears a reasonable and cost beneficial screen in patients with post-tonsillectomy hemorrhage.

8:17 Adenoidectomy: Selection Criteria for Surgical Cases of Otitis Media

Lily H. P. Nguyen, MD, Montreal, PQ, Canada
John J. Manoukian, MD, Montreal, PQ, Canada
Adi Yoskovitch, MD, Montreal, PQ, Canada

OBJECTIVES: Nasopharyngeal adenoids may serve as a mechanical obstruction to the Eustachian tube (ET) and contribute to the pathophysiology of otitis media (OM). The purpose of this study was to determine if abutment of adenoids laterally against the torus tubaris (TT) affects the outcome of patients requiring pressure equalization tubes (PET) for OM. **DESIGN:** Randomized prospective clinical trial. **INTERVENTION:** Patients requiring PET for OM were randomized to two groups: 1) PET placement only, 2) PET placement and adenoidectomy (AD), regardless if the adenoids assessed intra-operatively were abutting or not abutting the TT. **OUTCOME MEASURES:** Patients were followed for at least one year to determine rate of treatment failure, defined as recurrence of acute OM (>3 times/year); OM with persistent effusion with >30 dB hearing loss, or reinsertion of PET. **RESULTS:** Of the 36 patients in the abutting group, 16 patients underwent only PET insertion, of whom 6 failed (37.5%), while 20 patients had combined PET placement and AD, of whom 2 failed (10%). There was a statistical difference between these two groups ($p = 0.05$). Of the 31 patients in the non-abutting group, 25 patients underwent only PET insertion, of whom 6 failed (24%), while 6 patients underwent combined PET placement and AD, of whom 2 failed (33.3%). There was no statistical difference between these two groups ($p = 0.64$). **CONCLUSIONS:** The position of the hypertrophied adenoids, and its removal, may alter the final otologic outcome of patients requiring PET insertion for OM. Patients with adenoids abutting the TT may benefit most from an adjuvant AD.

8:26 Discussion

SESSION 2: OTOTOLOGY 1

MODERATOR: KENNETH M. GRUNDFAST, MD*, BOSTON, MA

8:36 A Diagnostic Paradigm in Childhood Sensorineural Hearing Loss: The Role of Connexin 26 Screening, Radiologic Imaging and Laboratory Testing

Diego A. Preciado, MD, Cincinnati, OH
Colm Madden, MD, Cincinnati, OH
David Meyer, BS, Cincinnati, OH
Daniel I. Choo, MD, Cincinnati, OH
John Bradshaw, BS, Cincinnati, OH
John Greinwald, MD, Cincinnati, OH

OBJECTIVES: 1) To determine the yield of radiological imaging, GJB2 mutation screening and laboratory testing in children with idiopathic sensorineural hearing loss (SNHL), 2) to propose a diagnostic algorithm for these patients. **DESIGN:** Retrospective clinical database review. **SETTING:** Tertiary care children's hospital. **PATIENTS:** Consecutive children ($n=810$) identified with SNHL and diagnostic imaging ($n=616$), GJB2 mutation screening ($n=136$) and laboratory testing ($n=609$). **MAIN OUTCOMES MEASURES:** Correlation of radiographic, molecular genetic and laboratory results with the type and severity of SNHL. **RESULTS:** 650 children had idiopathic SNHL. GJB2 mutations were found in 22.1% (30/136) of children with bilateral SNHL compared to 0/25 children with unilateral SNHL. The diagnostic yield of GJB2 screening was significantly higher in severe-profound SNHL (37.7%) than in less severe SNHL (14.3%) ($p=0.0042$). The overall diagnostic yield for imaging was 27.6% (170/616) with enlarged vestibular aqueduct the most common finding. The diagnostic yield for imaging was higher in children with unilateral SNHL (36.7%) compared to bilateral SNHL (24.7%) ($p=0.004$). Laboratory testing did not reveal an etiology for SNHL in any patient except in 2 patients with abnormal electrocardiograms. **CONCLUSIONS:** We propose that children with bilateral SNHL first undergo GJB2 screening. An imaging study is then obtained if the GJB2 screen is negative and in cases of unilateral SNHL. Laboratory investigation should not be routine but based on the clinical history and the genetic and imaging results.

8:45 Abnormalities of the Temporal Bone in Enlarged Vestibular Aqueduct Syndrome

Colm Madden, MB FRCSI Cincinnati, OH
Mark J. Halsted, MD, Cincinnati, OH
Dianna Bardo, MD, Chicago, IL
Corning Benton, MD, Cincinnati, OH
Daniel Choo, MD, Cincinnati, OH
John Greinwald, MD, Cincinnati, OH

OBJECTIVES: To correlate clinical and audiometric findings with a detailed radiological analysis of the temporal bone in patients with enlarged vestibular aqueduct syndrome (EVAS). **DESIGN:** A retrospective review of data from EVAS patients identified in a pediatric hearing impaired database of 1500 patients. **SETTING:** A tertiary care pediatric referral center. **PATIENTS:** Ninety-one children with EVAS, 89 children served as controls. **OUTCOME MEASURES:** Clinical data, audiometric thresholds and radiographic temporal bone measurements. **RESULTS:** Ninety-one patients were identified with an EVA. Patients were followed for a mean of 31 months (range 0-205 months). Hearing loss was bilateral in 66% of cases. The mean pure-tone average (PTA) was 53dB. Ninety-eight percent (173/177) of ears in control subjects with no SNHL had normal inner ear temporal bone measurements. Differences in temporal bone measurements were significant for the vestibular aqueduct width at the midpoint and operculum between the EVA group and the controls. There were also significant differences at the lateral semicircular canal ($p=0.0001$), vestibule ($p=0.0001$) and modiolus width ($p=0.0001$). A modified Antonelli radiological scale and the degree of cochlear partitioning were also significantly different ($p=0.0001$). **CONCLUSIONS:** Enlargement of the vestibular aqueduct and the upper vestibule, hypoplasia of the lateral semi-circular canal and modiolus and abnormal cochlear partitioning are associated with EVAS in children.

8:54 Universal Newborn Hearing Screening: Are We Achieving the Joint Committee on Infant Hearing's Objectives?

James L. Connolly, MD, Jackson, MS
Jeffrey D. Carron, MD, Jackson, MS
Suzanne D. Roark, MS, Jackson, MS
William D. Mustain, PhD, Jackson, MS

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the listener will have a better understanding of the current Joint Committee on Infant Hearing (JCIH) recommendations and the efficacy of two-stage universal newborn hearing screening (UNHS). The overall incidence of newborn hearing loss will be discussed, along with a comparison of the incidence rates between neonates with high risk characteristics and low risk characteristics.

OBJECTIVES: To determine whether a two-stage auditory brainstem response (ABR) Universal Newborn Hearing Screening (UNHS) protocol at an academic medical center has been achieving the Joint Committee on Infant Hearing recommendations for screening all infants, diagnosing hearing loss within 3 months, and instituting intervention within 6 months. **STUDY DESIGN:** Retrospective database and chart review in an academic tertiary care hospital. **METHODS:** A 5-year retrospective chart review and database search of all newborns screened at our medical center between 1997-2001 was performed. Screening was done by multiple in-hospital postnatal sequential ABR with follow-up outpatient ABR for referrals. The overall screening population capture rate, referral rate, and false positive rate were calculated. Additionally, hearing loss risk factors, age at diagnosis of hearing loss, and age at onset of intervention were obtained. **RESULTS:** The total number of babies screened was 17,602. Seventy-eight (0.44%) were diagnosed with hearing loss, with 62 (79%) in

the high-risk population. The frequency of hearing loss was 1 per 811 low-risk neonates versus 1 in 75 meeting high-risk criteria. Overall population capture rate was greater than 99%, referral rate 4.1%, and false positive rate 3.6%. Mean age at diagnosis was 3.9 months, with mean age at intervention 6.1 months. **CONCLUSIONS:** Our current UNHS protocol utilizing sequential ABR has been successful in screening virtually all neonates. This retrospective review has shown one hearing loss diagnosis for every 811 babies without risk factors for hearing loss. Prospective studies are planned to assess the cost-effectiveness of the current protocol.

9:02 Discussion

SESSION 3: OTOTOLOGY 2 MODERATOR: MARGARET A. KENNA, MD*, BOSTON, MA

9:11 Effectiveness of Laser-Assisted Myringotomy for Otitis Media in Children

Cheryl S. Cotter, MD, Orlando, FL
James R. Kosko, MD, Orlando, FL

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to formulate an opinion regarding the role of laser-assisted myringotomy in children in their practice.

OBJECTIVES: To evaluate the effectiveness of OtoScan laser-assisted myringotomy (OtoLAM) for acute otitis media and chronic otitis media with effusion in children. **STUDY DESIGN:** Retrospective review of a pediatric otolaryngology practice within a pediatric multispecialty tertiary referral center. **METHODS:** Laser-assisted myringotomy was performed on 48 patients (81 ears) using the Oto-LAM device. There were 28 children (ages 6 months-3 years) with refractory acute otitis media and 20 children (ages 7 months-15 years) with chronic otitis media with effusion. **RESULTS:** Fifty-eight% of procedures were considered treatment failures, defined as recurrence or persistence of their disease. Failures occurred in 54% of patients with refractory acute otitis media on average 3 weeks following the procedure and in 65% of patients with chronic otitis media with effusion on average 7 weeks following the procedure. Age, microorganism isolated, and laterality did not affect outcome. Ventilation tube insertion was required in 25 patients (52%). Two patients with refractory acute otitis media have persistent tympanic membrane perforations. **CONCLUSIONS:** Laser-assisted myringotomy in children was associated with a high incidence of recurrence or persistence of disease, and with perforation of the tympanic membrane. Recommendations for use of the Oto-LAM should include discussion of high failure rates and the strong likelihood of subsequent ventilation tube insertion. The Oto-LAM remains an option for office-based ventilation of the middle ear for families and patients where general anesthesia is a concern.

9:19 The Efficacy of Laser Myringotomy Versus Ventilation Tubes: Can We Identify the Eligible Patient?

H. M. Blom MD, PhD, Den Haag, The Netherlands
J. P. Koopman, MD, Den Haag, The Netherlands

BACKGROUND: The insertion of ventilation tubes for chronic otitis media with effusion (OME) is an accepted therapy. The efficacy of the laser assisted myringotomy (LAM) has not been established also the ideal patients have not been identified. **OBJECTIVES:** This study was designed 1) to assess the effectiveness of LAM versus ventilation tubes in children with chronic OME, and 2) to identify the patients most likely to benefit from the procedure. **METHODS:** In this prospective randomized controlled study we enrolled all children until 10 years of age with symmetric bilateral OME, existing for more than three months. To compare the result of the LAM procedure with the result of a ventilation tube, both interventions were performed at random, in one procedure and under general anesthesia. In the same patient the ventilation tube was inserted using cold knife myringotomy on one side, and LAM was performed at the other side. In this manner, confounding factors were eliminated. Post-operative follow-up was scheduled each month for the period of 6 months. **RESULTS:** Of the 999 children assessed for eligibility, 208 children received the allocated intervention. The findings of a normal middle ear at the tube-side versus LAM-side were: 70.7% versus 39.1% at 6 months. Using GENMOD the chance of normal middle ear status of the patients 6 months after treatment can be predicted between 4% and 70% for the laser and between 13% and 90% for the tube. **CONCLUSIONS:** LAM is effective in a subgroup of identifiable patients.

9:28 Tympanic Membrane Perforation Repair Using Acellular Porcine Small Intestine Submucosa

Joshua L. Kessler, MD, Boston, MA
Jeffrey H. Spiegel, MD, Boston, MA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to compare the use of autologous tissue to acellular porcine small intestine submucosa in the repair of chronic tympanic membrane perforations in a chinchilla model.

OBJECTIVES: To evaluate the efficacy of porcine small intestine submucosa (SIS) in the repair of chronic tympanic membrane perforations. While tympanoplasty with autologous temporalis fascia and perichondrium is common practice in the repair of chronic tympanic membrane perforations, these materials are associated with increased operative time, the potential for increased morbidity, and have variable availability and quality in individual patients. Recently, new materials for tympanoplasty have been explored, including acellular human dermis. SIS is an inexpensive and readily available alternative to autologous and cadaveric grafts. In this study we examine the use of SIS (Surgisis, Cook Surgical, Bloomington, IN) in the repair of chronic tympanic membrane perforations in a chinchilla model. **STUDY DESIGN:** Prospective pilot study using 10 adult chinchillas. **METHODS:** Chronic bilateral tympanic membrane perforations were created in 10 adult chinchillas for a total of 20 perforations. Each animal underwent observation in one ear and repair with either autologous perichondrium or SIS in the opposite ear by underlay tympanoplasty. **RESULTS:** A total of 20 chronic tympanic membrane perforations were created with zero healing spontaneously after 8 weeks. In tympanoplasties performed in 5 chinchillas with SIS, 5 out of 5 (100%) were completely healed 4 weeks post-operatively, while only 3 out of 5 (60%) tympanic membranes repaired with autologous tissues were closed. Histologic analysis was performed in both successful perichondrium and SIS repairs. **CONCLUSIONS:** These results suggest that SIS is a viable alternative to autologous and cadaveric grafts in tympanoplasty. Its low cost, availability, and effectiveness suggest it may be a superior choice as a tympanoplasty graft material.

9:37 Discussion

9:45 Break

SESSION 4: RECURRENT RESPIRATORY PAPILLOMATOSIS MODERATOR: ROBERT F. WARD, MD*, NEW YORK, NY

10:15 Is Human Papillomavirus Type 11 a High Risk Virus in Laryngeal Papillomatosis?

Patrick M. Reidy, MD, Detroit, MI
Rajah R. Rabah, MD, Detroit, MI
Jayson B. Field, MD, Detroit, MI

Lucie L. Gregoire, PhD, Detroit, MI
Herbert H. Dedo, MD*, San Francisco, CA
Robert H. Mathog, MD*, Detroit, MI

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the role and pathogenesis of HPV type 11 infections in squamous cell carcinoma of the larynx in patients with a previous history of recurrent respiratory papillomatosis.

OBJECTIVES: To demonstrate that Human Papillomavirus (HPV) type 11 plays a more significant role in the development of laryngeal cancer in patients with a history of recurrent respiratory papillomatosis (RRP) than previously reported, and to delineate the molecular mechanisms underlying the malignant transformation of RRP to invasive squamous cell carcinoma. **STUDY DESIGN:** Non-randomized, retrospective laboratory study utilizing tissue specimens from nine patients with laryngeal cancer and a history of RRP. **METHODS:** DNA and RNA extractions were performed on squamous cell carcinomas of 9 patients with a history of RRP and laryngeal cancer. PCR was performed to determine the type of HPV present in each specimen, and, using type specific primers for the E7 oncogene and E5 regulatory gene, to determine the presence of integration of the viral genome into the host genome. The p53 gene in each specimen will be sequenced to locate mutations within this proto-oncogene, which is thought to play a large role in the malignant transformation of HPV-infected cells. **RESULTS:** In patients with a history of RRP, there is a statistically significant relationship between the presence of HPV-11 and the progression to malignancy when compared to HPV-6 infected lesions ($p < 0.0001$). Furthermore, HPV-11 was found in all of the laryngeal cancers of those patients with RRP in this study. We will demonstrate that HPV-11 induced carcinogenesis involves the integration of the viral genome into the host genome and that specific mutations in the p53 oncogene play a role in the transformation of benign papillomas to invasive squamous cell carcinoma. **CONCLUSIONS:** While HPV types 6 and 11 are "low risk" viruses when compared to types 16 and 18, HPV type 11 is an aggressive virus that should be closely monitored in patients with RRP.

10:24 Long-Term Experience with Intralesional Cidofovir for the Management of Pediatric Recurrent Respiratory Papillomatosis

James T. Albright, MD, San Diego, CA
Seth M. Pransky, MD, San Diego, CA
Anthony E. Magit MD, San Diego, CA

OBJECTIVES: To review the long-term experience of using intralesional cidofovir, an acyclic nucleotide phosphonate antiviral medication, for treating severe recurrent respiratory papillomatosis (RRP). **DESIGN:** Clinical case series. **SETTING:** Tertiary care children's hospital. **RESULTS:** Over a 6-year period, 15 children with severe RRP who required operative debulking every 2-6 weeks to maintain airway patency were treated with intralesional cidofovir. Six patients experienced complete remissions after cidofovir therapy and are disease-free over a mean period of 40.7 months. Four other patients with active RRP no longer requiring cidofovir decreased their mean severity scores from 15.8 (range 11-19) to 4.5 (range 3-6) following treatment. Five patients are currently receiving cidofovir for active RRP. Throughout the study period, no patients demonstrated any adverse effects, laboratory abnormalities or evidence of carcinogenesis. The evolution in protocol that occurred as greater experience was gained with this modality will be reviewed. **CONCLUSIONS:** Intralesional cidofovir is a useful adjunct for managing severe RRP. Children with previously uncontrolled papilloma that required frequent operative debulkings were brought under control once cidofovir was instituted. No adverse effects of therapy have been observed over 6 years of use.

10:33 Cidofovir Blood Concentration After Intralesional Injection for Papillomatosis

Patrick Froehlich, MD, Lyon, France
Gilles Roger, MD, Paris, France
Nuca Naiman, Lyon, France
Marie-Claude Gagnieu, Lyon, France
Joelle Bordenave, Paris, France
Savine Mathaut, Paris, France
Noel Garabedian, Paris, France

OBJECTIVES: To appreciate blood diffusion after intralesional treatment for laryngeal papillomatosis. **METHODS:** Cidofovir blood concentration was measured 10 and 45 minutes after intralesional injection in 35 patients with laryngeal or tracheal papillomatosis. **RESULTS:** 0.7 to 60 mg of cidofovir was injected. Ten minutes after injection, serum concentration ranged from 0.04 ng/ml to 1378 ng/ml. 45 minutes after, concentrations varied in both ways, higher or lower. Concentrations varied greatly from one patient to another and could not be predicted from initial volume of cidofovir injected. Concentrations were 10 to 100 times lower than those obtained with intravenous perfusion of cidofovir at 5mg/kg except in some cases where blood concentrations were unexpectedly high. **CONCLUSIONS:** Blood diffusion of cidofovir was observed in all cases, was usually much lower than concentrations measured using intravenous cidofovir, except in few unpredictable cases for which side effects could be expected but didn't occur.

10:42 American Society of Pediatric Otolaryngology (ASPO) Member's Experience with Recurrent Respiratory Papillomatosis (RRP) and the Use of Adjuvant Therapy

Scott A. Schraff, MD, Norfolk, VA
Craig S. Derkay, MD, Norfolk, VA
M. Louise Lawson, PhD, Norfolk, VA
Bonnie Burke, MS, Norfolk, VA

OBJECTIVES: To describe current approaches regarding medical and surgical treatment of RRP. **DESIGN:** A web-based survey regarding experience in children with RRP was administered to members of ASPO. Data is summarized with frequencies or medians with Interquartile Range (IQR). **SETTING:** Private hospitals and tertiary medical centers. **PARTICIPANTS:** 59 pediatric otolaryngologists from 50 practices treating 548 patients with RRP, with a median of 9.5 patients per practice (IQR: 5-15). **RESULTS:** Twenty-six (52%) practices encompassing 312 patients currently utilize adjuvant medical therapies for their RRP patients with 30 receiving interferon, 18 cidofovir, and 11 other adjuvant therapy. Twenty-seven (56%) of 48 practices have treated a total of 56 children with cidofovir. Median age at first cidofovir injection was 6 years (IQR: 3-11) with a median of 12 lifetime RRP surgeries (IQR: 7-20). After a median of 6 (IQR: 3-9) treatments, 3/56 (5.4%) children have worsened, 20/56 (35.7%) are unchanged, 17/56 (30.4%) are improved, and 16/56 (28.6%) are disease-free. Microdebrider is the preferred surgical tool by 30/59 (52%) while 26/59 (44.8%) prefer CO2 laser. Regarding anesthesia, 43.1% prefer spontaneous ventilation, 22.4% jet ventilation, 15.5% apneic ventilation, 10.3% endotracheal tube, and 8.6% other. A total of 35 RRP patient deaths were reported by 24 practices while distal spread was noted in 68 patients from 26 practices. **DISCUSSION:** Management of children with RRP has changed with the advent of new surgical tools and adjuvant medications. **CONCLUSIONS:** Despite the introduction of new therapies, RRP continues to be a disease with significant morbidity and mortality in children.

10:51 Spastic Diplegia and Motor Disorders Occurring in Infants Receiving Interferon-Alpha Therapy: A Meta-Analysis and Case Report

Andre-Paul Michaud, Iowa City, IA
Nancy M. Bauman, MD, Iowa City, IA
Diane K. Burke, RN, Iowa City, IA

Yutaka Sato, MD, Iowa City, IA
Jose M. Manaligod, MD, Iowa City, IA
Richard J. H. Smith, MD*, Iowa City, IA

BACKGROUND: While most hemangiomas are managed with observation, aggressive intervention is required for life-threatening hemangiomas. Alpha-interferon (IFN) is effective in treating most steroid-resistant, life-threatening hemangiomas. The development of spastic diplegia (SD) in a patient receiving IFN prompted a literature review to determine the frequency of this association. **METHODS:** Meta-analysis of 600 English manuscripts published 1/91-6/02 reporting IFN use in infants/children to identify patients manifesting neurologic deficits. **RESULTS:** Including our case, we identified 11/441 pediatric patients receiving IFN to treat vascular anomalies who developed SD. The mean age-of-initiation and duration of IFN therapy were 16.4 weeks (5-36) and 11.2 months, respectively; mean age-at-diagnosis of SD was 17.3 months. 50% of patients had other prenatal/perinatal risk factors for SD. In an additional 18/441 patients, a motor disorder other than SD was noted, usually a subtle change in deep tendon reflexes that improved with IFN cessation. Average age-of-initiation (7.0 weeks) and duration (24 weeks) of therapy were similar in both groups ($p>0.05$). SD was not reported in 3200 patients receiving IFN for other causes, like chronic hepatitis, but therapy was rarely initiated prior to 1 year of age. **CONCLUSIONS:** IFN use should be avoided in infants with life-threatening hemangiomas if effective alternative treatments are available. When IFN use is necessary, patients should undergo monthly neurologic examinations to detect subtle changes in motor activity that may herald the onset of serious motor disturbances such as SD.

11:00 Discussion

SESSION 5: AIRWAY MODERATOR: LAUREN D. HOLINGER, MD*, CHICAGO, IL

11:11 HONORABLE MENTION FOR BASIC SCIENCE - TRIOLOGICAL SOCIETY THESIS

Otitis Media: Treatment with Intranasal Aerosolized Surfactant

Sujana S. Chandrasekhar, MD, New York, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the pathophysiology of acute and serous otitis media as it relates to Eustachian tube dysfunction and evaluate the validity of otitis media treatment with intranasal surfactant in the animal models detailed.

To determine the effect of intranasal surfactant treatment via intranasal metered dose inhaler (MDI) aerosol on Eustachian tube (ET) passive opening pressure (POP) and on the resolution of otitis media with effusion (OME) and acute otitis media (AOM), randomized controlled animal studies were performed. A significant reduction in POP was seen in both 5 and 10 minute post-surfactant measurements in two animal models. When compared to control and propellant-only groups, a significant decrease in days with OME was seen in the surfactant QD (10.57) and BID (8.57), and surfactant with betamethasone QD (8.57) and BID (6.3) groups. In AOM, tympanometry was normal or near normal in half of treated ears and only 24% of placebo ears on day 12. On day 27, 67% of placebo ears were culture-positive compared to 13% of surfactant treated ears, and 58% of placebo middle ears had fluid, while 62% of surfactant treated ears were dry. 75% of untreated animals developed severe labyrinthitis, compared to 15% of treated animals. These findings were significant. Intranasal application of aerosolized MDI surfactant reduces ET POP in normal animals, duration of effusion in animals with experimental OME, and severity and duration of middle ear infection in AOM in another animal model.

11:20 The Management of Posterior Glottic Stenosis in Children Utilizing Posterior Cricoid Grafting

Mike Rutter, MD, Cincinnati, OH
Robin Cotton, MD*, Cincinnati, OH

OBJECTIVES: Posterior glottic stenosis (PGS) is frequently misdiagnosed, and there is no consensus as to the best management strategies. We present our experience with PGS utilizing posterior cricoid grafts. **DESIGN:** A retrospective chart review over a 12-year period. **PATIENTS:** Inclusion criteria included children with PGS as the dominant airway lesion, and in whom laryngotracheoplasty was required. Exclusion criteria included children with concomitant vocal cord paralysis, subglottic stenosis worse than Grade I, or a history of posterior laryngeal clefting. **OUTCOME MEASURES:** Etiology, intervention, decannulation rate, failure rate. **RESULTS:** 29 children were treated. 21 patients had a history of prolonged intubation, and 8 had a history of laryngeal trauma. 20 patients were tracheotomy dependent, and the remainder had stridor. 6 children were referred with a misdiagnosis of bilateral vocal cord paralysis. 12 were repaired as a single stage procedure, and 17 with a suprastomal stent. In 26 cases reconstruction was with costal cartilage. The overall decannulation rate has been 97%, though a second procedure was required in 5 children. **CONCLUSIONS:** Posterior glottic stenosis is well managed with costal cartilage grafting of the posterior cricoid. This series has seen an evolution in management with shorter stenting periods, placement of flanged posterior grafts without sutures, and graft placement without complete laryngofissure.

11:29 Repair of Subglottic Stenosis Using Autogenous Thyroid Cartilage

Mark A. Varvares, MD, Boston, MA
William W. Montgomery, MD*, Boston, MA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the advantages of rigid fixation of the cartilage graft, in posterior cricoid split procedures.

OBJECTIVES: Subglottic stenosis continues to be a difficult management problem. Conservative management using bouginage, laser therapy, and Mitomycin-C and steroid injections frequently fail. Definitive resection of the subglottis with thyrotracheal anastomosis has increased in popularity, but carries significant operative risks and postoperative complications. In the past nine years, we have used a modification of a technique to successfully widen the subglottis, which we first published twenty years ago. Using a laryngofissure approach, the cricoid cartilage is split vertically, anteriorly and posteriorly. Cartilage grafts, obtained from the upper thyroid laminae anteriorly, are inserted in these splits and the posterior graft is fixed in place using specially designed pins. Securing the posterior cartilage graft with pins improves the graft fixation, by adding rigidity and by shortening the procedure. The repair is held in place for three to four weeks with either a silicone t-tube or a laryngeal stent. **STUDY DESIGN:** Retrospective review, single surgeon's experience, tertiary care medical center. **METHODS:** Retrospective review, single surgeon's experience, tertiary care medical center. **RESULTS:** The charts of 20 consecutive patients treated with this technique were reviewed. The overall decannulation rate was 95%, with one patient requiring intermittent treatment for tracheobronchitis and reflux. **CONCLUSIONS:** Autogenous grafting is a useful tool in the treatment of subglottic stenosis. Posterior cartilage graft fixation with our pin technique offers a significant advantage of suture fixation, by increasing graft stability and decreasing operative time, and resulted in a 95% decannulation rate in our series.

11:38 In Situ Tissue Engineering of the Laryngeal and Tracheal Tissue: Experimental Study

Koichi Omori, MD, Kyoto, Japan
Tatsuo Nakamura, MD, Kyoto, Japan
Shin-ichi Kanemaru, MD, Kyoto, Japan

Akhmar Magrufov, MD, Kyoto, Japan
Yasuyuki Hiratsuka, MD, Kyoto, Japan
Yasuhiko Shimizu, MD, Kyoto, Japan

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the regeneration of the laryngeal and tracheal tissue using a novel technology of in situ tissue engineering in canine model.

OBJECTIVES: Objective of the present study is to evaluate the efficacy of regeneration of the laryngeal and tracheal tissue using in situ tissue engineering in a canine model. **STUDY DESIGN:** Marlex mesh reinforced with polypropylene yarns coated with collagen and covered by a collagen sponge was used as the tissue scaffold. It was implanted into the defect of the larynx and trachea. **METHODS:** The operation was undertaken under general anesthesia on seven beagle dogs. The larynx was exposed and the anterior one third to half of the cricoid cartilage was resected. The scaffold material was anastomosed to the lower edge of the thyroid cartilage and to the first tracheal cartilage using 4-0 absorbable sutures. In two dogs, the cricoid and trachea were simultaneously resected. Endoscopy, light microscopy, scanning electron microscopy and strain-force measurement were undertaken for the evaluation of the regenerated tissue. **RESULTS:** Postoperative endoscopic examination during 3 to 12 months showed no airway obstruction in all dogs. There were granulation tissue in 2 dogs and slight mesh exposure in 1 dog although they were asymptomatic. The endolaryngeal and endotracheal lumen were covered by ciliated epithelial cells. Framework was firmly supported by regenerated tissue as well as the normal cricoid. **CONCLUSIONS:** Confluent regeneration of the epithelium over the scaffold and good incorporation of the scaffold material into the host tissue were observed after the surgery. In tissue engineering of the laryngeal and tracheal tissue will be feasible in the future for reconstruction after partial resection.

11:47 Molecular Mechanisms of Upper Respiratory Tract Cartilage Development

Ravindhra G. Elluru, MD PhD, Cincinnati, OH
Jeffrey A. Whitsett, MD, Cincinnati, OH

OBJECTIVES: To identify genes expressed early in the formation of the mouse trachea that control patterning of tracheal cartilaginous rings. **DESIGN:** Digoxigenin labeled RNA probes to putative tracheal patterning genes were generated by in vitro transcription. Embryos ranging from fetal day 9 to 19 were then subjected to whole mount in-situ hybridization using these labeled RNA probes. In this manner the three-dimensional temporal and spatial expression of putative tracheal patterning genes were examined. **SUBJECTS:** F/VBN mice. **INTERVENTIONS:** None. **RESULTS:** In the developing trachea the expression of Sox 9 mRNA, a transcription factor known to be important in the differentiation of chondrocytes, preceded cartilage ring formation. Sox 9 was expressed as two distinct longitudinal stripes along the posterior-lateral aspect of the trachea as early as PC day 9 when the developing trachea is first identified. Collagen 2A1, a cartilage specific protein, was subsequently expressed in the same longitudinal pattern as Sox 9, consistent with the early commitment of Sox 9 expressing cells to the cartilage program. As cartilage rings formed, collagen 2A1 was expressed over the anterior aspect of the trachea. **CONCLUSIONS:** We have developed a system to study the early expression of genes that may pattern the formation of the trachea. We have identified a gene, Sox 9 that may be essential in establishing the initial spatial patterning of pre-chondrocytes, which may subsequently form tracheal rings.

11:55 Discussion

12:00 Adjourn

7:00 Triological Society Reception and Banquet

TUESDAY, MAY 6, 2003
JOINT SESSION WITH AMERICAN HEAD AND NECK SOCIETY
DELTA BALLROOM C

7:15 Triological Society Business Meeting

7:55 Introduction of Triological Society President-Elect, Robert A. Jahrsdoerfer, MD*
Roger L. Crumley, MD*, Irvine, CA

SESSION 7

MODERATORS: ARA A. CHALIAN, MD, PHILADELPHIA, PA
ANNA M. POU, MD, GALVESTON, TX

8:00 Giant Juvenile Nasopharyngeal Angiofibroma: Management by Skull Base Surgery
Paul J. Donald, MD*, Sacramento, CA

Over the period from 1977 to 2001, 5 patients were seen with giant angiofibromas that had intracranial penetration. Three of these had involvement of the cavernous sinus with angiographic evidence of significant blood supply to the tumor. All patients had a skull base procedure in an attempt at complete tumor removal. The infratemporal fossa/middle fossa (ITF/MF) approach was used in 3 patients, and anterior craniofacial approach on 1 and an anterior sub-cranial approach on 1. Complete tumor removal was achieved in 4 patients and incomplete excision on 1. The latter was attempted with an anterior sub-cranial approach, required an ITF/MF approach for completion because of unanticipated cavernous sinus involvement. The patient declined further surgery. This was the only patient with persistent disease. Preoperative and intra-operative management, blood loss, complications and residual effects will be described.

8:08 Patterns of Drainage and Recurrence Following Sentinel Lymph Node Biopsy for Cutaneous Melanoma of the Head and Neck

T. R. Fincher, MD, Dallas, TX
J. C. O'Brien, MD, Dallas, TX
T. L. Fisher, RN, Dallas, TX
Z. H. Lieberman, MD, Dallas, TX
J. S. Stephens, MD, Dallas, TX
T. M. McCarty, MD, Dallas, TX
J. T. Preskitt, MD, Dallas, TX
J. A. Kuhn, MD, Dallas, TX

INTRODUCTION: The long-term technical and clinical results for patients undergoing sentinel lymph node (SLN) biopsy for cutaneous head and neck (H&N) melanoma is limited. The purpose of this study is to characterize patterns of lymphatic drainage and tumor recurrence in a single institutional experience. **METHODS:** A retrospective review of patients undergoing SLN biopsy for H&N melanoma over a six year period was performed. Tc-99 sulfur colloid along with isosulfan blue dye was injected at the primary site. Lymphoscintigraphy was performed preoperatively. The SLN was serially sectioned and evaluated by H/E staining and immunohistochemistry. **RESULTS:** Forty-six patients were identified with primary melanomas of the face (n=23), fronto-parietal scalp (n=4), occipital scalp (n=6), and neck (n=13). The number of draining lymph node basins was one (n=26), two (n=15), or three (n=6). SLN drainage included unpredicted basins in 12/46 cases including: face (4/23), fronto-parietal (2/4), occipital (2/6), and neck (4/13). The extent of SLN biopsy included removal of one node (n=11), multiple nodes in one basin (n=16), one node in multiple basins (n=7), and multiple nodes in multiple basins (n=11). Parotidectomy was required in seven patients. Of the eight patients with a positive SLN (mean f/u = 27.7 months), recurrent disease was identified in 2(25%) at a mean interval of 6.7 months. The site of first recurrence was nodal (n= 1) and local (n=1). Of the 38 patients with a negative SLN (mean f/u = 34.2 months), recurrent disease was identified in 5 (14.3%) at a mean interval of 19.1 months. The site of first recurrence was systemic (n=4) and local (n=1). There were no nodal recurrences. **CONCLUSIONS:** This study shows that the number and location of the SLN is variable and unpredictable for cutaneous H&N melanoma. Lymphoscintigraphy is an important tool to guide the complete removal of all SLN including those in the parotid gland. With this approach, the long term nodal basin recurrence after SLN biopsy is very low.

8:16 Vertical Partial Laryngectomy: A Viable Option Following Radiotherapy Failure

K. Mannion, MD, Farmington, CT
J. D. Spiro, MD*, Farmington, CT

OBJECTIVES: To evaluate the efficacy of vertical partial laryngectomy as salvage therapy after failure of primary radiotherapy for early glottic cancer. **INTRODUCTION:** Radiation therapy is frequently used as primary treatment of stage 1 and 2 cancer of the glottic larynx, however the recurrence rate remains at least 12%. Salvage surgery is the main treatment modality in these cases. **METHODS:** Eleven consecutive patients were identified through a prospectively maintained surgical database as having undergone vertical partial laryngectomy for recurrence after radiotherapy at the University of Connecticut Health Center from 1991-2002. A retrospective outcome analysis was performed for these patients. **RESULTS:** Average hospital stay was 7.4 days, with ten of eleven patients decannulated and swallowing by discharge. The remaining patient was decannulated and swallowing 3 weeks postoperatively. Two patients died of other causes free of disease at 17 and 21 months after surgery. Average follow up for the remaining nine patients is 38 months (range 10-117 months), during which there were no recurrences or deaths. Two patients did require further endoscopic surgery for airway maintenance (one for granulation tissue at the surgical site; one for redundant tissue at the supraglottic level). All patients felt their voice quality was satisfactory, and none had long term swallowing difficulty. **CONCLUSIONS:** Vertical partial laryngectomy is effective salvage surgery for both disease control and preservation of laryngeal function in carefully selected patients whose early glottic cancer recurs after radiotherapy.

8:24 Positive Mandibular Bone Margins: Clinical Implications and an Improved Technique for Intraoperative Assessment

Edward C. Weisberger, MD*, Indianapolis, IN

OBJECTIVES: To present the significance of positive bone margins during resection of malignant tumors of the oral cavity and to validate an improved technique for intra-operative pathologic assessment of a full cross-section of bone. **METHODS:** Four cases where the mandible bone margin was positive regarding the presence of tumor on the final pathology assessment rendered one week after resection are presented including a description of management and clinical outcomes. Improvements in a previously reported method using microwave technology to speed decalcification and therefore provide intra-operatively a full cross-sectional analysis of resected bone are described. **RESULTS:** Three of four patients who had positive mandible margins on a final pathology report experienced recurrence of cancer at the primary site despite subsequent radiation and/or surgical therapy. In twenty-five other patients where bone margins were analyzed intra-operatively using a microwave augmented process there was a 100% correlation of the intra-operative bone margin with that obtained employing a standard decalcification method requiring seven days to complete. **CONCLUSIONS:** Intra-operative assessment of mandible margins is feasible

and clinically important in the treatment of cancer of the oral cavity.

8:32 Discussion

- 8:40 THE TRIOLOGICAL SOCIETY OGURA LECTURE**
“Dr. Ogura, It Gets Worse” - Healthcare Commentary from the U.K.
Arnold G. D. Maran, MD, Edinburgh, Scotland

SESSION 8

MODERATORS: CAROL G. SHORES, MD, CHAPEL HILL, NC
RALPH W. GILBERT, MD, TORONTO, ON, CANADA

- 9:15 HONORABLE MENTION FOR CLINICAL RESEARCH - TRIOLOGICAL SOCIETY THESIS**
The Application of Sentinel Node Radiolocalization to Solid Tumors of the Head and Neck—A Ten Year Experience
James C. Alex, MD, New Haven, CT

OBJECTIVES: Research goals were to: 1) develop an accurate, minimally invasive technique of sentinel node radiolocalization (SNRL) and biopsy (SNRLB) in the feline model and compare it to blue dye mapping techniques, and 2) test the applicability of SNRLB in three head and neck tumor types: a) N0 malignant melanoma, b) N0 Merkel cell carcinoma (MCC), and c) N0 squamous cell carcinoma (HNSCC). **STUDY DESIGN:** Prospective consecutive series study (in feline and human studies). **METHODS:** In eight felines, the technique of SNRL/SNRLB was compared against blue dye mapping. Patterns of sentinel node (SN) gamma emissions were recorded. Localization success rates were determined for blue dye and SNRL/SNRLB. In the human studies, SNRLB was performed for N0 malignant melanoma, MCC and HNSCC. The accuracy of SNRL/SNRLB, the micrometastatic rate, the false negative rate and long-term recurrence rates are reported for each tumor type. In the melanoma study, the success of SN localization was compared between SNRLB, blue dye mapping and lymphoscintigraphy. In the MCC study, localization rates were evaluated for SNRLB and lymphoscintigraphy. In the HNSCC study, the localization rate of SNRLB and the predictive value of the SN relative to the remaining lymphatic bed were determined. **RESULTS:** Across the different head and neck tumor types studied, SNRLB had a success rate approaching 95%. SNRLB was more successful than blue dye mapping or lymphoscintigraphy at identifying the SN. No SN negative patient developed a later regional recurrence. In the HNSCC study, there was no instance where negative SN was associated with a positive lymphadenectomy specimen. **CONCLUSIONS:** In head and neck tumors, SNRLB was performed through a small incision with a high success rate and a low false negative rate. In HNSCC, the histology of the SN does appear to reflect the regional nodal status of the patient.

- 9:23 Impact of Positron Emission Tomography (PET) with 18F-Flouro-Deoxy-Glucose (FDG) on Staging of Advanced Head and Neck Squamous Cell Carcinoma (HNSCC)**
Daniel T. Schmid, MD, Zurich, Switzerland
Sandro J. Stoeckli, MD Zurich, Switzerland (*Presenter*)
Florian Bandhauer, MD, Zurich, Switzerland
Pia Huguenin, MD, Zurich, Switzerland
Stephan Schmid, MD, Zurich, Switzerland
Gustav K. VonSchulthess, MD, Zurich, Switzerland
Gerhard W. Goerres, MD, Zurich, Switzerland

OBJECTIVES: To evaluate the impact of a FDG-PET in addition to high resolution computed tomography (HRCT) on staging and treatment planning in patients with locoregionally advanced HNSCC. **METHODS:** Forty-eight consecutive patients with advanced stage (T>2 and/or N>1, M0) HNSCC underwent PET. Endpoints were extent of nodal disease, distant metastases, second primary tumors, and alteration in therapy planning. **RESULTS:** In 41/48 patients (85%) nodal findings between HRCT and PET were concordant. In 3 patients PET upstaged the tumor in its N category and in 4 patients PET underestimated nodal disease. PET revealed more difficulties in delineating lymph node metastases in the close vicinity of the primary tumor than HRCT. Conversely, PET seemed to be superior for the detection of more distant or even contralateral lymph node metastases. PET suggested distant disease in 6/48 patients (13%). Cytologic work-up confirmed distant metastases in 2 (4%) and a second primary tumor in 2 (4%) patients. PET was false positive in 2 (4%) patients due to inflammatory changes. Detection of contralateral neck disease in 1, distant metastases in 2 and a second primary in 2 patients influenced the treatment planning in totally 5/48 patients (10%). **CONCLUSIONS:** FDG-PET acquired in a whole body mode is able to assess lymph node involvement, distant metastases and second primaries in a single study mode and has impact on staging and therapy planning. Addition of anatomical information as recently introduced as combined PET/CT will possibly improve the accuracy of cervical lymph node assessment and allow the evaluation of the primary tumor and radiation planning.

- 9:31 The Role of Computed Tomography (CT) Scan in the Management of the N Positive Neck After Chemo-Radiotherapy**
Ruben Velazquez, MD, San Antonio, TX
Frank R. Miller, MD, San Antonio, TX
David Sycamore, MD, San Antonio, TX

OBJECTIVES: The role of the neck dissection after completion of organ preservation protocols remains controversial. The purpose of this study was to determine the accuracy of CT scanning (CT) in predicting residual cervical metastatic disease in patients with squamous cell carcinoma (SCC) of the upper aerodigestive tract undergoing chemo-radiotherapy. **METHODS:** Retrospective case series of patients undergoing chemo-radiotherapy for advanced head and neck SCC. Entry criteria included: N positive disease upon study entrance, complete response at the primary tumor site, completion of post treatment CT, post treatment neck dissection, and correlation of the CT scan with the pathologic neck specimen. Calculation of the sensitivity and specificity of CT scan to predict the presence or absence of residual metastatic disease. **RESULTS:** Fifty patients met the criteria for analysis. Seventeen of the 50 (34%) neck dissection specimens were positive for residual metastatic disease. The sensitivity of the CT scan was 78% while the specificity was only 33%. The positive predictive value of the CT scan was 36%. **CONCLUSIONS:** While the role of the post treatment remains controversial the surgeon must rely on clinical examination and imaging studies to guide post treatment decision-making. Our practice has been to perform planned staged neck dissections for all N2/N3 necks as well as N1 necks with an incomplete response to treatment. The CT scan lacks adequate sensitivity/specificity to predict the presence or absence of residual cervical metastatic disease. Clinical examples will demonstrate the limitations of CT scan.

9:39 Discussion

- 9:47 Diagnostic Accuracy of MR in the Assessment of Mandibular Involvement by Squamous Cell Carcinoma: A Prospective Study**
Andrea Bolzoni, MD, Brescia, Italy
Cesare Piazza, MD, Brescia, Italy
Johnny Cappiello, MD, Brescia, Italy
Giorgio Peretti, MD, Brescia, Italy

Davide Farina, MD, Brescia, Italy
Roberto Maroldi, MD, Brescia, Italy
Piero Nicolai, MD, Brescia, Italy

OBJECTIVES: Aim of the study was to evaluate sensitivity, specificity, accuracy, positive, and negative predictive values of MR in the assessment of mandibular involvement by oral-opharyngeal squamous cell carcinoma (SCC). **METHODS:** Between January 1994 and September 2002, 40 patients with oral-opharyngeal SCC who underwent marginal or segmental mandibulectomy (19 treated for recurrence) were preoperatively studied with MR. Tumor signal replacing the hypointense cortical rim was considered the main radiologic finding for mandibular invasion. Indications for mandibulectomy were: MR suggestive for bony invasion, tumor involving the retromolar trigone, recurrent lesion, and intraoperative suspicion of periosteal invasion. **RESULTS:** MR suggestive for mandibular involvement was found in 15 patients. Segmental mandibulectomy was performed in 14 cases, and marginal resection in 1. In 13 only bony invasion was confirmed at histopathologic examination. All the remaining 25 who received marginal or segmental mandibulectomy with negative MR had no pathologic evidence of involvement, except for 1 patient with a retromolar trigone lesion previously treated by RT, which, in spite of cortical integrity, had neoplastic spread along Havers' channels into the medullary space. This patient represents the only false negative in the present series. MR sensitivity, specificity, accuracy, negative, and positive predictive values were thus 93%, 92%, 92.5%, 96%, and 87%, respectively. **CONCLUSIONS:** MR is considered the technique of choice for treatment planning in advanced oral-opharyngeal SCC for its accuracy in revealing soft tissue involvement. We also demonstrated the additional diagnostic value of this technique in detecting bony invasion. Other preoperative examinations (OPT, CT, DentaScan, scintigraphy, and SPECT) can therefore be considered superfluous in terms of cost and time.

9:55 Targeted Molecular Disruption of the MRN Complex Induces Radiation Sensitization in HNSCC

Bert W. O'Malley, MD, Baltimore, MD
Daqing Li, MD, Baltimore, MD
James Carney, PhD, Baltimore, MD
Joung Rhee, PhD, Baltimore, MD
Mohan Suntharalingam, MD, Baltimore, MD

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the basic principals of cellular DNA repair and how molecular or gene therapy strategies could be used to alter this important cellular function in tumor cells to enhance the therapeutic effects of radiation.

OBJECTIVES: Recurrent tumor, local failure and toxicity to adjacent critical structures are significant problems associated with primary radiation therapy of cancers of the head and neck. We are developing an "anti-sense" type gene therapy strategy to sensitize head and neck squamous cell carcinoma (HNSCC) to radiation treatment. Our strategy is founded on the rare hereditary disorder, Nijmegen breakage syndrome, where patients with this disease show severe radiation sensitivity. The basis for Nijmegen breakage syndrome is a defect in the Nbs1 component of a three protein DNA repair complex (Mre11/Rad50/Nbs1, known as MRN) contained within all cells in the human body. We hypothesized that tumor-specific disruption of the function of this MRN complex, specifically the Nbs1 protein, would lead to enhanced tumor cell sensitivity to ionizing radiation therapy. **STUDY DESIGN:** In order to test this hypothesis we have devised recombinant adenoviruses expressing the full-length Nbs1 as well as the C-terminal Mre11 interaction domain and have assessed the ability of these viruses to increase the radiation sensitivity and kill HNSCC cells in vitro. **METHODS:** We constructed two recombinant adenoviruses by cloning the full-length Nbs1 cDNA as well as the C-terminal 300 amino acids of Nbs1 into an adenovirus backbone under the control of a CMV promoter. The resulting adenoviruses were used to infect HNSCC cell lines in vitro. These cells were evaluated for expression of the viral based constructs and assayed for growth rate and clonogenic survival following radiation exposure. **RESULTS:** A constitutively expressed GFP gene in the viral backbone confirmed efficient uptake of the virus into the HNSCC cell line and Western blot confirmed the presence of the virally expressed Nbs1 and Nbs1-300. Following exposure to ionizing radiation cells infected with the Nbs1-300 virus showed a statistically significant reduction in growth rate relative to cells infected with control virus. Surprisingly, this effect was even stronger with the full-length wild-type Nbs1 protein. Examination of clonogenic survival also demonstrated statistically significant radiation sensitization. Furthermore, the use of a fractionated radiation scheme following gene therapy with the full-length Nbs1 protein results in significant reduction in cell survival. **CONCLUSIONS:** Our data provide a proof of principle that targeted molecular disruption of Nbs1 function in tumor cells may provide a means of enhancing the radiosensitivity of head and neck tumors.

10:03 Discussion

10:10 The American Head and Neck Society John J. Conley Lecture Surgeons as Samaritans: Medical Ethics and the Rising Costs of Practice Jonathan D. Moreno, PhD

10:55 Break

SESSION 9

**MODERATORS: C. RON CANNON, MD*, FLOWOOD, MS
ROBERT A. SOFFERMAN, MD*, BURLINGTON, VT**

11:20 Adenoid Cystic Carcinoma of the Head and Neck: Factors Influencing Survival—A Review of 31 Cases Freedom Johnson, BS, Sacramento, CA Danny J. Enepekides, MD, Sacramento, CA Paul J. Donald, MD*, Sacramento, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the therapeutic and anatomic factors influencing the outcome of therapy for adenoid cystic carcinoma of the head and neck.

OBJECTIVES: Determine the impact of surgical margins, radiation therapy, and anatomic location on survival in patients with adenoid cystic carcinoma. **STUDY DESIGN:** Retrospective chart review. **METHODS:** We reviewed records of 31 patients with histopathologically proven adenoid cystic carcinoma who presented to the University of California, Davis Department of Otolaryngology between 1973 and 2002. **RESULTS:** The patients included 19 women and 12 men, with a mean age of 51 at diagnosis, and a mean follow-up of 5.1 years. Twenty-two patients survived (overall survival = 71%). Six of 9 with positive margins survived, compared to 16 of 22 with negative margins. Sixteen received adjuvant radiation therapy with 9 surviving, while 13 of 15 non-irradiated patients survived. Ten of 16 irradiated patients had paranasal sinus tumors whereas 14 of 15 who had no radiation had tumors elsewhere. The primary sites included 10 major salivary gland tumors and 21 in the minor salivary glands, with 11 of those in the paranasal sinuses. Five of 11 patients with paranasal sinus tumors survived contrasted with 8 of 10 with tumors of other minor salivary glands and 9 of 10 with major salivary gland tumors. **CONCLUSIONS:** Seventy-three percent of patients with negative surgical margins survived compared to fifty percent survival in those with positive margins, suggesting negative margins have an important impact on survival. The role of adjuvant radiation remains unclear. More non-irradiated patients survived, likely reflecting selection

bias with more advanced cases receiving radiation. Lastly, tumor location impacts outcome with paranasal sinus tumors predicting lower survival.

11:28 Impact of Surveillance Patterns Upon Detection of Recurrent Disease in Patients Treated for Head and Neck Cancer

Amit Agrawal, MD, Columbus, OH
Brad deSilva, BS, Columbus, OH
Brooke Buckley, MD, Cleveland, OH
David E. Schuller, MD*, Columbus, OH

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the relative impact of current standard surveillance patterns in the detection of recurrent or new primary disease in patients treated for head and neck cancer.

OBJECTIVES: Objective evidence supporting current NCCN guidelines regarding surveillance of patients treated for head and neck cancer (HNC) is presently lacking. This study examines the relative impact of current surveillance methods upon disease detection in this patient population. **STUDY DESIGN:** Prospective study. **METHODS:** Clinical information was prospectively collected in a standardized format during 3,645 HNC patient encounters over an eight-month period. Data pertaining to visit history/compliance, symptom history, patient findings, physician findings, and disease status for each encounter were reviewed. **RESULTS:** Of 3,645 visits, disease recurrence/new primary tumor was documented in 183 encounters (5%). Salvage therapy was offered in 63% of cases. Of these 183 recurrences/new primaries, there were 143 patients (80%) who had identified new symptoms and/or physical findings before the physician's examination. Most commonly reported was the presence of a neck mass (37%), progressive pain (27%), or other visible lesion/ulcer (14%). Patients with recurrence represented nearly 40% of all patients reporting new symptoms/findings (143/367). Conversely, recurrence was rare in the absence of reported symptoms/findings (1.2%). Surprisingly, despite patients reporting new symptoms/findings, physician evaluation most commonly occurred at the patient's routine surveillance visit rather than an earlier time point (123/143, 86%). **CONCLUSIONS:** Self-diagnosis of recurrent or new primary disease is extremely common by virtue of symptoms/findings noted by patients prior to interaction with the clinician. Presence of symptoms/findings, however, did not motivate the patients to seek earlier medical attention. In the absence of such symptoms, physician diagnosis of recurrence is uncommon. Given the significant social and economic impact involved in surveillance of HNC patients, further prospective study to optimize the method and frequency of this type of clinical activity is warranted and planned.

11:36 Salvage Rate of Cervical Metastases

Liana Puscas, MD, Sacramento, CA
Danny J. Enepekides, MD, Sacramento, CA
Paul J. Donald, MD*, Sacramento, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the success rate of salvage of cervical metastases in patients with upper aerodigestive tract squamous cell carcinoma.

OBJECTIVES: To evaluate the salvage rate of treatment of cervical metastases in patients with upper aerodigestive tract squamous cell carcinoma. **STUDY DESIGN:** Retrospective chart review. **METHODS:** The charts of 1000 consecutive patients treated for head and neck cancer at a single university teaching hospital were reviewed. Patients with a history of squamous cell carcinoma who had residual or recurrent cervical nodal disease were selected. Patients with distant/systemic metastases at the time of the presentation of the residual or recurrent cervical nodal disease and living patients with followup of less than two years were excluded. **RESULTS:** Of the over 100 patients who met the inclusion criteria, 35% were alive without disease. Sixty-five percent had succumbed to the squamous cell carcinoma or had died of other causes. Eighty-eight percent of patients with residual or recurrent cervical nodal disease had received previous radiation therapy to the neck with/without chemotherapy. Thirty percent of the patients had undergone previous neck dissection. Only 10% of patients who had received both prior surgical and radiation therapy to the neck survived more than two years. **CONCLUSIONS:** The literature reports a generally poor outcome for patients with residual or recurrent cervical nodal disease. This study revealed a relatively good result with one third of the patients living at least two years after undergoing surgical salvage and radiation whenever possible. However patients who received aggressive initial therapy with both surgery and radiation and then went on to develop recurrent disease had a very poor survival of only 10% at two years.

11:44 The Diagnostic Utility of Computed Tomography for Preoperative Localization in Surgery for Hyperparathyroidism

Neil D. Gross, MD, Portland, OR
Jane L. Weissman, MD, Portland, OR
Elizabeth L. Veenker, MS, Portland, OR
James I. Cohen, MD PhD, Portland, OR

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the diagnostic utility of computed tomography for preoperative localization in surgery for hyperparathyroidism.

OBJECTIVES: Successful unilateral exploration, the minimally invasive approach and reoperative surgery of the parathyroids require accurate preoperative localization of the abnormal gland. While ultrasound and nuclear imaging techniques have an established role in this regard, the use of CT for parathyroid exploration is not well understood. The purpose of this study is to better define the diagnostic utility of computed tomography (CT) in preoperative localization of the abnormal gland in surgery for hyperparathyroidism. **STUDY DESIGN:** Retrospective cohort study/tertiary care academic medical center. **METHODS:** Twenty-one cases of hyperparathyroidism were investigated preoperatively using CT imaging. The majority of cases (14/21) were reoperative and all patients had previously undergone inconclusive sestamibi scanning and/or ultrasound. **RESULTS:** Parathyroid exploration was successful in all but one patient. Computed tomography correctly localized 18 (90%) of the 20 patients who underwent successful extirpation of parathyroid pathology and was able to identify abnormal glands with equal utility in the neck and the mediastinum. **CONCLUSIONS:** When ultrasound or sestamibi are unsuccessful, CT imaging can provide valuable preoperative localizing information prior to surgery for hyperparathyroidism, even in patients with recurrent or persistent disease who have already been operated on.

11:52 Discussion

12:00 Adjourn

**POSTER PRESENTATIONS AND RECEPTION
SUNDAY, MAY 4, 6:00 - 7:30 PM
COMBINED SESSION WITH ASPO AND AHNS**

**POSTER VIEWING - SUNDAY, MAY 4 - TUESDAY, MAY 6, 2003
POSTER NUMBERS AS THEY WILL APPEAR IN
TRIO/ASPO/AHNS POSTER PROGRAM**

**ASPO POSTERS 1-32
AHNS POSTERS 33-66
TRIO POSTERS 67-104**

67. The Proton Pump is Associated with Human Laryngeal Submucosal Glands

Kenneth W. Altman, MD, PhD, Chicago, IL
Neal Hammer, MS, Chicago, IL
G. Kenneth Haines III, MD, Chicago, IL
Ron R. Dubreuil, PhD, Chicago, IL
James A. Radosevich, PhD, Chicago, IL

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to recognize the presence, location and potential for clinical significance of the H⁺/K⁺-ATPase proton pump in the human larynx.

OBJECTIVES: Diagnosis and treatment of laryngopharyngeal reflux disease (LPRD) has been significantly increasing over recent years. The larynx is highly sensitive to the effects of LPRD, which is commonly treated with proton pump inhibitor (PPI) pharmacotherapy. The hypothesis of this study is that proton pump activity exists in the human larynx and is not solely associated with the parietal cells of the stomach. **STUDY DESIGN:** Pathophysiologic investigation. **METHODS:** Two fresh human cadaveric larynges (one male and one female) were obtained as part of an exempt protocol from the Human Subjects Committee, formalin fixed and paraffin embedded. Banked human stomach tissue was also obtained for comparative positive and negative control. Sections were immunostained with monoclonal antibodies reactive with both alpha and beta subunits of the H⁺/K⁺-ATPase (proton) pump. Specimens were reviewed for staining pattern and intensity. **RESULTS:** Stomach parietal cells exhibited strongly positive staining for both the alpha and beta subunits of the proton pump. There was no staining in stomach cells that were not morphologically consistent with the parietal cell. In the human larynx, there was strong focal staining in the serous cells and ducts of the minor seromucinous glands. There was some variable staining in the laryngeal epithelium thought to be consistent with artifact. **CONCLUSIONS:** The H⁺/K⁺-ATPase (proton) pump is present in serous cells and ducts of submucosal glands in the human larynx. Proton pump inhibitor pharmacotherapy may therefore have a site of action in seromucinous glands of the human larynx, with possible relevance to those patients treated for chronic laryngitis.

68. The Expression of Focal Adhesion Kinase and Phosphorylated Focal Adhesion Kinase in Squamous Cell Carcinoma of the Larynx

Michael S. Aronsohn, MD, Gainesville, FL
Heather Brown, MD, Gainesville, FL
Garret Hauptman, BA, Gainesville, FL
Lori J. Kornberg, PhD, Gainesville, FL

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to explain recent discoveries involving focal adhesion kinase (FAK) and phosphorylated focal adhesion kinase (phospho-FAK) in laryngeal carcinoma.

OBJECTIVES: This study is designed to demonstrate whether FAK and phospho-FAK are overexpressed in carcinoma of the larynx. In addition, staining intensity will be compared with differentiation status to determine if a correlation exists. **STUDY DESIGN:** Retrospective archival pathology review. **METHODS:** Thirty-five paraffin embedded tissue specimens of laryngeal carcinoma were obtained from the department of pathology at the University of Florida. Immunohistochemical staining of the specimens for FAK and its phosphorylated form, phospho-FAK were performed. Mucosa derived from tonsillectomy specimens served as a control. Stain intensity on a zero to 3+ scale, distribution of staining, and percentage of cells stained was determined by a board certified pathologist. **RESULTS:** Both FAK and phospho-FAK were overexpressed in laryngeal carcinoma. There was a statistically significant correlation between FAK staining intensity and tumor differentiation. Poorly differentiated tumors had more intense staining compared with more moderately differentiated tumors (p<0.001). In addition, a unique nuclear staining pattern, not previously described, was noted with phospho-FAK. **CONCLUSIONS:** Focal Adhesion Kinase and its activated phosphorylated form are overexpressed in squamous cell carcinoma of the larynx. Not only is there a correlation between FAK and tumor differentiation, phospho-FAK is uniquely expressed in the nucleus. Further investigation is warranted to determine the clinical implication of these novel findings.

69. Reconstruction of the Entire Ossicular Conduction Mechanism

Alex S. Battaglia, MD, PhD, San Diego, CA
C. Gary Jackson, MD*, Nashville, TN
Ben M. McGrew, MD, Honolulu, HI

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the treatment plan for a group of patients requiring reconstruction of the entire ossicular conduction mechanism including removal of the stapes footplate.

OBJECTIVES: Stapes fixation combined with fixation, absence or malformation of the malleus-incus complex requires an uncommon surgical reconstruction and offers a unique combination of challenges and hazards. This situation may occur in the presence of severe tympanosclerosis, otosclerosis, congenital ossicular malformations, and revision surgery for either stapedectomy or chronic ear disease. In previous reports this procedure has been grouped with total ossicular reconstruction without much distinction. However, the challenges unique to this problem deserve special consideration. This report offers a treatment plan for a group of patients requiring reconstruction of the entire ossicular conduction mechanism including removal of the stapes footplate. **STUDY DESIGN:** Retrospective. **METHODS:** Three-thousand, three-hundred-and-fifty (3,350) charts of patients requiring total ossicular reconstruction prostheses were reviewed. Of this group of patients only 21 out of 3,350 patients from 1977 to 1999 required TORP placement and removal of the stapes footplate. The patients were followed for an average time of 50-months. **RESULTS:** Hearing results indicated an overall improvement in the air-bone gap (ABG) of 10 dB, with 52% achieving an ABG of less than 20 dB. Of the twenty-one cases, five revision surgeries were performed. Three were performed due to a displaced TORP

(14.2%) and two were performed due to extruded TORP's (9.5%). **CONCLUSIONS:** Reconstruction of the entire ossicular conduction mechanism including removal of the stapes footplate can be successfully achieved with improvement of the ABG less than 20 dB. Hearing results and extrusion rates are comparable to reported results of TORP placement on a mobile footplate. Successful stapedectomy and simultaneous ossicular chain reconstruction can be performed as a single or staged procedure. Special attention is paid to avoid intrusion of the prosthesis into the vestibule.

70. Voice Rest After Surgery for Benign Vocal Fold Lesions: Current Opinion and Practice

Alison Behrman, PhD, New York, NY
Lucian Sulica, MD, New York, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to 1) explain the rationale for use of postoperative voice rest, including potential physiologic mechanisms and their impact on vocal fold mucosal repair, and 2) review current clinical opinions and practices regarding voice rest after microsurgery for benign mucosal lesions.

OBJECTIVES: Although voice rest is often recommended after excision of benign mucosal vocal fold lesions, no standard of care exists for guidelines regarding the use, duration or extent of vocal restrictions. This study is intended to explore current opinions and practices of otolaryngologists regarding the use of complete and relative voice rest. **STUDY DESIGN:** This is a prospective survey of clinical practices. **METHODS:** A 16-item survey was mailed to all active U.S. members of the American Academy of Otolaryngology-Head and Neck Surgery (n=7321) regarding use of complete and relative voice rest after surgical excision of vocal fold nodules, polyps and cysts. Treatment preference questions used a Likert 5-point scale with end anchors of one equaling "never" and five equaling "always". **RESULTS:** The response rate was 16.5% (1208). Differences by lesion type were not statistically significant, suggesting that surgeons consider the mucosal disruption resulting from the surgery to be similar across lesions. Approximately 51.4% (620) favored complete voice rest. Approximately 62.3% (753) favored relative voice rest. Approximately 18% (213) of the respondents who "always" recommend complete rest also "always" recommend relative rest. The most common duration for both types is seven days. **CONCLUSIONS:** There is a clear preference among otolaryngologists for the use of voice rest, but the specific type (complete or relative) is controversial, and a clinically significant percentage of respondents (19%) do not favor any type of voice rest. It is likely that the lack of uniformity of opinions and practices reflects the absence of empirical data. Prospective clinical trials are needed to guide clinical standards of care.

71. Complications of Microdebrider Assisted Partial Tonsillectomy (MAPT)

Alex Sorin, MD, New York, NY
John Bent, MD, New York, NY
Max April, MD, New York, NY
Robert Ward, MD*, New York, NY
Rajendra D. Bhayani, MD, New York, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand safety and efficacy of microdebrider assisted partial tonsillectomy in pediatric patients with sleep apnea.

OBJECTIVES: To study complications of MAPT procedure in pediatric patients with sleep apnea. **STUDY DESIGN:** Retrospective chart review and review of literature. **METHODS:** Microdebrider assisted partial tonsillectomy is a new innovative technique which has shown promising results with minimal postoperative pain and morbidity, early return of diet and activity and less need of postoperative analgesia. We studied 320 patients who underwent this procedure since September 2000. The complication rate in this group of patients was studied and compared with the literature such as postoperative pain, postoperative bleeding, return of sleep apnea symptoms, snoring, nasal voice, velopharyngeal insufficiency, postoperative fever, dehydration, tonsil regrowth. **RESULTS:** Out of 320 patients operated by this technique all patients had resolution of symptoms of apnea. Four patients had tonsil regrown with snoring and one patient had early symptoms of sleep apnea, two patients had spitting of blood which was resolved without any intervention. None of the patients had VPI or nasal tone. **CONCLUSIONS:** MAPT is a new innovative technique where partial tonsillectomy is performed. As compared to the literature the overall complication rate is much less with this technique. Because of partial removal of tonsil the about 1% patients may regrow the tonsils. Postoperative bleeding is less than other methods. Further prospective long term trial is being carried out.

72. Angiogenesis and Trans Endothelial Migration of Monocytes—A Target for Future Anti-Cancer Strategies

Mary N. Bresnihan, AFRCSI, Dublin, Ireland
Clair Condron, MSc, Dublin, Ireland
Catherine Dowling, MD, Dublin, Ireland
Declan Donovan, PhD, Dublin, Ireland
David B. Hayes, FRCS, Dublin, Ireland

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to explain the relationship between angiogenesis and macrophages and their impact on tumour microbiology. They will also understand the mechanism by which macrophages cross the tumour microvessels to enter the tumour and how this migration can be attenuated with an antiangiogenic agent.

OBJECTIVES: Angiogenesis, the growth of new blood vessels from pre-existing ones, is an essential phenotype for tumour formation. Angiogenesis is dependent on interplay of cytokines produced by tumour cells and the various constituents of the surrounding stroma, including macrophages. Vascular endothelial growth factor (VEGF) is one of the most potent pro-angiogenic cytokines and is produced by macrophages. The presence of macrophages in the tumour stroma has been shown to correlate with tumour differentiation, grade, lymph node status and prognosis. In order for macrophages to enter the tumour they must first cross the endothelial barrier. Cell surface adhesion receptors, CD11b and L-selectin are intimately involved in this trans-endothelial migration. Tamoxifen has recently been shown to have anti-angiogenic properties. We aimed to investigate how macrophages are recruited into tumours and whether this can be modulated using an anti-angiogenic strategy. **STUDY DESIGN:** Isolated human monocytes were cultured with VEGF and Tamoxifen to assess the effect on the expression of adhesion markers CD11b and L-selectin. **METHODS:** Peripheral blood was isolated from healthy volunteers (n=7) and monocytes isolated using histopaque sedimentation. Monocytes were cultured with VEGF and tamoxifen. CD11b and L-selectin expression was analyzed using a fluorescent probe by flow cytometry and expressed as mean fluorescent per cell. **RESULTS:** An up regulation in mean cell fluorescence was seen in cells treated with VEGF. This response was attenuated by treatment with tamoxifen. **CONCLUSIONS:** Reduction in the number of tumour-associated macrophages may be another molecular target for future anti-cancer strategies. Tamoxifen attenuates the VEGF-induced increase in adhesion molecules and may be effective in reducing the number of tumour-associated macrophages in head and neck tumours.

73. Diagnosis and Management of Spontaneous CSF Otorrhea with Cryptic Presentation

Neil E. Brown, MD, Boston, MA
Anthony Jabre, MD, Boston, MA
Clifford A. Megerian, MD, Cleveland, OH

Bert W. O'Malley, MD, Baltimore, MD
Kenneth M. Grundfast, MD*, Boston, MA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the approach to the diagnosis and management of spontaneous tegmen defects.

OBJECTIVES: Spontaneous cerebrospinal fluid (CSF) otorrhea occurs rarely in adults, especially the elderly. In the absence of temporal bone trauma, diagnosis can be elusive. Multiple site tegmen defects are not common and more difficult to repair than single site defects. Effective repair is via a combined transmastoid/middle fossa approach, using hydroxyapatite, fibrin glue, and autologous bone source. We describe the presentation and method of management in six patients presenting with CSF otorrhea. **STUDY DESIGN:** Case report. **METHODS:** Six case reports and review of relevant literature. **RESULTS:** All six patients presented with persistent otorrhea. Five of the six patients were diagnosed with encephalocele (one diagnosed intraoperatively), all were repaired via a combined middle fossa/transmastoid approach. The remaining patient had multiple tegmen defects with a small meningocele into one of the defects, and repair was accomplished with middle fossa approach. The patients with encephaloceles were diagnosed by CT or MRI preoperatively. In the remaining patient, the dural leak was confirmed with a 111Indium-DPTA (diethylenetriamine pentaacetic acid) intrathecal study preoperatively. **CONCLUSIONS:** The presentation of these cases demonstrates clearly how spontaneous CSF leak due to tegmen defect in adults can go unsuspected. When CT or MRI imaging is nondiagnostic, intrathecal 111Indium-DPTA radioisotope combined with insertion of an expandable sponge wick in the external ear canal can be employed. Since definitive repair is difficult to achieve via the mastoid approach alone, diagnosing a tegmen defect with or without encephalocele prior to mastoidectomy is preferable for appropriate surgical planning and definitive first-time repair.

74. Can Uvulopalatopharyngoplasty Be Performed in the Outpatient Setting?

Sreekant Cherukuri, MD, Detroit, MI
Michael S. Benninger, MD*, Detroit, MI
Sandeep D. Sule, MD, Southfield, MI

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to identify those patients undergoing uvulopalatopharyngoplasty that can safely be performed in an outpatient setting.

OBJECTIVES: The purpose of this study is to review all complications of uvulopalatopharyngoplasty (UPPP) at our institution to evaluate if there are clinical parameters that may be identified as pre-operative risk factors for complications that mandate an overnight hospital admission. The study then will compare a small cohort of UPPP patients performed in the outpatient setting to those performed in the inpatient setting. Ultimately, an algorithm for UPPP disposition will be presented. **STUDY DESIGN:** Retrospective. **METHODS:** Patients that underwent UPPP and associated procedures were reviewed from 1996-2001, evaluating for age, gender, comorbidities, body-mass index, neck circumference, respiratory disturbance index, apnea index, lowest pre-operative oxygen saturation (LSAT), surgeries performed, complications, and total hospital days. Complication data was generated for this cohort and compared to a prior study from the same institution from 1987-1995 to generate a 15 year review of all UPPP complications. **RESULTS:** 307 charts were reviewed (257 male, 50 female) from the 1996-2001 cohort. The prior study reviewed 347 patients. There were 32 total complications over the 15 years (4.8%), and 18 complications during the past 6 years (5.8%). Those that had any complication in our study group had a significantly lower LSAT than those without a complication (72.5% vs. 80%, $p=0.0198$). All other variables were statistically similar. Those patients with complications mandating overnight hospital admission were also found to have a significant lower LSAT (66% vs. 80%, $p=0.0120$). Those patients who had UPPP performed in an outpatient setting were statistically similar to those patients routinely admitted after surgery. However, there was a trend towards having fewer comorbidities and fewer procedures performed in the outpatient group. **CONCLUSIONS:** UPPP is a safe operation and outpatient consideration can be given for those patients with mild to moderate obstructive sleep apnea with LSAT $\geq 80\%$. Our data supports outpatient consideration for RDI ≤ 38 , AI ≤ 22 , LSAT $\geq 80\%$, and ≤ 3 concurrent surgical procedures. Given the data from the earlier cohort, hospitalization should be considered for those patients undergoing 4 or more independent procedures.

75. Three Dimensionally Reconstructed Images of Paranasal Sinuses

Seung-Kyu S. Chung, MD, Seoul, Korea

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to demonstrate the three dimensional anatomy of the paranasal sinuses.

OBJECTIVES: Complete understanding of the anatomy of the paranasal sinuses and surrounding structures is essential to do endoscopic sinus surgery safely. Authors made the images of paranasal sinuses reconstructed in three dimensions from the computed tomography images as teaching materials. **STUDY DESIGN:** Anatomic. **METHODS:** One mm thickness axial computed tomograms of 10 patients were used as source images. These images were reconstructed with PC-based software (Vworks 4.0, Seoul, Korea) reconstructing DICOM file. The anatomic structures of paranasal sinuses such as uncinate process, bulla, turbinates and lamellae were reconstructed separately. **RESULTS:** The anatomic structures of the paranasal sinuses were visualized three dimensionally in many combinations of each anatomic structure. These images were converted into video file. **CONCLUSIONS:** The complicated anatomy of the paranasal sinuses could be understood easily. These 3 dimensionally reconstructed images can be seen repeatedly in any directions and be used as good teaching material.

76. Diagnostic Four Week Test with Proton Pump Inhibitors in Laryngopharyngeal Reflux. Predictors for Good Response

Nora Ąiupėinskienė, MD PhD, Kaunas, LT Lithuania
Kęstutis Adamonis, MD PhD, Kaunas, LT Lithuania

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the role of psycho emotional status of patients having laryngopharyngeal reflux and dose of proton pump inhibitor on good short-term treatment response.

OBJECTIVES: To determine predictors for good proton pump inhibitor (PSI) treatment response through 4 weeks period in laryngopharyngeal reflux (LPR) patients. **STUDY DESIGN:** Open prospective clinical study. **METHODS:** Data from 100 patients with posterior laryngitis and firstly proven LPR based on upper GI endoscopy and/or positive omeprazole test were evaluated. During three month omeprazole treatment, patients were classified as responders, if total (laryngological and esophageal) symptom index improved at least 50% and patients were satisfied with results. **RESULTS:** After 4 weeks treatment 65 of 100 LPR patients were classified as responders. Only anxiety (HAD scale) and heartburn scores showed significant difference between responders and non-responders groups ($p<0.05$). No significant difference was found on other evaluated parameters. Logistic regression analysis revealed these variables and dose of medicine as relevant for response prediction. 1 more point of anxiety score decreased odds ratio for positive test in 1.16 time (95%CI 1.04-1.3), though presence of heartburn on entry and dose of omeprazole more than 20 mg dose daily increased odds ratio for 3.4 time (95%CI 1.3-8.6) and 3.1 time (95%CI 1.1-8.5) respectively. Combination of variables separate groups in 73% accuracy (cut off $P=0.5$). **CONCLUSIONS:** Findings encourage to pay more attention to psychological distress and adequate dose for good PSI response.

77. Laryngoscopic Findings and Quality of Life in Laryngopharyngeal Reflux Patients

Nora Ėiurþinskienė, MD PhD, Kaunas, LT Lithuania
Kęstutis Adamonis, MD PhD, Kaunas, LT Lithuania

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to demonstrate how important is laryngopharyngeal reflux impact on patients quality of life and to discuss whether objective or subjective findings are most important for diagnosis and assessment of severity of the disease.

OBJECTIVES: To investigate and compare quality of life (QL) and laryngoscopic findings in patients with laryngopharyngeal reflux (LPR) vs. healthy persons and to determine correlation of objective findings and QL. **STUDY DESIGN:** Prospective open clinical study. **METHODS:** 100 out patients with LPR and 110 healthy voice persons were enrolled. QL was evaluated using self-rated individual and combined symptom indexes - laryngological (LSI), esophageal (ESI), and total (TSI), Hospital Anxiety and Depression (HAD) scale, disability in social activities, and well-being in general using 100 mm visual analogue scale (W-BVAS). Laryngeal injury was graded using laryngoscopic reflux finding index (RFI). **RESULTS:** The mean scores of severity as well as occurrence of each (laryngological and esophageal) symptom were significantly higher for clinical group patients vs. control ($p < 0.05$). The most important symptoms for LPR diagnostics were hoarseness, globus sensation, throat clearing and soreness. Combination of these parameters using logistic regression classified LPR patients from normal with 91.5% overall classification accuracy. Abnormal anxiety (equal and more 11 points) were obtained for 33.3% (30/100) LPR and 5.4% (6/110) control group patients ($p < 0.05$). **CONCLUSIONS:** The quality of life is impaired in patients presenting with reflux symptoms and laryngoscopic findings. The severity of symptoms and laryngoscopic findings has significant relation with the patient's quality of life.

78. Considerations in the Diagnosis and Treatment of Malignant Meningioma

Harley S. Dresner, MD, Minneapolis, MN
Samuel C. Levine, MD*, Minneapolis, MN

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to define the characteristics of malignant meningioma, appreciate the diagnostic challenges posed by malignant meningioma, recognize risk factors predisposing to the development of malignant meningioma, and discuss modalities for the treatment of malignant meningioma.

OBJECTIVES: The authors consider the diagnostic and treatment challenges posed by middle ear tumors, focusing on malignant meningioma. The authors also discuss the effects of radiotherapy on the clinical course of middle ear tumors. **STUDY DESIGN:** Case study. **METHODS:** Case study. **RESULTS:** A 45 year-old male underwent multiple surgical resections for a recurrent left middle ear tumor. He received post-operative radiotherapy following the initial resection. Increasing cranial nerve palsies accompanied each recurrence. Several pathologic diagnoses were rendered before the patient was correctly diagnosed with a malignant meningioma. The authors discuss the difficulties involved with rendering a correct diagnosis in this area of temporal bone pathology. **CONCLUSIONS:** Given the history of post-operative radiotherapy, the important question of radiation-induced malignant degeneration in initially benign meningioma arises. This possibility becomes especially poignant as patients pursue treatment modalities like stereotactic radiosurgery. Previous radiotherapy for other intracranial neoplasms increases the risk for subsequent development of histologically aggressive meningioma. The case also illustrates the challenge of distinguishing atypical from malignant meningioma. Largely qualitative histological classification systems correlate poorly with clinical behavior and patient outcome. Recent attention to specific histological criteria, such as the presence or absence of cellular anaplasia, explains much of the clinical variability present amongst the atypical meningiomas. For malignant meningioma, initial complete surgical excision followed by post-operative, high-dose radiotherapy affords the best chance of long-term disease control.

79. External Auditory Canal Reconstruction

Jose N. Fayad, MD, New York, NY
Eli Grunstein, MD, New York, NY
Tony E. Baino, MD, New York, NY
Simon C Parisier, MD*, New York, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to become familiar with surgical techniques for external auditory canal reconstruction, understand indications, limitations, and complications of these techniques.

OBJECTIVES: To review the commonly accepted approaches for the surgical creation of the external auditory canal (EAC). Our technique of EAC reconstruction is presented. The operative results achieved in our series of patients with congenital aural atresia and severe stenosis of the EAC are reviewed. **STUDY DESIGN:** Retrospective chart review of patients operated on at 3 tertiary medical centers in the New York Metropolitan area. **METHODS:** Patients with congenital and acquired EAC stenosis were included. EAC reconstruction was performed by one of two attending otologists. Thin split thickness skin grafts that were glued on to silastic sheeting facilitated the resurfacing of the drilled out ear canal. Outcomes and complications were analyzed with specific attention to hearing results achieved and to the incidence of restenosis. **RESULTS:** 42 patients underwent surgery. Indications included congenital aural atresia and stenosing external otitis. Our results are compared to those presented in the literature. **CONCLUSIONS:** We present a proven technique of EAC reconstruction. Our restenosis rate of less than 10% compares favorably with the literature, and may, in part, result from the use of thin split thickness skin-silastic composite grafts.

80. "Painless" Uvulopharyngopalatoplasty: A Modified Technique for Selected Patients

Michael Friedman, MD*, Chicago, IL
Hani Z. Ibrahim, MD, Chicago, IL

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to identify candidates for UP2 and recognize the benefits of this procedure.

OBJECTIVES: The goal of uvulopharyngopalatoplasty is to reduce obstruction in three areas: soft palate, tonsils, and pharynx, by eliminating redundant mucosal folds. Many patients, however, may have tonsil hypertrophy and elongated soft palate without redundant pharyngeal folds. The purpose of this study was to treat this group of patients with tonsil reduction using radiofrequency coblation technique combined with uvulopalatoplasty (UP2) using palatal flap technique without pharyngoplasty. Morbidity and outcome was then compared to a group of patients who underwent classic UP3. **STUDY DESIGN:** A prospective, nonrandomized study. **METHODS:** Patients were all staged according to the previously described Friedman Staging System. Only Stage I and II patients were studied. Fifty patients were divided into two groups. Those with redundant mucosal folds were treated with UP3 and those without redundant mucosal folds were treated with tonsil coblation and UP2. Pre- and post-operative quality of life questionnaires and patient questionnaires focusing on diet, pain, and return to activity were used to assess subjective morbidity and elimination of symptoms. Objective measurements include preoperative and postoperative (6 to 18 months) polysomnography. **RESULTS:** Symptom elimination and objective PSG results were compared by stage. There was no statistical difference in results between the UP3 group and the UP2 group for either Stage I or Stage II patients. Morbidity, however, was significantly different for both Stage I and Stage II. Patients undergoing UP2 had lower levels of pain, fewer pain days, less narcotic use, and a quicker return to solid diet and to normal activity. **CONCLUSIONS:**

UP2 with tonsil coblation offers significant reduction in postoperative morbidity without affecting outcome for selected patients with Stage I or Stage II SDB.

81. The Butterfly Graft Technique for Management of Nasal Valve Collapse

Oren Friedman, MD, Portland, OR
Ted Cook, MD, Portland, OR
Tom Wang, MD*, Portland, OR
Ricardo Maniglia, MD, Portland, OR

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to recognize nasal valve collapse as a frequently overlooked cause of nasal obstruction. The participants will learn to diagnose and treat this disorder appropriately. We demonstrate the techniques we use and compare them to other methods of repair of a collapsing nasal valve.

OBJECTIVES: Internal nasal valve collapse is a frequently unrecognized cause of nasal obstruction. Failure to achieve a successful surgical result for nasal obstruction often stems from a failure to recognize and adequately treat a collapsed internal nasal valve. The butterfly graft technique involves the placement of auricular cartilage in the nose for structural support of the collapsing valve. We describe the technique, its applications, associated complications, and the success we have had in relieving nasal obstruction. We report our experience with this technique over the first five years of its use. **STUDY DESIGN:** A retrospective review of all patients undergoing repair of a collapsed nasal valve with the butterfly graft technique at our institution. **METHODS:** Patient age, etiology of the obstruction, history of prior nasal surgery, degree of obstruction before and after surgery, diagnostic methods employed, subjective relief of obstruction, cosmetic appearance of the nose as judged by the patient and an objective observer, and the duration of symptom improvement, were all recorded. **RESULTS:** Over two hundred fifty patients underwent butterfly graft repair of nasal valve collapse during the five-year period. Preliminary results reveal a greater than 85% success rate for this surgical approach over the period reviewed. Detailed results are presented in the paper. **CONCLUSIONS:** The butterfly graft technique is a highly effective method of treating nasal valve collapse.

82. Management Dilemmas of Tracheotomy in the Tracheoesophageal Fistula Patient

Patricia A. Gilroy, MD, Danville, PA
W. Edward Wood, MD, Danville, PA
Thomas R. O'Donnell, MD, Danville, PA
Jay A. Yates, MD, Clifton Springs, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to explain the anatomic malformations present in tracheoesophageal fistula (TE fistula) patients, the hazards of tracheotomy in these patients after repair of their fistula, and management techniques employed to avoid life threatening airway obstruction.

OBJECTIVES: To review the different types of TE fistulas. To outline the anatomic abnormalities present after the repair of a TE fistula. To illustrate the potential for life-threatening airway obstruction in TE fistula patients with tracheotomies, due to tracheotomy tube tip displacement into the blind pouch of the fistula repair. To present a logical algorithm to prevent or minimize the potential for tracheotomy tube obstruction in TE fistula patients. **STUDY DESIGN:** Retrospective chart review of all patients s/p TE fistula repair with subsequent tracheotomy placement who subsequently suffered life-threatening airway obstruction. **METHODS:** We retrospectively reviewed all patients who suffered life-threatening airway obstruction with a tracheotomy and a history of TE fistula repair. **RESULTS:** Four patients were identified. Case reports will be detailed regarding prematurity, comorbid conditions, and events leading to tracheotomy tube occlusion and life-threatening event. Management strategies include the use of custom tracheotomy tubes, fiberoptic intraoperative assistance in tracheotomy tube selection and placement with subsequent intratracheal visualization with head manipulation, and diligent education of all ancillary personnel as to the potential for this life-threatening complication and its acute management. **CONCLUSIONS:** In tracheotomy patients who have had a TE fistula repair, there is potential for inadvertent displacement of the tracheotomy tube tip into the blind pouch of the fistula repair, especially with patient positioning and movement. The consequences can be devastating. This potential for airway obstruction can be minimized with intraoperative fiberoptically assisted tracheotomy tube positioning along with visualization of the tracheotomy tube tip with intraoperative patient positioning and manipulation. Various tracheotomy tubes can be employed. All caregivers of these unique patients need to be aware of this life-threatening complication and the appropriate actions needed to prevent devastating consequences.

83. Do Corticosteroids in Pediatric Bacterial Meningitis Prevent Hearing Loss? An Evidence—Medicine Approach

Romaine Johnson, MD, Houston, TX
Spiros Manolidis, MD, Houston, TX
Carla Gianonni, MD, Houston, TX

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants will have a thorough overview of the literature concerning the protective effect of corticosteroids in bacterial meningitis.

OBJECTIVES: To review, stratify and analyze the available literature on the question of protective effect of corticosteroids in meningitis with an evidence based medicine approach. **STUDY DESIGN:** Evidence based medicine (EBM) review. **METHODS:** A MEDLINE search identified 170 articles from 1966 to January 2002 related to meningitis and corticosteroid use. We excluded case reports, non-English language publications and editorial comments. Sixty five papers addressed the question of dexamethasone and meningitis. Only 16 studies had acceptable data regarding audiometric evaluation and follow-up and these comprise the subject of this report. **RESULTS:** We used a 5 point grading system of levels of evidence developed by the Oxford Center for EBM. Of the 16 publications examined 12 were grade 1, 2 were grade 4 and 2 were grade 5. Of the 10 randomized controlled trials 4 showed some beneficial effect of corticosteroids in meningitis and 6 showed no such effect. Two meta-analyses concluded a protective effect from corticosteroid use. **CONCLUSIONS:** Despite well-designed studies with level 1 evidence, the use of corticosteroids in meningitis to protect from hearing loss still remains an unresolved question. Type of bacterium and antibiotic used as well as the timing of the first corticosteroid dose in relation to the first antibiotic dose are significant variables.

84. Cytofluorimetric Analysis of TH1/TH2 Immune Response in HNSCC Patients

Ladislav W. Kacani, PhD, Innsbruck, Tirol Austria
Georg M Sprinzl, MD, Innsbruck, Tirol Austria (*Presenter*)
Martin W. Wurm, PhD, Innsbruck, Tirol Austria
Volker W. Scharfetter, MD, Innsbruck, Tirol Austria
Pierre W. Paolini, PhD, Vienna, Wien Austria
Walter F. Thumfart, MD, Innsbruck, Tirol Austria

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the mechanisms of immune regulation during cancerogenesis in HNSCC patients.

OBJECTIVES: Numerous studies have shown that the cytokine environment plays a critical role in the induction of tumor-specific immune response. **STUDY DESIGN:** Since tumors have been shown to actively induce immune tolerance, the TH1 and TH2 cytokine pattern of T lymphocytes in HNSCC patients was investigated. **METHODS:** T lymphocytes isolated from peripheral blood and efferent lymph were reactivated with PMA/ionomycin in vitro and subsequently stained for intracellular cytokines followed by cytofluorimetric analysis. **RESULTS:** Our data demonstrated a significant, quantitative difference in cytokine patterns secreted by T cells in efferent lymph when compared with peripheral blood of a single individual. Up to 10% of T cells in efferent lymph produced measurable amounts of either IFN- γ or IL-4, whereas not more than 5% of T cells obtained from peripheral blood secreted these cytokines. Although TH1 and TH2 pattern varied extensively among HNSCC patients, TH1 cells were more frequently detected than TH2 lymphocytes. **CONCLUSIONS:** With regard to ongoing efforts in development of immuno therapeutical approaches for treatment of HNSCC, the measurement of intracellular cytokines represents an essential improvement in the evaluation of cellular immune response in cancer patients.

85. APACHE II in the Critically Ill Tracheotomy Candidate: Minimizing Morbidity and Mortality

Harold H. Kim, MD, Bronx, NY
David Myssiorek, MD, New Hyde Park, NY
Alan Multz, MD, New Hyde Park, NY
Anit Patel, MD, Bronx, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to determine the benefits and proper indications for tracheotomy in critically ill patients who have been intubated for a prolonged period.

OBJECTIVES: We evaluated the role of the APACHE II severity of disease classification system in the determination of prognosis of critically ill patients requiring tracheotomy for prolonged intubation. Observed mortality was compared with the expected mortality based on APACHE II score. **STUDY DESIGN:** Retrospective chart review. **METHODS:** Intensive care unit patients aged greater than 15 years requiring tracheotomy for prolonged intubation were identified. Those with previous head and neck pathology were excluded. APACHE II scores were determined prior to tracheotomy, and patients were stratified based on APACHE II scores in the following manner: 5-9, 10-14, 15-19, >20. Mortality rates were calculated for each group and compared with the predicted mortality rates based on APACHE II scores. Chi square analysis was used to determine statistical significance. **RESULTS:** One hundred and forty nine patients were identified. Mean age was 73 years +/- 14.2 years. The distribution of prognostic groups were as follows: 5-9—8 patients; 10-14—72 patients; 15-19—65 patients, and >20—4 patients. These prognostic groups displayed mortality rates of 0, 34.5, 49.2, and 75.0% respectively which differed significantly ($p < 0.01$). Furthermore, significantly higher mortality rates were observed than predicted by APACHE II scores. **CONCLUSIONS:** The APACHE II severity of disease classification system can accurately identify those with greatest risk of not surviving their acute illness and may allow identification of those patients most likely to benefit from tracheotomy. Furthermore, greater mortality was seen in critically ill patients who underwent tracheotomy than would be predicted based on disease severity.

86. Smoking and Taste Perception

Soo H. Kim, MD, Philadelphia, PA
Richard L. Doty, PhD, Philadelphia, PA
Natasha Mirza, MD, Philadelphia, PA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to describe the effects of smoking on regional taste testing ability.

OBJECTIVES: To determine the effect of smoking on regional taste testing ability; specifically, to determine if regional taste perception in current smokers differs from that of previous smokers and nonsmokers, and determine whether this effect differs across gender. **STUDY DESIGN:** A retrospective study was conducted on a series of 333 subjects. **METHODS:** All subjects were administered the University of Pennsylvania Taste Assessment Test (UPTAT), a 96-item test of suprathreshold taste ability. The study group consisted of control subjects (no chemosensory complaints) and subjects with chemosensory dysfunction attributed to head trauma, URI, or sinonasal disease. **RESULTS:** After adjusting for age and etiology, the overall percentage of correct responses for the anterior tongue on the regional taste test was lower for female current smokers than for female past smokers or female nonsmokers ($p < 0.05$). Overall, this sample revealed that women correctly identified tastants in both regions better than men [posterior ($t=4.22, p < 0.0001$), anterior ($t=2.65, p=0.0086$)]. Furthermore, female current smokers also had much more difficulty correctly identifying bitter and sour tastants anteriorly than their nonsmoking and past smoking counterparts ($p < 0.05$). For males, there was no statistically significant difference between smokers and non-smokers in either tongue region ($p > 0.16$). Consistent with findings from several past studies there was decreased perception as age increased. Furthermore, patients with head trauma had a significant lower taste perception scores than all other etiologies ($p < 0.05$). **CONCLUSIONS:** Among women, smoking adversely affects anterior lingual taste perception, particularly for bitter and sour tastants.

87. Cricoid Chondrosarcoma Presenting as Arytenoid Hypertelorism

James A. Koufman, MD*, Winston-Salem, NC
Jacob T. Cohen, MD, Winston-Salem, NC (Presenter)
Semeer M. Gupta, MD, Winston-Salem, NC
Gregory N. Postma, MD, Winston-Salem, NC

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to describe the finding of arytenoid hypertelorism in the diagnosis of cricoid chondrosarcoma and the different approaches in the management of these tumors.

OBJECTIVES: Arytenoid hypertelorism (arytenoid cartilages too widely spaced apart) appears to be a common finding of cricoid chondrosarcoma. Unlike patients who have vocal fold paresis/paralysis or fixation, posterior glottal closure is grossly incompetent causing aphonia despite membranous vocal fold closure. Because most of these tumors are low grade, the authors recommend unilateral hemi cricoidectomy as the treatment of choice. **STUDY DESIGN:** The medical records of patients suffering from cricoid chondrosarcoma including video examination were retrospectively analyzed. **METHODS:** A total of nine patients were included in our retrospective review. Two were women and seven were men. Average age at diagnosis was 70 years. **RESULTS:** Six patients had aphonia caused by arytenoid hypertelorism as their presenting symptom. Four were diagnosed after failed medialization laryngoplasty for glottal incompetence. 8/9 patients had a low grade tumor. The treatment in 8 patients included hemi cricoidectomy; only one patient needed a total laryngectomy. In three cases a second procedure was needed because of recurrence. The second procedure included total laryngectomy in two and endoscopic CO₂ laser excision in one. Seven patients are alive without disease; one is alive with disease and one died from unrelated causes. **CONCLUSIONS:** Patients presenting with arytenoid hypertelorism due to chondrosarcoma may be aphonic despite the fact that the membranous vocal folds contact. Because these tumors have a benign biologic behavior the authors recommend unilateral hemi cricoidectomy as the diagnosis/treatment of choice. This procedure allows sufficient tissue for histology and provides correction of the arytenoid hypertelorism without compromising long term survival. This procedure is appropriate for patients with: 1) mobility of one vocal fold, 2) aphonia, and 3) an adequate subglottic airway.

88. Safety of Modified Radical Neck Dissection for Differentiated Thyroid Carcinoma

Michael E. Kupferman, MD, Philadelphia, PA
D. Michael Patterson, BA, Philadelphia, PA
Susan J. Mandel, MD MPH, Philadelphia, PA
Virginia A. LiVolsi, MD, Philadelphia, PA
Randal S. Weber, MD*, Philadelphia, PA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the complications of neck dissection in the management of differentiated thyroid carcinoma.

OBJECTIVES: The management of cervical metastases from differentiated thyroid carcinoma (DTC) remains controversial. Most surgeons perform a neck dissection (ND) for clinically apparent disease. Morbidity from ND in the setting of DTC remains high, particularly when performed in the setting of a thyroidectomy. To determine complications from ND for DTC, we retrospectively reviewed our surgical experience of MRND for nodal metastases. **STUDY DESIGN:** Retrospective chart review. **METHODS:** Between 1997-2002, 36 consecutive patients, 28 females and 8 males, underwent a ND for DTC. Eighteen (50%) had prior treatment elsewhere. Pre-operative pathology revealed papillary carcinoma in 21 patients (58%), tall cell variant in 9 (25%) and follicular variant in 6 (16.7%). **RESULTS:** Seventeen patients (47%) underwent ND alone, while 19 (53%) underwent simultaneous ND and thyroidectomy (ND+T). Temporary hypocalcemia occurred in 2 patients who underwent ND+T; none developed permanent hypoparathyroidism. Transient RLN paresis occurred in 2 patients; there were no permanent RLN injuries. Transient spinal accessory nerve paresis, which developed in 11 patients (31%), was significantly associated with ND+T ($p < 0.05$) versus ND alone. **CONCLUSIONS:** When ND is necessary for the treatment of thyroid malignancies, the procedure can be performed safely with relatively low morbidity and is effective for treating regional metastases.

89. Surgisis for Repair of Tympanic Membrane Perforation

Anil K. Lalwani, MD*, San Francisco, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the indication and use of Surgisis soft tissue graft for repair of tympanic membrane perforation.

OBJECTIVES: A variety of autogenous tissue grafts are available for the repair of tympanic membrane perforation. Occasionally, grafting material is not readily available because of prior surgical intervention. Recently, Surgisis, an acellular, freeze-dried soft tissue graft derived from porcine small intestinal submucosa, has become available. Herein, we report the first experience with its use as grafting material for repair of tympanic membrane perforation. **STUDY DESIGN:** Nonrandomized case study accrual. **METHODS:** Surgisis was used for intraoperatively repair of tympanic membrane perforation using medial graft technique when the available temporalis fascia was deemed inadequate. **RESULTS:** In eight patients undergoing revision tympanomastoidectomy for chronic otitis media and cholesteatoma, Surgisis was used as grafting material. In one case, Surgisis was used to provide length to a short tympanomeatal flap. In all cases, there was successful closure of the tympanic membrane perforation. There was no clinical evidence of an inflammatory response to Surgisis. **CONCLUSIONS:** In cases when autogenous grafting material is unavailable, Surgisis is an effective replacement graft for the repair of tympanic membrane perforation. Based on this experience, its use as a primary graft in transcanal tympanoplasty, to obviate the need of a postauricular incision for harvesting fascia, should be investigated.

90. Internal Jugular Vein Thrombosis and Deep Neck Infection from Intravenous Drug Use: Management Strategy

Doris Lin, MD, San Francisco, CA
Jay B. Reeck, MD, San Francisco, CA
Andrew H. Murr, MD, San Francisco, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to state etiologies of internal jugular vein thrombosis, explain diagnostic techniques, and discuss treatment strategies for internal jugular vein thrombosis in the setting of deep neck infection due to intravenous drug use.

OBJECTIVES: Internal jugular vein thrombosis (IJVT) presents in multiple clinical scenarios including traumatic, neoplastic, and infectious processes. No clear management algorithm exists for IJVT in the setting of deep neck infections. This study examines the etiology, diagnosis, and treatment strategy for IJVT in the setting of deep neck infections caused by intravenous drug use (IVDU). **STUDY DESIGN:** Retrospective chart review. **METHODS:** The clinical, radiographic, and laboratory data of eight IVDU patients with deep neck infections and IJVT are reviewed in a retrospective fashion. The patients were seen in a university tertiary care facility. **RESULTS:** Eight patients with deep neck infections, recent history of IVDU, and concurrent IJVT were identified. All patients underwent computed tomography (CT) scanning. Antibiotic therapy was instituted in all cases, abscesses were treated invasively with aspiration or incision and drainage, and no veins were ligated or resected. Two patients received anticoagulation. One patient had bilateral IJVT with thrombus extension through the sigmoid sinus to the lateral sinus. This patient received anticoagulation and developed bacteremia. No further IJVT complications have been diagnosed at an average of 21 months post-intervention. **CONCLUSIONS:** IJVT and deep neck infection caused by IVDU constitute a clinical entity present even in the modern day era of antibiotic therapy. Aggressive antibiotic therapy and surgical intervention for the deep neck infection is recommended. Anticoagulation may not be necessary in cases uncomplicated by bacteremia or septic emboli. Ligation or resection of the thrombosed vein may be reserved for selected cases.

91. Human Progenitor Cells from Retroauricular Periost as a Cell Source for Tissue Engineering

Alexander I. Loch, MD, Berlin, Germany
Julia Tegeler, MD, Berlin, Germany
Iris Leinhase, MS, Berlin, Germany
Michael Sittinger, PhD, Berlin, Germany

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the possibility of obtaining human progenitor cells in the field of otorhinolaryngology and how those cells can be used in tissue engineering.

OBJECTIVES: Periosteal cells from the oral cavity are in use to grow artificial tissue for bone augmentation. In the current study we investigated the differentiation potential of retroauricular periosteal cells as a source for bone and cartilage engineering. **STUDY DESIGN:** Periosteal cells have been harvested from the mastoid. After isolation cells have been expanded up to the seventh passage. After osteogenic and chondrogenic induction differentiation has been assessed through histological staining. **METHODS:** Periosteum was harvested during tympanoplasty. Cells have then been isolated and expanded in monolayer culture with human serum. Osteogenic and chondrogenic differentiation has been initiated after standard protocols. Osteogenic and chondrogenic differentiation has been assessed through van Kossa and Alcian blue staining after each passage. **RESULTS:** Periosteal cells exhibited fibroblast-like morphology typical for progenitor cells during all passages. Osteogenic and chondrogenic differentiation could be shown up to passage seven. The osteogenic stimulation resulted in an intensive alkaline phosphatase activity and a notable deposition of bone matrix. Chondrogenic induced pellet cultures demonstrated formation of cartilage typ-

ical proteoglycan matrix molecules. Bone mineralization of chondrogenic pellets could not be detected. **CONCLUSIONS:** Human progenitor cells from retroauricular periosteum are well expandable in human serum and maintain their osteogenic and chondrogenic potential over several passages. Retroauricular periosteal cells are suggested as an excellent source of human progenitor cells for tissue engineering. They are easy to access and can be obtained with a minimal donor site morbidity.

92. Determination of Fluoroquinolones in the Middle Ear Mucosa in an Experimental Animal Model

Amber U. Luong, MD, PhD, Dallas, TX
Nathan D. Schwade, PhD, Dallas, TX

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to describe and compare the extent of middle ear mucosal penetration of three fluoroquinolone antibiotics.

OBJECTIVES: In children under the age of two, approximately 90% of all prescribed antibiotics are written for the treatment of otitis media (OM). The recent emergence of multi-drug resistant *Streptococcus pneumoniae* and beta-lactamase producing *Haemophilus influenzae* has posed a particular challenge to physicians treating OM. A relatively new family of antibiotics, fluoroquinolones (FQ), is becoming the primary antibiotic in the treatment of OM. FQ, effective in the treatment of pulmonary infections, are known to sequester in the pulmonary mucosa. This study evaluates the middle ear mucosal (MEM) penetration of three antibiotics of the FQ family: ciprofloxacin, moxifloxacin and gatifloxacin. **STUDY DESIGN:** Three groups of normal Sprague Dawley rats were established. Each rat was exposed to varying logarithmic increases of the intravenous dosage of the respective antibiotics. Temporal bones were harvested and the MEM isolated and processed for quantitative analysis. **METHODS:** The external jugular vein was cannulated for the intravenous infusion of the FQ. Blood samples were drawn at set time interval. After 3 hours, the rats were euthanized and the temporal bones removed. The FQ was extracted from the isolated MEM and analyzed via high pressure liquid chromatography. Serum and mucosal concentrations of the FQs were compared. **RESULTS:** Preliminary results show a dose dependent penetration into the MEM for each antibiotic. However, initial results show no differences in penetration among these FQ. **CONCLUSIONS:** Despite structural differences among these FQ antibiotics, initial results show no differences in MEM penetration. This study represents the first examination of FQ concentrations in MEM with respect to an experimental pharmacokinetic model.

93. Temporal Bone Abnormalities in a Pediatric Waardenburg Syndrome Population

Colm Madden, MB, FRCSI, Cincinnati, OH
Mark Halsted, MD, Cincinnati, OH
Robert J. Hopkin, MD, Cincinnati, OH
Daniel Choo, MD, Cincinnati, OH
John Greinwald, MD, Cincinnati, OH
Corning Benton, MD, Cincinnati, OH

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the prevalence and role of temporal bone anomalies in Waardenburg syndrome and to have an improved knowledge of the etiology of this disorder.

OBJECTIVES: To correlate audiometric thresholds with radiological findings and to determine the prevalence of inner-ear radiological abnormalities in patients with Waardenburg syndrome (WS). **STUDY DESIGN:** A retrospective review of subjects with WS identified in a pediatric hearing impaired database. **METHODS:** Seven children with WS were identified. 89 children without SNHL served as controls. Clinical data, audiometric thresholds and radiographic temporal bone measurements in these children were analyzed. **RESULTS:** Of the seven children, identified with WS, four children have WS type 1 syndrome and three children type 2 syndrome. The prevalence of hearing loss in our population was 78%. The mean pure-tone average (PTA) was 99 dB. All of the children had sensorineural hearing loss. The hearing outcome was stable in 86% of the children. Twelve ears were available for radiological analysis by computed tomography (CT). Enlargement of the vestibular aqueduct (EVA) was found in 50% of the scans. There was a statistically significant difference in measurements of vestibular aqueduct width at the midpoint between our two groups with WS and our control group ($p < 0.05$). There were also statistically significant differences in the measurements of the vestibule ($p = 0.0484$), internal auditory canal ($p = 0.0092$) and modiolus ($p = 0.0045$) between the children with WS and the control group. **CONCLUSIONS:** A profound sensorineural hearing loss was characteristic of our population with WS. Overall, 100% of subjects with WS had temporal bone anomalies on at least one measurement of their inner ear and 50% had an EVA at the midpoint.

94. Auditory Steady State Responses (ASSR) in Infants Undergoing Evaluation and Surgery for a Cochlear Implant

Spiros Manolidis, MD, Houston, TX
Andrea B. McMurphy, MD, Houston, TX
Ross Tonnini, PhD, Houston, TX

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation the participants should be able to explain the principles of steady state evoked potentials and understand their application in hearing preservation cochlear implant surgery.

OBJECTIVES: To explore the potential applications of auditory steady state responses (ASSR) in hearing preservation cochlear implant surgery. **STUDY DESIGN:** Prospective pilot study in a tertiary care academic medical center. **METHODS:** Children undergoing routine evaluation for cochlear implant candidacy were the subjects of this study. Preoperative, continuous intraoperative monitoring and postoperative ASSR at 3 months and 6 months were obtained on all participants. **RESULTS:** The majority of children tested had no obtainable thresholds at any frequency when tested at sound pressure levels up to 130db. Children with left/right asymmetrical thresholds were frequently identified. Consistent and reliable phase lock of the auditory steady state response could be obtained with levels of 15db above the established ASSR threshold levels. Using intraoperative continuous ASSR monitoring we were able to determine the precise point in surgery when thresholds are lost. **CONCLUSIONS:** ASSR has potential applications in deciding which side to implant and may be of great help in preserving residual hearing for electroacoustic stimulation.

95. Different Endoscopic Surgical Strategies in the Management of Inverted Papilloma. Experience on 47 Patients

Piero Nicolai, MD, Brescia, Italy
Paolo Castelnuovo, MD, Varese, Italy
Davide Tomenzoli, MD, Brescia, Italy
Fabio Pagella, MD, Pavia, Italy
Marco Berlucchi, MD, Brescia, Italy
Davide Lombardi, MD, Brescia, Italy

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the indications of three different surgical techniques used for the endoscopic treatment of inverted papilloma.

OBJECTIVES: To demonstrate possibilities and limitations of three different endoscopic procedures applied in a series of patients affected by inverted papilloma. **STUDY DESIGN:** Retrospective review. **METHODS:** From January 1992 to September 2000, 47 patients (40 males and 7 females) with IP received endoscopic resection. Preoperative work up included multiple biopsies of the lesion and imaging evaluation by CT and/or MR. Massive skull base erosion, intradural and/or intraorbital extension, extensive involvement of the frontal sinus, abundant scar tissue due to previous surgery and concomitant presence of squamous cell carcinoma were considered absolute contraindications for a purely endoscopic approach. Three types of resection were used: ethmoidectomy with wide antrostomy and sphenoidotomy (Type 1) for IPs confined to middle meatus; medial maxillectomy with ethmoidectomy and sphenoidotomy (Type 2) for IPs invading the maxillary sinus; Sturmann-Canfield operation (Type 3) for IPs involving the mucosa of the alveolar recess and/or of the anterolateral corner of the maxillary sinus. All patients have been prospectively followed by periodic endoscopic evaluations. **RESULTS:** Type 1, Type 2 or Type 3 resections were performed in 26, 15 and 6 patients, respectively. Up to September 2002, no recurrences were observed with a mean follow-up of 39 months (range: 24-130 months). One patient, who underwent a Type 2 resection, developed a stenosis of the lacrimal pathways requiring endoscopic dacryocystorhinostomy. **CONCLUSIONS:** Our experience confirms that endoscopic surgery is an effective and safe method of treatment for most IPs. The availability of different endoscopic techniques allows to modulate the entity of the dissection in relation to the extent of the disease. Strict application of selection criteria, meticulous use of subperiosteal dissection in the involved areas, and regular follow-up evaluation are key elements for success.

96. The Bipedicled Sternocleidomastoid Muscle Flap for Reconstruction of Tail of Parotid Defects

Ryan F. Osborne, MD, Los Angeles, CA
Jesse W. Tan, MD, Los Angeles, CA (Presenter)
Elliot Abemayor, MD*, Los Angeles, CA
Thomas C. Calcaterra, MD*, Los Angeles, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the simplicity and advantages of using the bipedicled sternocleidomastoid muscle flap in reconstructing tail of parotid defects.

OBJECTIVES: Successful surgery of the parotid gland includes adequate tumor extirpation with concurrent avoidance of facial nerve injury. Without reconstruction, the resulting parotid defect often results in facial asymmetry. Nearly exact symmetry can and should be achieved when reconstructing tail of parotid defects. We describe a bipedicled sternocleidomastoid (SCM) muscle flap which provides excellent cosmesis and requires no advanced surgical training. **STUDY DESIGN:** Sixty patients with tumors involving the superficial tail of the parotid gland were seen at the UCLA Medical Center. Each patient underwent a superficial parotidectomy with subsequent reconstruction using a bipedicled SCM muscle flap. Patients were seen post-operatively in the otolaryngology clinic where facial contour was assessed. **METHODS:** Sixty patients who underwent a superficial parotidectomy for a tail of parotid tumor were reconstructed intra-operatively using the bipedicled SCM muscle flap. The patients were followed post-operatively, where satisfaction with facial contour as well as evidence for associated morbidity from the flap reconstruction was assessed. **RESULTS:** Patients achieved good restoration of facial contour from the procedure. There were no major complications from the surgery, including no spinal accessory nerve injuries. Minor complications included only hematoma formation of which the incidence was less than 1%. **CONCLUSIONS:** The bipedicled SCM muscle flap is a superior technique in reconstructing tail of parotid defects. Autogenous tissue is used, therefore decreasing the risk of infections or inflammatory reactions. It employs vascularized tissue which has not been denervated, protecting against denervation muscle atrophy. Finally, no second donor site morbidity is required since it is harvested in the field of resection.

97. Validation of an Endoscopic Adenoid Grading System: A Prospective Study

Sanjay R. Parikh, MD FRCS, Bronx, NY
Mark J. Coronel, BA, Bronx, NY

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to utilize a statistically valid flexible endoscopic grading system for adenoid hypertrophy.

OBJECTIVES: To validate a flexible endoscopic grading system for adenoid hypertrophy. **STUDY DESIGN:** Prospective blinded study. **METHODS:** A simple grading system for adenoid hypertrophy was created. Nineteen patients underwent office nasal endoscopy which was digitally recorded. 15 blinded otolaryngology graders viewed the videos and rated adenoid hypertrophy from Grade 1 to 4: Grade 1—not touching eustachian tube cushion, Grade 2—touching eustachian tube cushion, Grade 3—touching vomer, or Grade 4—touching palate at rest. The inter-tester reliability of the grading system was determined by kappa correlation coefficient. **RESULTS:** Kappa correlation coefficient (K) for intertester reliability was determined to be 0.84. **CONCLUSIONS:** This study proves that the intertester reliability of the proposed adenoid grading system is good (K > 0.8). This suggests that this valid grading system may be of use during flexible endoscopic evaluation of adenoid hypertrophy.

98. Variance in the Results of Intraoperative PTH Determination for Patients with Multiglandular Parathyroid Hyperplasia of Varying Etiology

Phillip K. Pellitteri, DO, Danville, PA
Patrick C. Barth, MD, Danville, PA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the differences in intraoperative PTH determination, according to etiology, for patients with multiglandular parathyroid hyperplasia.

OBJECTIVES: To evaluate the differences encountered with intraoperative PTH testing in patients with multiglandular parathyroid hyperplasia of varying etiology. **STUDY DESIGN:** Retrospective review. **METHODS:** Forty-six patients surgically explored for hyperparathyroidism (HPT) as a result of diffuse hyperplasia of varying etiology represented the study population. Rapid intraoperative PTH testing (IOPTH) was performed in all patients and compared with traditional overnight PTH assay results performed within 1 month postoperatively in all patients. **RESULTS:** There were 27 patients with primary HPT and 16 and 3 patients with secondary and tertiary HPT, respectively. Etiologies for multiple gland disease in primary HPT included: sporadic diffuse four gland hyperplasia (23) and MEN 1 (3). IOPTH results for patients with primary HPT due to multiglandular hyperplasia were as follows: Mean IOPTH PRE (253 pg/ml) POST (48 pg/ml). IOPTH results in patients with diffuse hyperplasia secondary to renal disease did not achieve levels within the upper limit of normal, despite a decline of 50% from baseline, in 10 of 19 patients, all with secondary HPT undergoing initial exploration, mean IOPTH PRE (796 pg/ml) POST (118 pg/ml). All patients re-explored for secondary HPT (6) and 3 patients explored for tertiary HPT exhibited an IOPTH decline to within the normal limit, mean PRE (246 pg/ml), POST (39 pg/ml). All 10 patients initially explored for secondary HPT, were noted to normalize PTH levels within a month postoperatively, mean (45 pg/ml). **CONCLUSIONS:** IOPTH determination is less reliable in biochemically assuring the removal of all hyperfunctional parathyroid tissue in patients initially explored for secondary HPT, in contrast to patients with renal induced HPT undergoing re-exploration. A combination of renal failure induced metabolic changes and the degree to which extensive dissection (initial vs. re-exploration) is required, resulting in a prolonged and delayed degradation of PTH, is postulated as an explanation for this discrepancy.

99. Identification of Previously “Undetectable” Abnormalities of the Bony Labyrinth with CT Measurement

Derk D. Purcell, BS, San Francisco, CA
Nancy Fischbein, MD, San Francisco, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss how standardized measurements on temporal bone CT scan allow for identification of subtle bony abnormalities in a subgroup of patients with SNHL previously believed to have radiologically undetectable abnormalities limited to the membranous labyrinth.

OBJECTIVES: In patients with SNHL, CT scan of the temporal bone identifies inner ear malformations in approximately 25%, while it is grossly normal to qualitative visual inspection in the remaining 75% of the patients. In the latter group, the hearing loss is often attributed to radiologically undetectable abnormalities of the membranous labyrinth. However, visual inspection alone is insensitive to detection of subtle bony malformations. To test the hypothesis that there are subtle bony abnormalities of the inner ear in patients with SNHL using standardized measurements of the inner ear. **STUDY DESIGN:** Retrospective blinded review. **METHODS:** Measurements of the cochlea, vestibule, and semicircular canals (SCC's) were made on axial and coronal temporal bone CT scans on fifteen patients with normal hearing and fifteen patients with SNHL and grossly normal temporal bone CT scans. Student's t-test was performed to compare the measurements of the two groups. **RESULTS:** All studies were deemed normal by visual inspection. Surprisingly, there were significant differences in the size of the cochlear lumen, volume of the vestibule, and the dimensions of the SCC's between patients with and without SNHL ($p < 0.05$). **CONCLUSIONS:** As a group, patients with SNHL and "normal CT scan" have significant differences in the dimensions of the inner ear compared with patients with normal hearing. This suggests that these patients have disturbed morphogenesis of both membranous and bony labyrinth. This novel observation has important implications for understanding the etiology of SNHL.

100. Risk Factors for Determining Local Failure Following Intra-Arterial Concomitant Chemoradiation: A Possible Paradigm Shift

Kevin T. Robbins, MD*, Gainesville, FL
Ilana L. Doweck, MD, Haifa, Israel
Sandeep S. Samant, MD, Memphis, TN
Francisco L. Vieira, MD, Memphis, TN
Parvesh A. Kumar, MD, Brunswick, NJ

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should have an appreciation that the more potent effects of chemoradiation, relative to radiation alone, may be associated with different risk factors associated with local failure.

OBJECTIVES: To determine which risk factors (patient-, tumor-, and treatment-related) were associated with local failure (LF) or unsuccessful organ preservation following chemoradiation. **STUDY DESIGN:** Prospective single institutional study. **METHODS:** 240 consecutive patients treated with RADPLAT (intra-arterial cisplatin at 150 mg/m² with concurrent standard radiation therapy to 70Gy) were analyzed. Potential risk factors for local failure (LF) were analyzed. **RESULTS:** Forty patients (16.7%) experienced LF at the primary site. The univariate analysis identified the following risk factors: positive nodes in the neck dissection specimen ($p = .0076$); number of neck levels with clinically positive disease ($p = .019$); and the presence of bilateral neck disease ($p = .029$). The multivariate analysis using logistic regression identified only positive nodes in the neck dissection specimen and the number of neck levels with positive disease to be independently significant ($p = 0.07$ and 0.095 respectively). Contrary to the experience using radiation therapy only, site of disease and T classification were not significantly associated with local disease control. **CONCLUSIONS:** These findings suggest an important biologic relationship, and possible surrogate marker, between the histologic findings of persistent cancer in the nodes and the likelihood for disease control at the primary site. This data suggests that the more potent effects of chemoradiation using intra-arterial cisplatin, relative to radiation therapy alone, render such traditional risk factors as site of disease and T classification, less relevant in determining patient suitability for the RADPLAT organ preservation approach.

101. Functional MR Imaging of Activation in Subcortical Auditory Pathway

Peter S. Roland, MD*, Dallas, TX
Zerrin F. Yetkin, MD, Dallas, TX
Dianne B. Mendelsohn, MD, Dallas, TX
Phillip D. Purdy, MD, Dallas, TX

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the use of functional MR imaging in the evaluation of cortical and subcortical function in the auditory system.

OBJECTIVES: Invasive techniques have long been used to investigate both cortical and subcortical function in the auditory system of animals but these techniques are not appropriate for investigations using human subjects. The development of noninvasive techniques to evaluate human auditory system functioning has the potential to delineate the role of cortical and subcortical auditory pathways in a variety of abnormalities such as hearing loss, tinnitus, auditory agnosia, and hyperacusis. Despite the consistent detection of auditory cortex activation in neuroimaging studies, assessment of activation in subcortical auditory structures has been challenging. The aim of this study was to evaluate subcortical auditory pathway activation evoked by pure-tones using silent functional MR imaging. **STUDY DESIGN:** Prospective analysis. **METHODS:** Thirteen normal-hearing volunteers (5 male, 8 female, age range: 14-31 yrs.) underwent silent functional MR imaging. An audiometer was used to deliver pure-tones of 1000 Hz to the left ear. Pure-tones were presented at hearing thresholds determined in the scanner. Regions of brain showing increased activation during pure-tone stimulus presentation were mapped using cross-correlation analysis. Regions of activation exceeding $p < 0.0001$ were included in the analysis. **RESULTS:** Pure-tone stimulus evoked activation in cortical regions of bilateral transverse and superior temporal gyri, and planum temporale. Activation in subcortical structures comprised medial geniculate body in all subjects, inferior colliculus in eight, and ipsilateral cochlear nucleus in eight. **CONCLUSIONS:** Silent functional MR imaging findings documented the feasibility of detecting activation elicited by pure-tone along the cortical and subcortical auditory pathway. The use of this technique in the assessment of disorders with auditory dysfunction merits further investigation.

102. Quantitative Outcomes Analysis of Fungal DNA in Chronic Rhinosinusitis

Michael C. Scheuller, MD, San Francisco, CA
Anil K. Lalwani, MD*, San Francisco, CA
Anand N. Mhatre, PhD, San Francisco, CA
Andrew N. Goldberg, MD, San Francisco, CA
Andrew H. Murr, MD, San Francisco, CA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to understand the relationship of the quantity of fungus present in one's sinonasal cavity with one's development of chronic rhinosinusitis.

OBJECTIVES: Fungi have been recognized as important pathogens in sinusitis, however, they are equally present in patients with and without sinusitis. We postulate that it is the quantity of fungal DNA in the nose that is determinant of disease and is greater in patients with chronic rhinosinusitis (CRS) and is directly correlated to their quality of life (QOL). **STUDY DESIGN:** Quantitative PCR outcomes analysis. **METHODS:** Endoscopically-guided middle meatus

mucosal samples were collected from patients with CRS and in normal controls. Fungal specific PCR was performed on each sample. Every fungal positive sample underwent fungal specific quantitative PCR analysis. Objective QOL data was collected using 3 validated questionnaires: Medical Outcomes Survey Short-Form (SF-36), Sinonasal Outcomes Test (SNOT-20), and the Guy Marks' Asthma Questionnaire (GMAQ). Statistical analysis was used to correlate fungal DNA quantities with outcomes indices between groups. **RESULTS:** Four of 19 (21.1%) CRS patients and 7 of 19 (36.8%) normal controls were positive for fungal DNA using PCR. The median relative quantity of fungal DNA to human DNA for CRS and control samples was 0.13 using quantitative PCR. Patients with CRS had a mean SNOT-20 index of 32.0 as compared with the normal control SNOT-20 index of 17.3 ($p < 0.01$). There were no statistical differences between the groups' indices for the SF-36 or GMAQ outcomes questionnaires. **CONCLUSIONS:** The quantity of fungal DNA in the middle meatus did not differ in patients with and without CRS and was not correlated with QOL outcomes. Therefore, the quantity of fungi does not explain pathogenicity in patients with CRS.

103. Office Based Transnasal Pharyngolaryngoesophagoscopy: Staging Endoscopy for Head and Neck Cancer Patients

Christopher R. Siemens, MD, Norfolk, VA
J. Trad Wadsworth, MD, Norfolk, VA
Daniel W. Karakla, MD, FACS, Norfolk, VA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the role of transnasal pharyngolaryngoesophagoscopy (TNPLE) as it relates to staging endoscopy of patient with mucosal head and neck malignancy.

OBJECTIVES: Describe our initial experience with office based TNPLE in patients with mucosal head and neck malignancy and compare it to panendoscopy. **STUDY DESIGN:** Prospective, non-randomized. **METHODS:** Patients with known or suspected first primary mucosal head and neck malignancy were staged using office based TNPLE, CT scan of the neck, and chest x-ray or CT scan of the chest. All patients then underwent traditional panendoscopy. **RESULTS:** Seventeen consecutive patients with known or presumed mucosal head and neck malignancy were enrolled. One patient subsequently refused panendoscopy. Of the remaining 16 patients, 12 (75%) were able to complete TNPLE. Of the 4 that were aborted, one was due to a tight nasal vault, one was due to marginal airway from a T3 lesion of the glottis, and two were due to limited scope mobility and strong gag in patients with a T4 lesion of the oropharynx and a T4 lesion of the base of tongue. Four (25%) patients were biopsied via the scope; one glottic, two supraglottic, and one base of tongue, all yielding squamous cell carcinoma. There were no immediate complications. All 16 patients completed panendoscopy. No synchronous primary malignancies were identified on either TNPLE or panendoscopy. There were 4 (33%) T1, 3 (25%) T2, 3 (25%) T3, and 2 (17%) T4 lesions in our study population. Staging at the time of TNPLE did not change after panendoscopy. **CONCLUSIONS:** In select patients, office based TNPLE is a safe and effective alternative for staging endoscopy in patients with mucosal head and neck malignancy.

104. The Success of Multiple, Sequential Free Tissue Transfers to the Head and Neck

Mark A. Varvares, MD, Boston, MA
Tessa A. Hadlock, MD, Boston, MA
Babek Azzizadeh, MD, Boston, MA
Richard E. Gliklich, MD, Boston, MA
Mark F. Rounds, MD, Boston, MA
James Rocco, MD, PhD, Boston, MA

EDUCATIONAL OBJECTIVE: At the conclusion of this presentation, the participants should be able to discuss the overall success rate of free tissue transfer in patients who undergo more than one free tissue transfer procedure and identify pitfalls encountered in this population.

OBJECTIVES: Free tissue transfer has become the primary reconstructive modality for significant ablative defects in the head and neck. The overall success rate is high, approaching 95% in most centers. The success rate of multiple sequential free flaps has been thought to be lower, based upon the absence of optimal vessel availability, and the presence of significant scar tissue in the previously operated patient. We evaluated a series of patients who underwent multiple free flaps at different time points to determine the overall success rate, and to identify pitfalls encountered in this population. **STUDY DESIGN:** Retrospective review, tertiary care medical center. **METHODS:** Chart review. **RESULTS:** From 1995 to 2001, 327 free flaps were performed by our reconstructive service. Of these cases adequate data were available on 265 patients, encompassing 305 free flap procedures. Of this group, 33 underwent multiple free flaps at different time points. Twenty-nine had 2 flaps, 3 had 3 flaps and one patient had 4 flaps. Reasons for performing sequential free flap procedures were as follows: recurrent disease/new primary (15), need for further augmentation (12), and failed previous flap (7). Some patients had more than 1 reason for multiple flap transfer. The overall failure rate on the second, third and fourth flap was 2/29, 0/3 and 0/1 respectively, not significantly different than this institution's failure rate for initial free flap procedures. **CONCLUSIONS:** Multiple, sequential free tissue transfer for reconstruction of head and neck defects is a safe and reliable procedure with success rates equal to that in patients undergoing initial free flap reconstruction. Careful preoperative planning can result in optimal outcomes even in this difficult patient population.